DYES CLASSIFIED BY INTERMEDIATES

Dyes tabularly arranged under each intermediate, with statistical and other data for both dyes and intermediates. Glossary of Dye and Intermediate names alphabetically arranged.

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PREFACE

Experience in the manufacture of dyes indicates that the proper viewpoint for a correct technical program is from the intermediate side. This is a direct corollary of the fact that the intermediates are the materials out of which dyes are fabricated. Furthermore, the tremendous complexity of the dye industry, the interrelationship of one dye to another or of one intermediate to another, as well as the relationship of dyes and intermediates to the whole organic chemical industry, all require that there be available tables showing the commercial dyes derived from each important intermediate. To give this is the prime object of this work.

It is believed that this book will be of service not only to manufacturers in looking for uses of any intermediate, but to research chemists and to students. Since the tables give the various outlets and the poundage imported and manufactured, the book will aid the merchant in the buying or selling of dyes and intermediates. The very complete glossary of names, both of dyes and intermediates, will help in many directions, especially as the intermediate part includes the so-called common or trivial names. This feature will be of great service in reading the older literature and patents.

The intermediate names are alphabetically arranged. Under each principal name is given the synonyms, which are also cross-indexed in their alphabetical order. A special feature is the giving of the name used by Chemical Abstracts; this, together with the listing of the principal formulas, will aid in the use of the Chemical Abstracts by the Dye Chemist.

A Formula Index to the names of the intermediates and to the pages is given following the main part of this book containing the alphabetical treatment of the intermediates. Here the formulas of the intermediates are listed in an alphabetical order as in a dictionary, except that CH comes first; and in this way a 5-atom formula may precede a 3-atom one. This is similar to the excellent formula index of the 1920 Chemical Abstracts.

After the writer had been engaged for some time in the preparation of this book, he was informed of a somewhat similar classification undertaken by Messrs. Warren N. Watson and A. R. Willis of the Tariff Commission, Washington, D.C. It was deemed fair to coöper-

ate and to associate the two works by the mutual use of the other names as "collaborators." Messrs. Watson and Willis have published a part of their work, comprising about a third of the Schultz dyes, in the *Color Trade Journal* serially from May to September during 1921. This serial publication by Messrs. Watson and Willis and this book by the writer are separate and independent productions. The writer, however, takes this occasion to express his appreciation for advice and help to Messrs. Watson and Willis.

It is a pleasure to acknowledge help from Dr. Austin M. Patterson on the Chemical Abstracts nomenclature. Aid has also been rendered by J. R. Minevitch, M. N. Conklin and Oscar Newman. The statistical data are taken from the yearly *Census of Dyes and Coal Tar Chemicals* compiled by the U. S. Tariff Commission, and from *Artificial Dyestuffs Used in the United States* by Thomas H. Norton.

R. NORRIS SHREVE.

NEW YORK CITY
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ABBREVIATIONS

Dye Application Column

A	Acid dye
ACr	Acid chrome dye
B	Basic dye
CL	Color lake
D	Direct dye
MF	Color made on fiber
M	Mordant dye
S	Sulfur dye
ss	Spirit soluble dye
V	Vat dye

Statistics Column

I '14	Imports, Fiscal Year 1914 (year ending June 30, 1914)
I '20	Imports, Calendar Year 1920
M'17 M'18 M'19 M'20	Manufactured in Calendar Year 1917, 1918, 1919, or 1920

Literature References

BARNETT, ANTHRACENE AND ANTHRAQUINONE
E. de Barry Barnett, Anthracene and Anthraquinone, 1921. D. Van Nostrand & Co.

BEIL.
Beilstein, Handbuch der organischen Chemie (3rd Ed.).

BER.
Berichte der Deutschen Chemischen Gesellschaft.

CAIN, INTERMEDIATE PRODUCTS
J. C. Cain, The Manufacture of Intermediate Products for Dyes, Second Edition 1919, Macmillan & Co.

FRDL.
P. Friedlaender, Fortschritte der Teerfarbenfabrikation, 1877–1916, 12 vols., Julius Springer.

GREEN, ORGANIC COLORING MATTERS
A. G. Green, A Systematic Survey of the Organic Colouring Matters, 1908 Edition, Macmillan & Co.

GEORGIEVICS AND GRANDMOUGIN, DYE CHEMISTRY
G. von Georgievics and E. Grandmougin, translated by F. A. Mason. A Textbook of Dye Chemistry, 1920. Scott Greenwood & Son.

HEUMANN, ANILINFARBEN
K. Heumann (Fourth part edited by G. Schultz), Die Anilinfarben und ihre Fabrikation, Four Parts, 1888–1906, Friedrich Viewig.

LANGE, SCHWEFELFARBSTOFFE
Otto Lange, Die Schwefelfarbstoffe, ihre Herstellung und Verwendung, 1912, Otto Spamer.

LANGE, ZWISCHENPRODUKTE
Otto Lange, Die Zwischenprodukte der Teerfarbenfabrikation, 1920, Otto Spamer.

THORPE, DIC. CHEMISTRY
Edw. Thorpe, A Dictionary of Applied Chemistry, First Edition, Longmans Green & Co.

ULLMANN, ENZY. TECH. CHEMIE
Enzyklopaedie der technischen Chemie, Edited by Dr. Fritz Ullmann, 1914. Urban & Schwarzenberg.

Miscellaneous

o	ortho
m	meta
p	para
α	alpha
β	beta
N	Nitrogen (*signifies nitrogen attachment of radical*)
C. A. nomen. . .	Chemical Abstracts nomenclature
(mols)	Molecules
Schultz Number .	Number for dye as given in Schultz, Farbstofftabellen, 1914 Edition.

INTRODUCTION

The contents of this book fall into two parts: first, an alphabetical list of intermediates with their data and dye tables, and second, an aphabetical list of dye names referring to their Schultz numbers when known, by which any dye here classified can be found in the tables by looking in the "Page Index of Schultz Numbers" at the end of the book for the appropriate pages.

Often an intermediate is known by as many as half a dozen names, and each one is listed in its alphabetical order, but the synonyms all refer to one name under which are arranged the tables and other data. Thus the book is a glossary of intermediate names. In selecting the name given at the head of the data for a certain intermediate, the writer was influenced first by considerations of clearness and then of custom and usage. For a full discussion of this important nomenclature question, reference is made to the nomenclature section of this introduction.

Following the synonyms, is given the structural formula, the empirical formula, and the molecular weight. It is the emphatic opinion of the writer that the indexing of organic compounds by their formulas is the simplest, the most universal, and the clearest. Chemical Abstracts, starting with 1920, has inserted a formula index, and it is believed that chemists can find a given intermediate quicker and more surely in Chemical Abstracts by the use of this formula index than by the ordinary subject index. The formulas given here will be an aid in this direction. Furthermore a formula index is included in this book.

Under each intermediate there is listed a short description of methods of *Formation* followed by *Literature References*. These are not exhaustive in any sense, but the aim has been to give the usual commercial preparation together with several references to the literature for any one who desires more details. The references to Lange, Zwischenprodukte, cover the German patents.

In order to give some basis for judging the extent to which a dye or an intermediate is used, the statistical data for importation and manufacture in the United States is given under *Statistics*. These data are taken from the following government reports: *Census of Dyes and Coal-Tar Chemicals*, by U. S. Tariff Commission; *Artificial Dyestuffs Used in the U. S.*, by Thomas H. Norton, and *Chemicals and Allied Products*

Used in the U. S. by E. R. Pickrell. The *Imports 1914* both under intermediates and under dyes refer to the imports for the fiscal year ending June 30, 1914. Otherwise the imports, and always the amounts manufactured, refer to the calendar year marked. It is believed that the addition of these statistical data to the tables will be of much service in pointing out forcibly the relative commercial importance of the dyes and intermediates, and will help to complete development of the dye industry in America. In considering these statistics, it must be borne in mind that since 1914 the United States has been endeavoring to fully supply her own needs, and proceeded naturally along the lines of least resistance, so that often a dye was manufactured because of its comparative simplicity, to be later superseded by a more suitable dye of more complexity. The Imports for 1914 (fiscal year ending June 30, 1914) are "normal" except that Vat Dyes were not imported as heavily that year as had been the usual case.

The statistics of import of a dye, especially for the fiscal year ending June 30, 1914, often include a number of very similar though not identical dyes. These statistics were obtained by adding together the individual dye weights as listed by Norton under a given Schultz number.

Where *I'14, M'19, Manufactured 1919*, etc., are given followed by a question mark, it indicates that the dye or intermediate was imported or manufactured for the year marked but in amounts that have not been disclosed by the U. S. Government.

When a figure is given for imports or manufactures of dyes or intermediates, this figure always refers to pounds.

The tables proper give for any intermediate all the dyes listed in Schultz, *Farbstofftabellen*, 1914 Edition, that are derived from this intermediate. This includes practically all of the important dyes except a few of the newer ones of undisclosed constitution. Thus a given dye is separately arranged under each of its intermediates. As there is named in a special column the *Other Intermediates* constituting a dye besides the one at the head of each table, the intermediate relationship is clearly stated.

The following dyes listed in Schultz, *Farbstofftabellen* (1914), are not classified, on account of lack of information as to their composition.

30	Radial Yellow G	706	Cachou de Laval
87	Peri Wool Blue	707	Sulfine Brown
608	Euchrysine	708	Sulfaniline Brown
609	Homophosphine G	744	Sulfo Black B, 2B

751	Krygene Brown RB	756	Kryogene Black TGO
752	Kryogene Direct Blue GO	757	Sulfogene Brown G, D
753	Kryogene Direct Blue B	863	Anthraquinone Blue Green B XO
754	Kryogene Direct Blue 3B	871	Indanthrene Violet RN Extra
755	Kryogene Black BNX		

In very many cases, the writer has supplemented the information in Schultz, *Farbstofftabellen*, as to composition of dyes, and hence has been able to classify many dyes whose composition is indefinite in this book. In a number of instances when Schultz refers the dyes to complex intermediates, these have been split into simpler components, and the components as well as the complex parent compound have all been indexed. Also certain obvious errors in Schultz, *Farbstofftabellen*, have been corrected, as for example, where in #182, reference is made to 1-amino-4-naphthol-sulfonic acids which the patent refers to α_1: α_4-sulfonic acids (1-amino-8-naphthol-sulfonic acids) and specifically names H acid in the example given.

When the patents describing a dye list a number of intermediates, then those listed under Example I of the patent are chosen for classification unless, of course, Schultz, *Farbstofftabellen*, gives definite composition to the dye. Quite often intermediates are indexed even though not a component part of the final dye, provided they were necessary to its manufacture, e.g. benzoic acid in the manufacture of certain of the Triphenyl-methane Dyes as Diphenylamine Blue and Aniline Blue.

All possible intermediates for any given dye are not indexed, but it is hoped to extend the present classification at a later date. Previous tables resembling those given here, but along much less extensive lines, are to be found in Heumann, *Die Anilinfarben und ihre Fabrikation* IV, II, 2, pages 1943–2013, and Lefevre, *Traité des Matières Colorantes* (1896), pages 140–407.

In the column in the tables headed *Other Intermediates Used and Notes*, there is given first the intermediates other than the one at the head of the table, which compose the dye in question. Unless otherwise marked, it is to be understood that one molecule of an intermediate is used. When more than one molecule is employed, of the intermediate heading the table, then the name of this intermediate is also given in the *Other Intermediates* column followed by the number of molecules (mols) that are used in the dye.

The notes are in brackets, and are mostly self-explanatory, and refer chiefly to constituents, such as sulfur (S), sodium sulfide (Na_2S), and the like, which enter into the formation of the dye. Such steps as

Sulfonation, Bromination, and Chlorination are given, but Coupling by Diazotization and Condensation are to be understood.

Under notes is generally listed the name of a given dye if it is a step in the preparation of the dye classified in the table, but this component dye is not used as the index or heading for any of the dye classification tables, and this fact is indicated by placing the name of the component dye in a bracket.

Indigo is an exception, and the dyes based on it are tabulated thereunder as well as under the various component intermediates.

The last column in the tables classifies the dyes by their usual method of application as indicated by the following abbreviations.

A	Acid dye
ACr	Acid chrome dye
B	Basic dye
CL	Color lake
D	Direct dye
MF	Color made on fiber
M	Mordant dye
S	Sulfur dye
ss	Spirit soluble dye
V	Vat dye

A classification of this kind is not very exact in certain cases where a dye is susceptible of several different methods of application. The aim has been to give the mode of application most generally employed.

Regarding the naming of the dyes, there is used in the tables that name first given in Schultz, *Farbstofftabellen* (1914), followed by a second name in those cases where the second name is more generally used in the United States than the first Schultz name.

A glossary of the ordinary German and Swiss names, together with many of the American and English names, is given in the back of the book. It would have been very helpful to have added to this list all the current American and English marks, but in the present development stage of the American dye industry, this turned out to be impractical. The list as given includes those listed and classified by Norton in *Artificial Dyestuffs Used in U. S.*, with various corrections and a considerable number of additions. These names refer to "Schultz" numbers where known, and as the last few pages of the book give a list of the pages on which occur references to any "Schultz" number, the place of any dye of known constitution can be readily found, together with the data regarding that dye.

In the tables, the dyes are classified under the usual constitutional headings, which are here grouped in the following list:

Nitroso Dyes
Nitro Dyes
Stilbene Dyes
Pyrazolone Dyes
Monoazo Dyes
Disazo Dyes
Trisazo Dyes
Tetrakisazo Dyes
Auramines
Triphenyl-methane Dyes
Diphenyl-naphthyl-methane Dyes
Xanthone Dyes
Acridine Dyes
Quinoline Dyes
Thiobenzenyl Dyes
Indophenol
Oxazine Dyes
Thiazine Dyes
Azine Dyes
Sulfur Dyes
Anthraquinone and Allied Dyes
Indigo Group Dyes
Aniline Black Group

NOMENCLATURE

The scientific naming of intermediates has indeed been confused, and in many instances a number of names have been used for the same compound, or the same name for several different compounds. It has been the aim of this book to give the various names met with in the literature for the intermediates, and to cross-index these names in the alphabetical arrangement,—thus giving a glossary of intermediate names for all those common intermediates here considered. Furthermore the common or trivial names are listed in a very complete manner and include the trivial names for many intermediates not specially considered here. As mentioned before, there has been chosen for the principal name from among the various synonyms that name which is clear and which is sanctioned by custom. In so choosing, the tendency has been to adopt a few of the well-known trivial or common names,

such as H Acid and Nevile-Winther's Acid, in place of the strictly chemical names; for the writer's experience is that dye men, whether in the research laboratory, the factory, or the office, speak of H Acid for example, and not 1-amino-8-naphthol-3: 6-disulfonic acid.

The most scientific nomenclature is that used by Chemical Abstracts of the American Chemical Society. This is fully explained in the Introduction to Decennial Index of Chemical Abstracts, as well as in the Journal of the American Chemical Society.[1]

It, however, offers the disadvantage of requiring considerable study to master its principles, which often vary from the practice of the dye industry, and furthermore there is comparatively little literature pertaining to dyes and intermediates in the years covered by Chemical Abstracts.

On the other hand, organic chemistry is now so complex that more attention must be paid to scientific naming of organic compounds, and also the amount of dye literature contained in Chemical Abstracts is increasing yearly, so that it is to the advantage of the dye chemist to familiarize himself with the procedure of Chemical Abstracts, and it cannot be too strongly recommended that every one make a study of the principles of Chemical Abstracts nomenclature as disclosed in the references given above.

This book aims to give the Chemical Abstracts name for each intermediate; and in the many cases where this name differs from the one in common use, this Chemical Abstracts name is so designated by being marked *C. A. nomen.*, as an abbreviation for Chemical Abstracts Nomenclature. If only one name is listed, it is to be understood that this is the one sanctioned by Chemical Abstracts.

Beginning with the 1920 volumes of Chemical Abstracts, a Formula Index is included, which offers the easiest way to find reference to a chemical compound or its nomenclature.

In case of many benzene derivatives, the writer has adopted the Chemical Abstracts nomenclature, as there is considerable confusion in the literature regarding these names, and as the Chemical Abstracts procedure does not vary greatly as a rule from well-recognized practice. However, in case of many of the naphthalene derivatives the Chemical Abstracts practice is so far from what is commonly used that the Chemical Abstracts names are only given as synonyms. The men responsible for Chemical Abstracts are showing a great willingness to bring their

[1] Patterson and Curran, J. Amer. Chem. Soc. **39**, 1623-38 (1917).

system as near to that used in practice as possible, and in all probability the near future will show closer accord.

The very common use of more than one of the terms *ortho*, *meta*, and *para*, to indicate position of substituents, is very confusing and should be dropped in preference either to the procedure of Chemical Abstracts where one such term is used in connection with numbers, or to the use of numbers alone. For example, *m-nitro-p-toluidine* ($CH_3=1$) and *o-amino-phenol-p-sulfonic acid* should be replaced by *2-nitro-p-toluidine* ($NH_2=1$) and *2-amino-1-phenol-4-sulfonic acid*, the present Chemical Abstracts usage. In the former case the writer much prefers the name *1-amino-2-nitro-4-toluene*.

Chemical Abstracts uses *p-toluidine* ($NH_2=1$) and *p-phenylene-diamine* and the like as "index compounds" with the various substituents as modifiers, arranged in an inverted order in their indices. In this book the practice of Chemical Abstracts in this regard is followed, except for the inversion for the principal name of the intermediate. The other names are given as synonyms and cross-indexed. However, in the body of the tables, such terms as *o-amino-phenol-p-sulfonic acid* are used in a few cases because of their very common usage, and consequent quick recognition.

Treating the matter broadly, the gist of the Chemical Abstracts nomenclature practice is that the "chief function" of a compound is expressed in the main part of the name, which with "its functional ending, if any, is placed first in the index, the names of the substituents following." The numbering starts from the "chief function" and is not varied by the addition of substituents, for instance,—*2: 7-naphthalene-sulfonic acid* is an "index compound," as is likewise *1 naphthalene-sulfonic acid;* and their amino, halogen, and nitro derivatives are indexed thereunder. For instance, Laurent's Acid or what is ordinarily called *1-naphthylamine-5-sulfonic acid* is indexed by Chemical Abstracts under *1-naphthalene-sulfonic acid*, and called *5-amino-1-naphthalene-sulfonic acid*. In the decennial index, hydroxy was also considered as a substituent.

However, *naphthol-sulfonic acids* and *phenol-sulfonic acids* are now recognized by Chemical Abstracts as exceptions to their rule of assigning the chief function to acids, and of allowing only one functional ending in the index name. So that while in the decennial index these *-ol-sulfonic acids* had their numbering start with the sulfonic group, now the numbering begins with the hydroxyl. For example, *1-naphthol-4-sulfonic acid* and *1-naphthol-3: 6-disulfonic acid*. In case of *amino- nitro-*

chloro- derivatives and the like, the positions are referred to the set numbering of the index compound. Take H Acid,—this is viewed as a derivative of index compound *1-naphthol-3: 6-disulfonic acid* by Chemical Abstracts, and is named in their index as *8-amino-1-naphthol-3: 6-disulfonic acid*, or in their inverted form as *1-naphthol-3: 6-disulfonic acid, 8-amino-*.

This numbering is quite different from the ordinary numbering of *1-amino-8-naphthol-3: 6-disulfonic acid* for H Acid. The giving in this book of both nomenclatures will help in the using of Chemical Abstracts, and as a further aid in this direction the first letter of the index compound as employed in Chemical Abstracts is italicized.

The rule of Chemical Abstracts regarding arrangement of substituents, reads as follows:—"The names of substituent radicals in the name of a compound are arranged in alphabetical order." This is an excellent practice and should be universally adopted. In conformance with this, benzyl-ethyl-aniline is recommended, and not ethyl-benzyl-aniline.

In the naming of toluene derivatives, the usual custom has been to start numbering from the CH_3 group irrespective of other substituents. In Chemical Abstracts, the numbering starts from the chief function, and the order of the chief function is: "*onium compounds, acid* (carboxylic first), *acid halide, amide, imide, aldehyde, nitrile, ketone, alcohol, phenol, mercaptan, amine, imine, ether, sulfide* (and *sulfoxide* and *sulfone*)." So whenever sulfonic acid is present, the start of the numbering is with this group, except that the carboxylic group, being an acid radical, is of same order as sulfonic, and has been given precedence over the sulfonic radical. Instead of *toluidine-sulfonic acid* with the numbering based on the CH_3, Chemical Abstracts uses *amino-o-* (or *m-* or *p-*) *toluene-sulfonic acid* and starts the numbering with the sulfonic acid group. *Toluidines* start their numbering from the NH_2 group, as it has precedence over CH_3. Another divergence of the Chemical Abstracts practice from the ordinary numbering is the place of the numbers or letters in such terms as the following:

Ordinary Practice	Chemical Abstracts Practice
Naphthalene-2: 7-disulfonic Acid	2: 7-Naphthalenedisulfonic Acid
Toluene-*p*-sulfonic Acid	*p*-Toluenesulfonic Acid

The custom of using hyphens to set off radicals and substituents from each other and from the parent compound is extensively used in this book for the sake of clearness, and as an aid to the eye and the mind. No one thinks of a complex organic chemical as a whole, but as a com-

plex of various substituents around a central body; therefore the writing of a long name like tetramethyldiaminodiphenymethane as one word is very reprehensible and should be early abandoned. Otherwise the careless practice of writing as two or more separate words the name of one chemical individual is bound to increase; already this latter practice is gaining too much headway, as can be seen by an inspection of our trade or semi-technical journals.

The rule about hyphens as used here is to insert them between all radicals, and between the radicals and the parent body, except in the case of compound radicals, such as *methylamino-* (CH_3NH-), *tetraethyl-*, *disulfonic-* and the like. *Methylamino* should not be written *methyl-amino*. While Chemical Abstracts does not employ hyphens in this broad way, yet the use of hyphens has been extended to the names otherwise following Chemical Abstracts procedure.

It is clearly recognized that the nomenclature here used is not always consistent as between the scientific and common usage. For example while *2-amino-1-phenol-4-sulfonic acid* is listed as the principal name of this intermediate, yet in the body of the tables the ordinarily used synonym *o-amino-phenol-p-sulfonic acid* is given because of its quick recognition. However, the movement to a more scientific nomenclature such as used by Chemical Abstracts should be encouraged as much as possible, and such terms as *o-amino-phenol-p-sulfonic acid* should be dropped gradually.

PART I

INTERMEDIATES

KEY TO PART I INTERMEDIATES AND DYE TABLES

The arrangement is alphabetical not only by chemical but by trivial or common names. Many trivial names are listed for intermediates which are not further considered. Dye tables and other data accompany those intermediates which enter directly into the formation of the commonly used dyes.

Synonyms and trivial names are given for the intermediates, and these synonyms and trivial names are listed not only under the appropriate intermediate but also separately in the alphabetical arrangement.

That chemical name called for by the Chemical Abstracts nomenclature is to be found either as the principal name of each intermediate or among its synonyms. This is distinguished by being followed by the abbreviation *C. A. nomen.*, except when only one name is used for an intermediate, in which case this name is the one in common usage and is also that one sanctioned by Chemical Abstracts. In the indices of Chemical Abstracts the names are alphabetically arranged under a number of "parent compounds" which in ordinary usage are preceded by the modifying radicals. As this book follows the ordinary usage, it was thought that it would be helpful to designate the Chemical Abstracts "parent compound," which is done by italicizing the first letter of these "parent compounds" in those names following Chemical Abstracts nomenclature.

The prefixes *m-*, *o-*, *p-*, *α-*, *β-* and the like are not considered in the main alphabetical arrangement. Hence *β*-naphthol (beta-naphthol) is to be found under N.

The import statistics are not for each strictly individual dye mark, but represent a group identical to or closely resembling a given Schultz dye. These figures are arrived at by adding the total poundage of these dyes arranged by Norton under each Schultz number in his book, *Artificial Dyestuffs Used in U. S.*

Unless otherwise marked, it is to be understood that only one molecule of each intermediate is a part of a dye. Furthermore, when more than one molecule is employed of the intermediate heading a dye table, the name of this intermediate is entered under the *Other Intermediates* column followed by the number of molecules involved.

A fuller consideration of these principles is to be found in the Introduction. See also abbreviations on page 5.

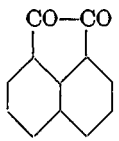
The intermediates are arranged alphabetically by their chemical names and by their trivial or common names, and they are accompanied by the dye tables and other data. See Introduction, or page 18, for explanation of this arrangement.

A Acid

1: 7-Dihydroxy-naphthalene-3:6-disulfonic Acid (*not considered herein*)

Acenaphthenequinone (*C. A. nomen.*)

7: 8-Diketo-acenaphthene



$= C_{12}H_6O_2 = 182$

FORMATION.—From acenaphthene by oxidation

LITERATURE.—Cain, Intermediate Products (2d Ed.), 242

Dyes Derived from Acenaphthenequinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
907	Ciba Scarlet G	I '11.—22,265 I '20:—25,578	2-Hydroxy-thionaphthene	V
908	Ciba Red R	I '14:— 1,001	2-Hydroxy-thionaphthene [Bromination]	V
911	Ciba Orange G	I' 14:— 222	5-Amino-2-hydroxy-thionaphthene	V

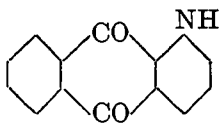
3-Acenaphthenol (*C. A. nomen.*)

See, 3-Hydroxy-acenaphthene

8-Acetamido-5-amino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)

See, Acetyl-1:4-naphthylene-diamine-6-sulfonic Acid

1-Acetamido-anthraquinone



$= C_{16}H_{11}NO_3 = 265$

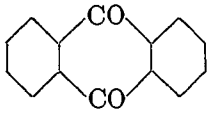
FORMATION.—From 1-amino-anthraquinone by action of acetic an hydride on solution in oleum

LITERATURE.—Lange, Zwischenprodukte, #3124

Dyes Derived from 1-Acetamido-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
813	Indanthrene Copper R	I '14:—1,268	1:6- (*or* 1:7-) Diacetamido-anthraquinone	V

2-Acetamido-anthraquinone



$= C_{16}H_{11}NO_3 = 265$

FORMATION.—From 2-amino-anthraquinone by action of acetic an hydride on oleum solution

LITERATURE.—Lange, Zwischenprodukte, #3124

Dyes Derived from 2-Acetamido-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
812	Indanthrene Orange R T	I '14:—2,103 I '20:— 381	1:6- (*or* 1:7-) Diacetamido-anthraquinone	V

8-Acetamido-1-naphthol-3: 6-disulfonic Acid

See, Acetyl-H Acid

Acetanilide

$= C_8H_9NO = 135$

STATISTICS.—Manufactured 1917:—1,897,703 lbs.
Manufactured 1918:—2,085,088 lbs.
Manufactured 1919:—1,934,125 lbs.
Manufactured 1920:—2,667,252 lbs.

FORMATION.—By heating aniline with glacial acetic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 52
Lange, Zwischenprodukte, #117

USES.—For preparation of *p*-nitro-acetanilide, and for *p*-nitro-aniline

Aceto-acetic Ethyl Ester

$CH_3 . CO . CH_2 . CO . OC_2H_5 = C_6H_{10}O_3 = 130$

FORMATION.—By the reaction of dry sodium ethylate and dry ethyl acetate

Dyes Derived from Aceto-acetic Ethyl Ester

Schult-Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYES			
19	Flavazine L Fast Light Yellow	I '14:—38,908 I '20:— 9,327	Aniline Phenyl-hydrazine-*p*-sulfonic Acid	A
22	Xylene Yellow 3 G	I '14:—23,074 I '20:—77,782	2: 5-Dichloro-phenyl-hydrazine-4-sulfonic Acid	A
25	Dianil Yellow 3 G		Primuline-sulfonic Acid	D
27	Dianil Yellow 2 R		Primuline-sulfonic Acid Phenyl-hydrazine-*p*-sulfonic Acid	D
	ANTHRAQUINONE AND ALLIED DYES			
773	Anthracene Yellow	I '14:— 4,046	Pyrogallol	M

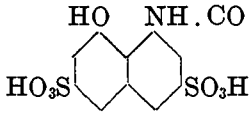
***N*-Acetyl-1-amino-8-naphthol-3: 6-disulfonic Acid**

See, Acetyl-H Acid

Acetyl-H Acid

N-Acetyl-1-amino-8-naphthol-3:6-disulfonic Acid

8-Acetamido-1-*naphthol*-3:6-disulfonic Acid (*C. A. nomen.*)



$= C_{12}H_{11}NO_8S_2 = 361$

STATISTICS.—Manufactured '20:—?

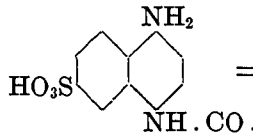
FORMATION.—From H acid by acetylation

Dyes Derived from Acetyl-H Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
42	Amido Naphthol Red G	I '14:— 3,500 M '17:— ? M '18:— ? M '19:— ? M '20:—132,637 I '20:— 2,028	Aniline	A
66	Amido Naphthol Red 6 B	I '14:— 45,697 M '18:— ? M '19:— ? M '20:—142,567 I '20:— 1,299	*p*-Amino-acetanilide	A

Acetyl-1: 4-naphthylene-diamine-6-sulfonic Acid

8-Acetamido-5-amino-2-*naphthalene*-sulfonic Acid (*C. A. nomer*



$= C_{12}H_{12}N_2O_4S = 280$

FORMATION.—From mixture of 1-naphthylamine-6-*and*-7-sulfonic aci (Cleve's Acids) by acetylation with glacial acetic acid, nitrati with mixed acid, and reduction with iron.

LITERATURE.—Georgievics and Grandmougin, Dye Chemistry, 152

Dyes Derived from Acetyl-1: 4-naphthylene-diamine-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
273	Diaminogen Blue BB	I '14:— 8,308	α-Naphthylamine	D
		M '17:— ?	Schaeffer's Acid	
		I '20:— 5,936	[Saponification]	
274	Diaminogen B	I '14:—313,629	α-Naphthylamine	D
		I '20:— 18,120	Gamma Acid	
			[Saponification]	

Acetyl-*p*-phenylenediamine

See, *p*-Amino-acetanilide (*C. A. nomen.*)

***o*-Acid (of Claus and Voltz)**

See, Croceine Acid

1: 2: 4 Acid

See, 1-Amino-2-naphthol-4-sulfonic Acid

β Acid *or* **Beta Acid**

See, Anthraquinone-2-sulfonic Acid

δ Acid *or* **Delta Acid**

See, 1-Naphthylamine-4: 8-disulfonic Acid *and* 2-Naphthylamine-7-sulfonic Acid

ε Acid *or* **Epsilon Acid**

See, 1-Naphthol-3: 8-disulfonic Acid

See, 1-Naphthylamine-3: 8-disulfonic Acid

and 1: 8-Dihydroxy-naphthalene-3-sulfonic Acid (*not considered herein*)

ζ Acid *or* **Zeta Acid**

Naphthasultone-3-sulfonic Acid (*not considered herein*)

λ Acid *or* **Lambda Acid**

See, 1-Naphthylamine-2-sulfonic Acid

μ Acid *or* **Mu Acid**

See, 1-Naphthylamine-6-sulfonic Acid

ρ Acid *or* **Rho Acid**

See, Anthraquinone-1 : 5-disulfonic Acid

χ Acid *or* **Chi Acid**

See, Anthraquinone-1 : 8-disulfonic Acid

Alén's α *or* **Alén's Alpha Acid.** (*This is generally followed by the class of the compound, e.g., Alén's α Naphthylamine-disulfonic Acid*)

See, Freund's Acid (1-Naphthylamine-3 : 6-disulfonic Acid)

1-Nitro-naphthalene-3 : 6-disulfonic Acid (*not considered herein*)

Alén's β *or* **Alén's Beta Acid.** (*Generally followed by the class of the compound, e.g., Alén's β Naphthylamine-disulfonic Acid*)

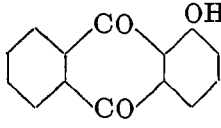
1-Naphthylamine-3 : 7-disulfonic Acid (*not considered herein*)

1-Nitro-naphthalene-3 : 7-disulfonic Acid (*not considered herein*)

Alizarin

1 : 2-Dihydroxy-anthraquinone

α : β-Dihydroxy-anthraquinone



$= C_{14}H_8O_4 = 240$

STATISTICS.—See #778 in following table

FORMATION.—From sodium 2-anthraquinone-sulfonate by fusion with caustic oda for 2–3 days at 200° C., in autoclave, and in presence of potassium chlorate

LITERATURE.—Schultz, Farbstofftabellen (1914 Ed.), #778

Dyes Derived from Alizarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
778	Alizarin	I '14:—202,392 M '17:— ? M '18:— ? M '19:— ? M '20:— ? I '20:— 8,575		M
779	Alizarin Orange	I '14:— 14,239 M '19:— ? M '20:— ? I '20:— 500	[Nitration]	M
780	Alizarin Red	I '14:— 81,919 M '17:— ? I '20:— 12,628	[Sulfonation]	M
781	Erweco Alizarin Acid Red BS		[Sulfonation]	M
783	Purpurin		[Oxidation]	M
787	Alizarin Bordeaux B	I '20:— 20	[Oxidation]	M
788	Alizarin Cyanine R	I '20:— 16,781	[Alizarin Bordeaux B, Oxidation]	M
797	Alizarin Garnet R	I '14:— 720	[1-Nitro-alizarin, Reduction]	M
798	Alizarin Maroon W	I '20:— 2,014	[Crude Nitro-alizarin, Reduction]	M
799	Alizarin Cyanine G	I '20:— 339	[Alizarin Cyanine R, Amidation]	M
854	Alizarin Viridine DG	I '20:— 11,397	[Alizarin Bordeaux B] *p*-Toluidine (2 mols) [Sulfonation]	M
862	Alizarin Blue Black B	I '14:— 54,706 I '20:— 28,802	[Purpurin] Aniline [Sulfonation]	M

Alpha = a

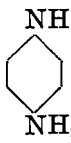
Note.—This is not considered in the alphabetical arrangement, e.g. alpha-Naphthol is indexed as a-Naphthol under "N." However β-Naphthol is placed after a-Naphthol

Alpha-Naphthol

See, a-Naphthol *under N.*

p-Amino-acetanilide (*C. A. nomen.*)

Acetyl-*p*-phenylene-diamine



$=C_8H_{10}N_2O=150$

STATISTICS.—Imported '14:—6,261 lbs.
Manufactured '17:— ?
Manufactured '18:—177,990 lbs.
Manufactured '19:— 62,567 lbs.
Manufactured '20:— 97,275 lbs.

FORMATION.—From *p*-nitro-acetanilide by reduction with iron and acetic acid at not higher than 60° C.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 89
Lange, Zwischenprodukte, #558

Dyes Derived from *p*-Amino-acetanilide

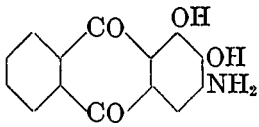
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
61	Victoria Violet	I '14:— 52,365 M '17:— ? M '18:— ? M '19:—105,086 I '20:— 2,082 M '20:— ?	Chromotropic Acid [Saponification]	A
64	Azo Acid Red B Lanafuchsine	I '14:— 78,305 M '17:— ? M '18:— ? M '19:— 15,272 I '20:— 674 M '20:— ?	1-Naphthol-3: 6-disulfonic Acid	A
65	Azo Coralline L	M '17:— ? M '18:— ? M '19:— ? I '20:— 249 M '20:— ?	R Acid	A

Dyes Derived from *p*-Amino-acetanilide (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
66	Amino Naphthol Red 6B	I '14:— 45,697 M '18:— ? M '19:— ? I '20:— 1,299 M '20:—142,567	Acetyl-H Acid	A
67	Chromotrope 6B	I '14:— 2,818 M '17:— ? M '18:— ? M '19:— 77,481 M '20:— ?	Chromotropic Acid	A
	DISAZO DYES			
239	Azotol C		*m*-Phenylene-diamine [Amino-chrysoidine] β-Naphthol	MF
243	Coomassie Wool Black R		α-Naphthylamine Schaeffer's Salt	A
244	Coomassie Wool Black S	M '18:— ? M '19:— ?	α-Naphthylamine R Salt	A
290	Violet Black		Nevile-Winther Acid α-Naphthylamine	D
296	Cotton Yellow G	I '14:— 31,472 I '20:— 4,651	Salicylic Acid (2 mols) *p*-Amino-acetanilide (2 mols) Phosgene	D
	SULFUR DYES			
714	Thiophor Yellow Bronze G		*p*-Phenylene-diamine Benzidine [Sulfur]	S
715	Thiocatechine		[Sulfur]	S

3-Amino-*a*lizarin (*C. A. nomen.*)

β-Amino-alizarin



$= C_{14}H_9NO_4 = 255$

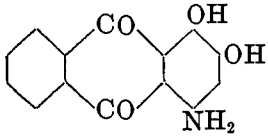
FORMATION.—From 3-nitro-alizarin by reduction.

Dyes Derived from 3-Amino-alizarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
S03	Alizarin Blue WX	I '14:—319,394 M '19:— ? I '20:— 5,585	3-Nitro-alizarin [Glycerol]	M
S04	Alizarin Blue S	I '14:—117,850 I '20:— 43,679	3-Nitro-alizarin [Glycerol]	M
S08	Alizarin Green X	I '14:—135,191 I '20:— 4,254	3-Nitro-alizarin [Glycerol; Oxidation]	M
S09	Alizarin Indigo Blue S		3-Nitro-alizarin [Glycerol; Oxidation]	M

4-Amino-*a*lizarin (*C. A. nomen.*)

α-Amino-alizarin



$= C_{14}H_9NO_4 = 255$

STATISTICS.—See #797 in following table

FORMATION.—From 4-nitro-alizarin by reduction with alkaline sulfides

LITERATURE.—Schultz, Farbstofftabellen (1914 Ed.), #797

Dyes Derived from 4-Amino-alizarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
797	Alizarin Garnet R	I '14:— 720	[This is 4-Amino-alizarin]	M
S05	Alizarin Green S	I '14:— 15,885	[Glycerol]	M

α-Amino-alizarin

See, 4-Amino-*a*lizarin (*C. A. nomen.*)

β-Amino-alizarin

See, 3-Amino-alizarin (*C. A. nomen.*)

2-Amino-5-(*p*-amino-phenyl)-benzene-sulfonic Acid (*C. A. nomen.* $SO_3H=1$)

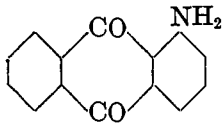
See, Benzidine-sulfonic Acid

***p*-(*p*-Amino-anilino)-phenol** (*C. A. nomen.*)

See, 4-Amino-4′-hydroxy-diphenylamine

1-Amino-anthraquinone (*C. A. nomen.*)

α-Amino-anthraquinone



$=C_{14}H_9NO_2=223$

FORMATION.—(1) From 1-nitro-anthraquinone by reduction with sodium sulfide

(2) From anthraquinone-1-sulfonic acid (potassium salt) by heating with 10 per cent ammonia in an autoclave to 180–190°

LITERATURE.—Ullmann, Enzy. tech. Chemie. **1**, 474

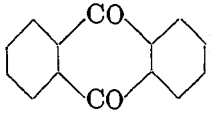
Lange, Zwischenprodukte, #3066, 3109, 3158

Dyes Derived from 1-Amino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
814	Algol Yellow W G	I '14:—5,185 I '20:— 4	Benzoyl chloride	V
824	Algol Orange R	I '14:— 51 I '20:— 406	2-Chloro-anthraquinone	V
826	Indanthrene Red G		2: 6-Dichloro-anthraquinone 1-Amino-anthraquinone (2 mols)	
830	Indanthrene Red R	I '14:—2,099 I '20:—6,595	2: 7-Dichloro-anthraquinone 1-Amino-anthraquinone (2 mols)	V
834	Algol Gray B	I '14:—4,192 I '20:— 840	1-Chloro-anthraquinone [Nitration, Reduction]	V
870	Algol Corinth R	I '20:— 134	2-Chloro-anthraquinone [Nitration, Reduction] Benzoyl chloride	V

2-Amino-anthraquinone (*C. A. nomen.*)

β-Amino-anthraquinone



$= C_{14}H_9NO_2 = 223$

STATISTICS.—Manufactured '19:—?
Manufactured '20:—?

FORMATION.—From sodium anthraquinone-2-sulfonate by heating with ammonia water in an autoclave at 200° C., preferably in the presence of an oxidizing substance

LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 476
Lange, Zwischenprodukte, #3107
Cain, Intermediate Products (2d Ed.), 254

Dyes Derived from 2-Amino-anthraquinone

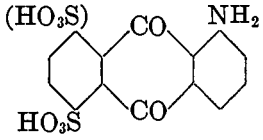
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
810	Helidone Yellow 3 G N	I '14:— 20,744 I '20:— 2,515	2-Amino-anthraquinone (2 mols) Phosgene	V
811	Algol Yellow 3G	I '14:— 1,604 I '20:— 570	2-Amino-anthraquinone (2 mols) [Succinic acid]	V
825	Algol Red B	I '14:— 2,399 I '20:— 4,151	4-Bromo-N-methyl-anthrapyridone	V
837	Indanthrene Blue R	I '14:— 500	2-Amino-anthraquinone (2 mols)	V
838	Indanthrene Blue RS	I '14:—187,379 M '17:— ? I '20:— 16,385 M '20:— ?	2-Amino-anthraquinone (2 mols) [Alkaline Reduction] [*or* Indanthrene Blue R reduced]	V
846	Indanthrene Dark Blue BT		2-Amino-anthraquinone (2 mols) [Glycerol (4 mols)] [*or* Benzanthrone-quinoline (2 mols)]	V

Dyes Derived from 2-Amino-anthraquinone (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
849	Indanthrene Yellow G	I '14:— 75,192 M '19:— ? I '20:— 75,665 M '20:— ?	2-Amino-anthraquinone (2 mols)	V
867	Indanthrene Brown B	I '14:— 6,175 I '20:— 3,511	2-Amino-anthraquinone (2 mols)	V

1: 5- *and* **1: 8-Amino-anthraquinone-sulfonic Acids**

5-*and* 8-Amino-1-anthraquinone-sulfonic Acids (*C. A. nomen*)



$= C_{14}H_9NO_5S = 303$

FORMATION.—Anthraquinone is sulfonated to a mixture of 1: 5-and 1: 8-disulfonic acids, which are then partly amidated by treatment with ammonia

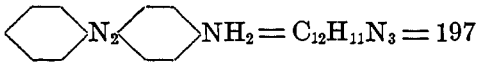
LITERATURE.—Cain, Intermediate Products (2d Ed.), 252
Ullmann, Enzy. tech. Chemie, **1**, 475
Lange, Zwischenprodukte, #3265

Dye Derived from 1: 5- *and* **1: 8-Amino-anthraquinone-sulfonic Acids**

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
851	Alizarin Direct Blue B	I '14:—10,201 I '20:— 2,982	[Dibromination] Aniline [Sulfonation]	A

Amino-azo-benzene

Phenyl-azo-aniline (*C. A. nomen.*)



$= C_{12}H_{11}N_3 = 197$

STATISTICS.—Imported '14:—very small
Manufactured '17:—141,888 lbs.
Manufactured '18:—171,594 lbs.
Manufactured '19:— 82,755 lbs.
Manufactured '20:—152,310 lbs.

FORMATION.—The amino-azo-benzene is prepared from aniline, by molecular rearrangement of diazo-amino-benzene, which in turn is made from aniline and diazo-benzene chloride (diazotized aniline)

LITERATURE.—Cain, Intermediate Products (2d Ed.), 81

Dyes Derived from Amino-azo-benzene

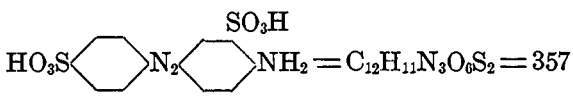
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*		*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES				
31	Amino-azo-benzene	M '17:—	?		ss
	Spirit Yellow	M '18:—	52,283		
		M '19:—	?		
		M '20:—	?		
137	Fast Yellow	I '14:—	37,378	[Oleum]	A
	Acid Yellow	M '17:—	?		
		M '18:—	?		
		I '20:—	7,848		
		M '20:—	?		
	DISAZO DYES				
223	Sudan III	I '14:—	2,409	β-Naphthol	ss
		M '17:—	?		MF
		M '18:—	?		
		M '19:—	?		
		M '20:—	?		
224	Cloth Red G	I '14:—	401	Nevile-Winther Acid	A
		M '19:—	?		
		M '20:—	?		
225	Croceine AZ	I '14:—	500	1-Naphthol-3: 6-disul-	A
		'20:—	100	fonic Acid	
226	Croceine B			1-Naphthol-4: 8-disul- fonic Acid	A

Dyes Derived from Amino-azo-benzene (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
227	Brilliant Croccine M	I '14:—125,137 M '17:— ? M '18:— 84,643 M '19:—157,509 I '20:— 49 M '20:—129,124	G Acid	A
228	Ponceau 5R Erythrine P	I '14:— 2,880 M '17:— ? M '19:— ?	2-Naphthol-3: 6: 8-trisulfonic Acid	A
229	Azo Acid Violet	I '14:— 150 I '20:— 11 M '20:— ?	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	A
279	Benzo Fast Scarlet	I '14:— 36,674 M '19:— ? I '20:— 24,153	J Acid Phosgene	D
	AZINE DYES			
696	Indamine Blue		Aniline (excess)	B
697	Induline (Spirit Soluble)	I '14:— 25,342 M '17:— ? M '18:— 8,589 M '19:—436,201 M '20:—140,400	Aniline (excess)	ss
699	Induline (Water Soluble)	I '14:— 29,177 M '17:—183,739 M '18:— 91,724 M '19:—130,704 I '20:— 500 M '20:—168,048	Aniline (excess) [Sulfonation]	A
701	Paraphenylene Blue R		*p*-Phenylene-diamine	B

Amino-azo-benzene-disulfonic Acid

6-Amino-3: 4′-azo-bisbenzene-sulfonic Acid (*C. A. nomen.*)



$= C_{12}H_{11}N_3O_6S_2 = 357$

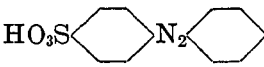
ORMATION.—From amino-azo-benzene by sulfonation with oleum

Dyes Derived from Amino-azo-benzene-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
247	Double Scarlet Scarlet EC	I '14:— 39,522 M '17:— ? M '18:— 74,203 M '19:— ? M '20:— ?	β-Naphthol	A
251	Croceine Scarlet O	I '20:— 100	Croceine Acid	A

Amino-azo-benzene-sulfonic Acid

p-(*p*-Amino-phenyl-azo)-benzene-sulfonic Acid (*C. A. nomen.*)



$= C_{12}H_{11}N_3O_3S = 277$

FORMATION.—From amino-azo-benzene by sulfonation at low temperature by means of oleum

Dyes Derived from Amino-azo-benzene-sulfonic Acid

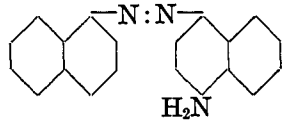
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
246	Cloth Scarlet G	I '14:— 9 I '17:— ? I '18:— ? I '19:— ? I '20:— ?	β-Naphthol	A
248	Fast Scarlet B	I '14:— 1,755	Schaeffer's Acid	A
249	Croceine Scarlet 3B	I '14:— 9,613	Croceine Acid	A
250	Milling Orange	I '14:— 4,370	Salicylic Acid	M

6-Amino-3: 4′-azo-bis*benzene*-sulfonic Acid (*C. A. nomen.*)

See, Amino-azo-benzene-disulfonic Acid

α-Amino-azo-naphthalene

4-(Naphthyl-azo)-1-naphthylamine (*C. A. nomen.*)



$= C_{20}H_{15}N_3 = 297$

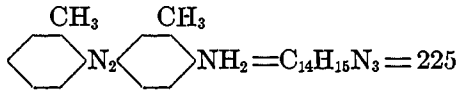
FORMATION.—From α-naphthylamine, this compound is prepared by mixing equal molecules of α-diazo-naphthalene chloride (from α-naphthylamine) and α-naphthylamine hydrochloride in cold aqueous solution.

Dyes Derived from α-Amino-azo-naphthalene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
694	Rose Magdala Fast Pink for Silk	I '14:— 597	α-Naphthylamine	A
695	Paraphenylene Violet	I '20:— 337	*p*-Phenylene-diamine	B

o-Amino-azo-toluene

p-(*o*-Tolyl-azo)-*o*-toluidine (*C. A. nomen.*)



$= C_{14}H_{15}N_3 = 225$

STATISTICS.—Manufactured 1917:—14,355 lbs.
Manufactured 1918:— ?
Manufactured 1919:— 4,836
Manufactured 1920:— ?

FORMATION.—From *o*-toluidine, by molecular rearrangement of diazo-amino-toluene, which in turn is made by the reaction of equal molecules of *o*-toluidine and diazo-toluene chloride (diazotized *o*-toluidine)

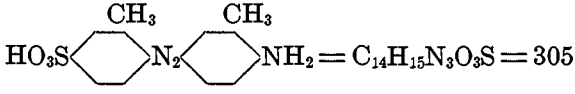
LITERATURE.—Cain, Intermediate Products (2d Ed.), 82.

Dyes Derived from *o*-Amino-azo-toluene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*		*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES				
68	Spirit Yellow R Yellow Fat Color			[This is amino-azo-toluene]	SS
149	Fast Yellow R			[Oleum]	A
	DISAZO DYES				
230	Cloth Red 3 GA	I '14:—	251	Bronner's Acid	M
231	Cloth Red 3B Extra	I '14:—	15	Ethyl-2-naphthyl-amine-7-sulfonic Acid	M
		I '20:—	84		
232	Sudan IV	I '14:—	51	β-Naphthol	SS
		M '17:—	13,334		MF
		M '18:—	14,904		
		M '19:—	?		
		M '20:—	?		
233	Cloth Red B	I '14:—	1,962	Nevile-Winther Acid	M
		M '18:—	?		
		M '19:—	?		
		M '20:—	?		
234	Cloth Red G	I '14:—	554	Schaeffer's Acid	M
235	Croceine 3B	M '19:—	?	1-Naphthol-4: 8-disul-fonic Acid	A
		M '20:—	?		
236	Cloth Red B Wool Red B	I '14:—	14,293	R Acid	A
		M '17:—	?		
		M '18:—	?		
		M '19:—	?		
		M '20:—	?		

o-Amino-azo-toluene-sulfonic Acid

4-(4-Amino-*m*-tolyl-azo)-*m*-toluene-sulfonic Acid (*C. A. nomen.*)



$= C_{14}H_{15}N_3O_3S = 305$

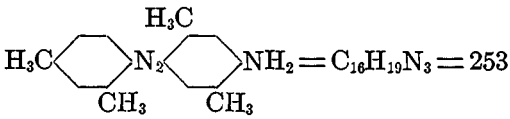
FORMATION.—*o*-Amino-azo-toluene is sulfonated with oleum

Dyes Derived from *o*-Amino-azo-toluene-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
252	Cloth Scarlet R		β-Naphthol	M
253	Orseilline BB		Nevile-Winther's Acid	A
254	Bordeaux G		Schaeffer's Acid	A
255	Croceine Scarlet 8B Ponceau 6RB	I '14:—2,379 I '20:— 154	Croceine Acid	A

Amino-azo-xylene

4-(2: 4-Xylyl-azo)-2: 5-xylidine (*C. A. nomen.*)



$= C_{16}H_{19}N_3 = 253$

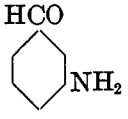
FORMATION.—From xylidine, and by action of diazo-*m*-xylidine (2: 4-xylidine) on *p*-xylidine (2: 5-xylidine)

LITERATURE.—Nölting and Forel, Ber. **18**, 2668 (1885)
Nietzki, Ber. **13**, 471 (1880)
Schultz, Chemie Steinkohlenteers **1**, 137

Dyes Derived from Amino-azo-xylene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
237	Bordeaux BX		Schaeffer's Acid	A
238	Union Fast Claret		R Acid	A

***m*-Amino-*b*enzaldehyde**



$= C_7H_7NO = 121$

FORMATION.—Benzaldehyde is nitrated, resulting in a mixture of *o*- and *m*-nitro-benzaldehyde (20 and 80 per cent). The reduction is effected and the *o*-derivative is removed by treating the crude nitration mixture with sodium hydrosulfite and hydrochloric acid, whereupon the *o*-derivative crystallizes out as the anhydro-derivative of *o*-amino-benzaldehyde. The solution contains the *m*-amino-benzaldehyde, and it is used directly

LITERATURE.—Cain, Intermediate Products (2d Ed.), 144, 145
Lange, Zwischenprodukte, #316–318

USES.—For preparation of *m*-Hydroxy-benzaldehyde

p-Amino-benzaldehyde

$= C_7H_7NO = 121$

FORMATION.—*p*-Nitro-toluene, in alcoholic solution, is run into a solution of sulfu in caustic soda; and the mixture is heated under a reflux condenser for 1½ hours, and then separated

LITERATURE.—Lange, Zwischenprodukte, #319–327
Ullmann, Enzy. tech. Chemie, 2, 307

Dyes Derived from *p*-Amino-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
129	Chromazone Red A	I'14:—243	Chromotropic Acid	M
130	Chromazone Blue R		Chromotropic Acid Ethyl-phenyl-hydrazine	M

p-Amino-benzaldehyde Ethyl-phenyl-hydrazone (*C. A. nomen.*)

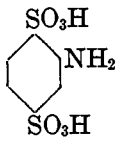
See, p-Amino-benzylidine-ethyl-phenyl-hydrazone

1-Amino-4-benzamido-anthraquinone (*C. A. nomen.*)

See, 1-Amino-4-benzoylamino-anthraquinone

2-Amino-*p*-benzene-disulfonic Acid (*C. A. nomen.*)

Aniline-2: 5-disulfonic Acid



$= C_6H_7NO_6S_2 = 253$

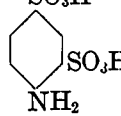
FORMATION.—The sodium salt of 4-chloro-3-nitro-benzene-sulfonate is boiled with sodium sulfite, resulting in formation of sodium 2-nitro-benzene-disulfonate, which is reduced with iron and acetic acid to aniline-2: 5-disulfonic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 49
Lange, Zwischenprodukte, #957

USES.—For preparation of ethyl-*m*-amino-phenol

4-Amino-*m*-benzene-disulfonic Acid (*C. A. nomen.*)

Aniline-2: 4-disulfonic Acid



$= C_6H_7NO_6S_2 = 253$

FORMATION.—By heating sulfanilic acid (*p*-aniline-sulfonic acid) with oleum at 170–180° C.

LITERATURE.—Ann. **198**, 17
Beilstein, Organische Chemie (3 auf.) II, 571

Dye Derived from 4-Amino-*m*-benzene-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
263	DISAZO DYE Jet Black R		α-Naphthylamine Phenyl-α-naphthyl-amine	A

m-Amino-benzene-sulfonic Acid

See, Metanilic Acid

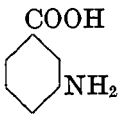
p-Amino-benzene-sulfonic Acid

See, Sulfanilic Acid

Amino-benzenyl-o-amino-thio-cresol

See, Dehydro-thio-*p*-toluidine

m-Amino-benzoic Acid



$= C_7H_7NO_2 = 137$

FORMATION.—*m*-Nitro-benzoic acid is reduced with iron and acetic acid

LITERATURE.—Ullmann, Enzy. tech. Chemie, 2, 333

Dyes Derived from *m*-Amino-benzoic Acid

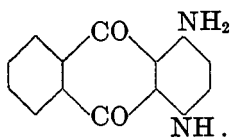
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
203	Yellow Fast-to-soap		Diphenylamine	M
204	Diamond Yellow G		Salicylic Acid	M
	TETRAKISAZO DYE			
486	Direct Brown J	I '14:—3,640	*m*-Phenylene-diamine (3 mols) *m*-Amino-benzoic Acid (2 mols)	D

o-Amino-benzoic Acid

See, Anthranilic Acid

1-Amino-4-benzoylamino-anthraquinone

1-Amino-4-benzamido-anthraquinone (*C. A. nomen.*)



$= C_{21}H_{14}N_2O_3 = 342$

FORMATION.—By heating 1:4-Diamino-anthraquinone in a toluene or nitro-benzene solution with benzoyl chloride

LITERATURE.—*Cf.* Ullmann, Enzy. tech. Chemie, **1**, 164

Dye Derived from 1-Amino-4-benzoylamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
833	Algol Olive R	I '14:—13,334 I '20:— 461	1-Benzoylamino-4-chloro-anthraquinone [Chloro-sulfonic Acid]	V

p-Amino-benzyl-diethylamine

p-Amino-*N*:*N*-diethyl-benzylamine (*C. A. nomen.*)

$= C_{11}H_{18}N_2 = 178$

FORMATION.—*p*-Nitro-benzyl chloride is treated with 2 mols of diethyl-amine in alcoholic solution at 100° C.; and the resulting *p*-nitro-benzyl-diethylamine is reduced with $SnCl_2$ and HCl to the *p*-amino-benzyl-diethylamine

LITERATURE.—Ber. 28, 1141

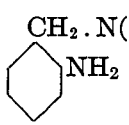
Cf. Lange, Zwischenprodukte, #255

Dye Derived from *p*-Amino-benzyl-diethylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYE			
435	Janus Brown B		α-Naphthylamine Resorcinol *or* *m*-phenylene-diamine [*or* Chrysoidine]	B

o-Amino-benzyl-dimethylamine

o-Amino-*N*: *N*-dimethyl-benzylamine (*C. A. nomen.*)



$= C_9H_{14}N_2 = 150$

FORMATION.—*o*-Nitro-benzyl chloride is treated with 2 mols of dimethyl-amine in alcoholic solution at 100° C., and the resulting *o*-nitro-benzyl-dimethylamine is reduced with $SnCl_2$ and HCl to the *o*-amino-benzyl-dimethylamine

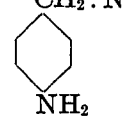
LITERATURE.—*Cf.* Ber. 28, 1141
Cf. Lange, Zwischenprodukte, #250, 255

Dyes Derived from *o*-Amino-benzyl-dimethylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
74	Tannin Orange	I '14:—2,202 I '20:— 349	*p*-Amino-benzyl-dimethylamine β-Naphthol (2 mols)	B
75	New Phosphine G	I '14:— 500	*p*-Amino-benzyl-dimethylamine Resorcinol (2 mols)	B

p-Amino-benzyl-dimethylamine

p-Amino-*N*: *N*-dimethyl-benzylamine (*C. A. nomen.*)



$= C_9H_{14}N_2 = 150$

FORMATION.—*p*-Nitro-benzyl chloride is treated with 2 mols of dimethyl-amine in alcoholic solution at 100° C.; and the resulting *p*-nitro-benzyl-dimethylamine is reduced with $SnCl_2$ and HCl to the *p*-amino-benzyl-dimethylamine

LITERATURE.—Ber. 28, 1141
Lange, Zwischenprodukte, #255

Dyes Derived from *p*-Amino-benzyl-dimethylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
74	Tannin Orange R	I '14:—2,202 I '20:— 249	*o*-Amino-benzyl-dimethylamine β-Naphthol (2 mols)	B
75	New Phosphine G	I '14:— 500	*o*-Amino-benzyl-dimethylamine Resorcinol (2 mols)	B

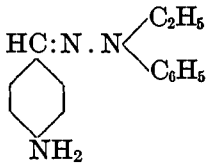
p-Amino-benzyl-ethyl-aniline-sulfonic Acid

See, Ethyl-sulfobenzyl-*p*-phenylene-diamine

p-Amino-benzylidene-ethyl-phenyl-hydrazone

Ethyl-phenyl-hydrazone *of* *p*-Amino-benzaldehyde

p-Amino-*b*enzaldehyde Ethyl-phenyl-hydrazone (*C. A. nomen.*)



$= C_{15}H_{17}N_3 = 239$

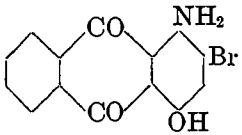
FORMATION.—By condensation of ethyl-phenyl-hydrazine and *p*-amino-benzaldehyde

Dye Derived from *p*-Amino-benzylidene-ethyl-phenyl-hydrazone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
130	Chromazone Blue R		Chromotropic Acid	M

1-Amino-2-bromo-4-hydroxy-anthraquinone

4-Amino-3-bromo-1-hydroxy-*a*nthraquinone (*C. A nomen.*)



$= C_{14}H_8BrNO_3 = 318$

FORMATION.—From 1-amino-2: 4-dibromo-anthraquinone by heating with monohydrate at 100–110°

LITERATURE.—Lange, Zwischenprodukte, #3314

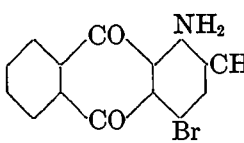
Dye Derived from 1-Amino-2-bromo-4-hydroxy-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
844	Algol Blue 3G	I '14:—9,191 I '20:—3,896	1-Amino-2-bromo-4-hydroxy-anthraquinone (2 mols)	V

4-Amino-3-bromo-1-hydroxy-anthraquinone (*C. A. nomen.*)

See, 1-Amino-2-bromo-4-hydroxy-anthraquinone

1-Amino-4-bromo-2-methyl-*a*nthraquinone



$= C_{15}H_{10}BrNO_2 = 316$

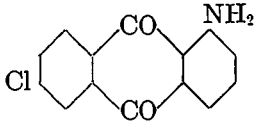
FORMATION.—2-methyl-anthraquinone (which is obtained by the condensation of toluene with phthalic anhydride) is nitrated and reduced. The resulting 1-amino-2-methyl-anthraquinone is brominated in a glacial acetic acid solution and the 1-amino-4-bromo-2-methyl-anthraquinone is formed

LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 486
Barnett, Anthracene and Anthraquinone, 80, 192, 229
Cain, Intermediate Products (2d Ed.), 260

Dyes Derived from 1-Amino-4-bromo-2-methyl-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
859	Cyananthrol R	I '14:—18,792 I '20:— 2,416	*p*-Toluidine [Sulfonation]	A
860	Cyananthrol G	I '20:— 5,127	*p*-Toluidine [Sulfonation]	A

1-Amino-6-chloro-*an*thraquinone



$= C_{14}H_8ClNO_2 = 257$

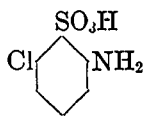
Dye Derived from 1-Amino-6-chloro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
827	Indanthrene Bordeaux B extra	I '14:—28,728 I '20:— 4,056	1-Amino-6-chloro-anthraquinone (2 mols) 2:7-Dichloro-anthraquinone	V

2-Amino-6-chloro-*be*nzene-sulfonic Acid (*C. A. nomen.*)

3-Chloro-aniline-2-sulfonic Acid

m-Chloro-aniline-*o*-sulfonic Acid



$= C_6H_6ClNO_3S = 207.5$

FORMATION.—By the reduction of *m*-chloro-nitro-benzene-*o*-sulfonic acid in the usual way.

LITERATURE.—Beil. II, 571

Dye Derived from 2-Amino-6-chloro-benzene-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
131	MONOAZO DYE Permanent Orange R		β-Naphthol	CL

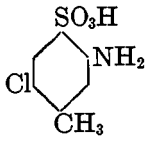
1-Amino-4-chloro-3-methyl-benzene-6-sulfonic Acid

See, 2-Amino-5-chloro-*p*-toluene-sulfonic Acid (*C. A. nomen. $SO_3H=1$*)

2-Amino-5-chloro-*p*-toluene-sulfonic Acid (*C. A. nomen. $SO_3H=1$*)

2-Chloro-5-toluidine-4-sulfonic Acid (*$CH_3=1$*)

1-Amino-4-chloro-3-methyl-benzene-6-sulfonic Acid



$= C_7H_8ClNO_3S = 221.5$

STATISTICS.—Manufactured '20:—22,753 lbs

FORMATION.—From *o*-chloro-toluene-*p*-sulfonic acid (*$CH_3=1$*) by nitration and subsequent reduction

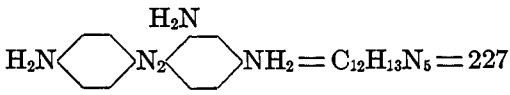
LITERATURE.—Lange, Zwischenprodukte, #1022

Dye Derived from 2-Amino-5-chloro-*p*-toluene-sulfonic Acid (*$SO_3H=1$*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
153	MONOAZO DYE Lake Red C	I '14:—306,607 M '19:— ? I '20:— 4,105	β-Naphthol	CL

4-Amino-chrysoidine (*C.A. nomen.*)

2: 4: 4′-Triamino-azo-benzene



$= C_{12}H_{13}N_5 = 227$

FORMATION.—(1) *p*-Amino-acetanilide (acetyl-*p*-phenylene-diamine) is diazotized and combined with *m*-phenylene-diamine, and then the acetyl group removed

(2) *p*-Nitro-aniline is diazotized and combined with *m*-phenylene-diamine, and the product reduced with sodium sulfide

LITERATURE.—Lange, Zwischenprodukte, #1765

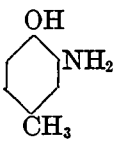
Dye Derived from 4-Amino-chrysoidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
239	DISAZO DYE Azotol C		β-Naphthol	MF

2-Amino-*p*-cresol (*OH=1, C. A. nomen.*)

m-Amino-*p*-cresol (*CH_3=1*)

3-Amino-*p*-cresol (*Eng. and Germ. nomen. CH_3=1*)



$= C_7H_9NO = 123$

FORMATION.—(1) *p*-Cresol is nitrated and then reduced with $SnCl_2$ and HCl. (2) *p*-Toluidine is treated with nitric and nitrous acids so as to form 2-nitro-*p*-cresol (*OH=1*), which is then reduced to the amino compound

LITERATURE.—Ber. **22**, 348; **24**, 1960
Beil. II, 752

Dye Derived from 2-Amino-*p*-cresol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
260	Erio-Chrome Verdon	I '14:—882	Sulfanilic acid β-Naphthol	ACr

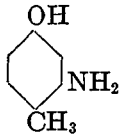
3-Amino-*p*-cresol (*Eng. and Ger. nomen. CH₃=1*)

See, 2-Amino-*p*-cresol (*OH = 1, C. A. nomen.*)

3-Amino-*p*-cresol (*OH = 1, C. A. nomen.*)

6-Amino-*p*-cresol (*CH₃ = 1*)

o-Amino-*p*-cresol (*CH₃ = 1, Ger. and English nomen.*)



$= C_7H_9NO = 123$

FORMATION.—*p*-Toluidine is nitrated, and the 3-nitro-*p*-toluidine sulfate (*NH₂ = 1*) therefrom is treated with $NaNO_2$ in the cold and then boiled with dilute sulfuric acid, thus forming 3-nitro-*p*-cresol, which latter on reduction with $SnCl_2$ and HCl gives 3-amino-*p*-cresol

LITERATURE.—Beil. II, 751, 753

Dye Derived from 3-Amino-*p*-cresol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYE			
576	Rhodamine 3G	I '14:—19,568 I '20:— 855	Dimethylamino - hydroxy - benzoyl - benzoic acid [Ethyl esterification]	B

6-Amino-*p*-cresol (*CH₃ = 1*)

See 3-Amino-*p*-cresol (*OH = 1, C. A. nomen.*)

m-Amino-p-cresol (*CH₃=1*)

See, 2-Amino-*p*-cresol (*OH =1, C. A. nomen.*)

o-Amino-p-cresol (*CH₃=1*)

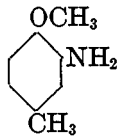
See, 3-Amino-*p*-cresol (*OH =1, C. A. nomen.*)

2-Amino-p-cresol Methyl Ether (*OCH₃=1*)

6-Methoxy-*m*-toluidine (*C. A. nomen. NH₂=1*)

m-Amino-*p*-cresol Methyl Ether (*CH₃=1*)

3-Amino-4-cresol Methyl Ether (*CN₃=1*)



$= C_8H_{11}NO = 137$

FORMATION.—2-Nitro-*p*-cresol (OH = 1), obtained by action of nitrous and excess nitric acids upon *p*-toluidine, is methylated and reduced

LITERATURE.—Ber. **22**, 348; **24**, 960

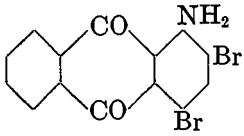
Dyes Derived from 2-Amino-p-cresol Methyl Ether (*OCH₃=1*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
96	Chrome Fast Yellow GG	I '14:— 150 I '20:— 500	Salicylic Acid	M
100	Eosamine B	I '14:—1,914 I '20:—1,600	1-Naphthol-3: 8-disulfonic Acid	A
101	Coccinine B		R Acid	A
	TRISAZO DYES			
439	Direct Indigo Blue A	M '18:— ?	Benzidine H Acid (2 mols)	D
440	Direct Indigo Blue BK		Benzidine Gamma Acid (2 mols)	D

m-Amino-p-cresol Methyl Ether ($CH_3=1$)

See, 2-Amino-*p*-cresol Methyl Ether ($OCH_3=1$)

1-Amino-2: 4-dibromo-anthraquinone



$= C_{14}H_7Br_2NO_2 = 381$

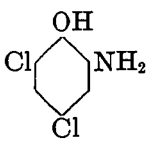
FORMATION.—1-Amino-anthraquinone is treated in nitro-benzene solution and at about 120–130° with an excess of bromine

LITERATURE.—Ullmann, Enzy. tech Chemie, **1**, 475
Ger. Pat., 160,169

Dye Derived from 1-Amino-2: 4-dibromo-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
855	Alizarin Pure Blue B		*p*-Toluidine [Sulfonation]	ACr

2-Amino-4: 6-dichloro-phenol



$= C_6H_5Cl_2NO = 178$

FORMATION.—4: 6-Dichloro-2-nitro-phenol is reduced with tin and hydrochloric acid

LITERATURE.—Beil. II, 727

Dye Derived from 2-Amino-4: 6-dichloro-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
86	Azarine S		β-Naphthol	M

4-Amino-1-diethylamino-benzene-3-thiosulfonic Acid

See, Diethyl-*p*-phenylene-diamine-thiosulfonic Acid

***p*-Amino-diethyl-aniline**

See, *N*: *N*-Diethyl-*p*-phenylene-diamine (*C. A. nomen.*)

***p*-Amino-diethyl-aniline-thiosulfonic Acid**

See, Diethyl-*p*-phenylene-diamine-thiosulfonic Acid

***p*-Amino-*N*: *N*-diethyl-*b*enzylamine** (*C. A. nomen.*)

See, *p*-Amino-benzyl-diethylamine

2-Amino-5-dimethylamino-*b*enzene-thiosulfonic Acid (*C. A. nomen.*)

See, Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid

***m*-Amino-dimethyl-aniline**

See N: N Dimethyl-*m*-phenylene-diamine *C. A. nomen.*)

***p*-Amino-dimethyl-aniline**

See, *N*: *N*-Dimethyl-*p*-phenylene-diamine (*C. A. nomen.*)

***p*-Amino-dimethyl-aniline-thiosulfonic Acid**

See, Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid

***o*-Amino-*N*: *N*-dimethyl-*b*enzylamine** (*C. A. nomen.*)

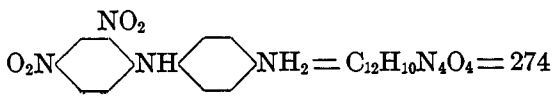
See, *o*-Amino-benzyl-dimethylamine

***p*-Amino-*N*: *N*-dimethyl-*b*enzylamine** (*C. A. nomen.*)

See, *p*-Amino-benzyl-dimethylamine

4′-Amino-2: 4-dinitro-diphenylamine

N-2: 4-Dinitro-phenyl)-*p*-phenylene-diamine (*C. A. nomen.*)



$= C_{12}H_{10}N_4O_4 = 274$

FORMATION.—1-Chloro-2: 4-dinitro-benzene is condensed with *p*-phenylene-diamine

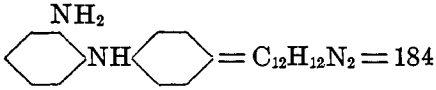
LITERATURE.—Lange, Zwischenprodukte, #1666

Dye Derived from 4'-Amino-2: 4-dinitro-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
727	SULFUR DYE Auronal Black B		[Glycerol; S + Na_2S]	S

o-Amino-diphenylamine

N-Phenyl-*o*-phenylene-diamine (*C. A. nomen.*)



$= C_{12}H_{12}N_2 = 184$

FORMATION.—By reducing *o*-nitro-diphenylamine (from *o*-bromo-nitrobenzene and aniline) by heating with ammonium sulfide

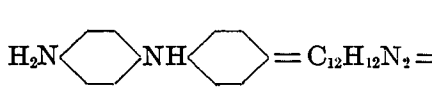
LITERATURE.—Lange, Zwischenprodukte, #1611
Chem. Zeitung, **18**, 1095
Ber. **23**, 1843

Dye Derived from *o*-Amino-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
668	AZINE DYE Flavinduline O	I '14:—660	Phenanthrene-quinone	B

***p*-Amino-diphenylamine**

N-Phenyl-*p*-phenylene-diamine (*C. A. nomen.*)



$= C_{12}H_{12}N_2 = 184$

FORMATION.—This intermediate can be prepared by reducing Orange IV, by means of sodium sulfide and sulfur. The Orange IV results from the coupling of diazotized sulfanilic acid with diphenylamine

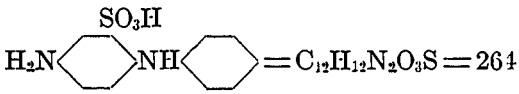
LITERATURE.—Lange, Zwischenprodukte, #1611
Cain, Intermediate Products (2d Ed.), 74

Dyes Derived from *p*-Amino-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYE			
687	Rosolan O	I '20:—1,083	Aniline *o*-Toluidine [Oxidation]	B
	ANILINE BLACK GROUP			
922	Diphenyl Black	I '14:—1,470 M'19:— ? M'20:— ?	*p*-Amino-diphenylamine (x mols) [Oxidation]	Special

p-Amino-diphenylamine-2-sulfonic Acid

2-Anilino-5-amino-benzene-sulfonic Acid (*C. A. nomen.*)



FORMATION.—*p*-Chloro-nitro-benzene is sulfonated to 2-chloro-5-nitro-benzene-sulfonate, which latter in presence of glycerol and sodium carbonate is condensed with aniline to form *p*-nitro-diphenylamine-2-sulfonic acid. This is reduced by iron and hydrochloric acid, resulting in *p*-amino-diphenylamine-2-sulfonic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 75
Cf. Lange, Zwischenprodukte, #1646, 1647

USES.—For preparation of the Nerol Dyes

α-(*p*-Amino-*N*-ethyl-anilino)-*p*-toluene-sulfonic Acid (*C. A. nomen.*)

See, Ethyl-sulfobenzyl-*p*-phenylene-diamine

α-(4-Amino-*N*-ethyl-3-sulfomercapto-anilino)-*p*-toluene-sulfonic Acid (*C. A. nomen.*)

See, Ethyl-sulfobenzyl-*p*-phenylene-diamine-thiosulfonic Acid

***p*-Amino-ethyl-*o*-toluidine** (*$CH_3 = 1$*)

See, N^3-Ethyl-4-*m*-tolyene-diamine (*C. A. nomen.* $NH_2 = 1$)

***p*-Amino-ethyl-*o*-toluidine** (*$NH_2 = 1$*)

See, N^1-Ethyl-*p*-tolylene-diamine

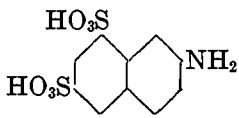
Amino-G Acid[1]

2-Naphthylamine-6:8-disulfonic Acid

7-Amino-1:3-naphthalene-disulfonic Acid (*C. A. nomen.*)

β-Naphthylamine-γ-disulfonic Acid

β-Naphthylamine-disulfonic Acid G



$= C_{10}H_9NO_6S_2 = 303$

STATISTICS.—Manufactured 1918:— ?
Manufactured 1919:— ?
Manufactured 1920:—894,624 lbs.

FORMATION.—From G acid, by heating the sodium salt with ammonia and sodium bisulfite solution, in an autoclave under pressure

LITERATURE.—Lange, Zwischenprodukte, #2599
Cain, Intermediate Products (2d Ed.), 209

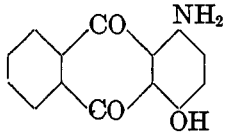
[1] Occasionally in the older literature, this 2-naphthylamine-6: 8-disulfonic Acid has been called G Acid.

Dyes Derived from Amino-G Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
178	Crumpsall Yellow		Salicylic Acid	A
	DISAZO DYES			
270	Brilliant Crocein 9B		Aniline G *and* R Acids	A
271	Diamine Blue 6G		1-Amino-2-naphthol ethyl ether β-Naphthol	D
272	Naphthol Black B Brilliant Black B	I '14 —103,598 M '19 — ? I '20 — 50	α-Naphthylamine R Acid	A

1-Amino-4-hydroxy-anthraquinone

4-Amino-1-hydroxy-anthraquinone (*C. A. nomen.*)



$= C_{14}H_9NO_3 = 239$

FORMATION.—(1) From quinazarin by heating with ammonia. (2) From 1-amino-anthraquinone by heating with sulfuric acid (66° Be.) and boric acid to 180–200° C.

LITERATURE.—Lange, Zwischenprodukte, #3253–3255

Dye Derived from 1-Amino-4-hydroxy-anthraquinone

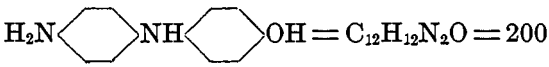
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
818	Algol Pink R	I '14 — 126 I '20 —1,368	Benzoyl chloride	V

4-Amino-1-hydroxy-anthraquinone (*C. A. nomen.*)

See, 1-Amino-4-hydroxy-anthraquinone

4-Amino-4′-hydroxy-diphenylamine

p-(*p*-Amino-anilino)-phenol (*C. A. nomen.*)



FORMATION.—From phenol and *p*-phenylene-diamine by oxidation at low temperature

LITERATURE.—Lange, Zwischenprodukte, #1639–1643

Dye Derived from 4-Amino-4′-hydroxy-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
732	SULFUR DYE Autogene Black	I '14:—7,495	Phenol [S_2Cl_2; S + Na_2S]	S

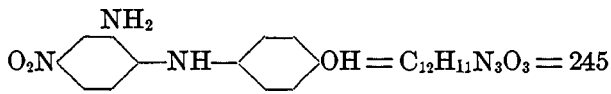
2-Amino-7-hydroxy-diphenylenazine

See, 2-Amino-8-hydroxy-phenazine

2-Amino-4′-hydroxy-4-nitro-diphenylamine

4-Nitro-2-amino-4′-hydroxy-diphenylamine

p-(2-Amino-4-nitro-anilino)-phenol (*C. A. nomen.*)



FORMATION.—Chloro-dinitro-benzene is condensed with *p*-amino-phenol in presence of an acetate to 2: 4-dinitro-4′-hydroxy-diphenylamine, which by partial reduction furnishes the above derivative.

LITERATURE.—Beil II, *spl.*, 399; IV, *spl.*, 397
Lange, Zwischenprodukte, #1670
Thorpe, Dic. Chemistry, **2**, 245

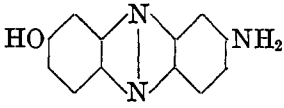
Dyes Derived from 2-Amino-4'-hydroxy-4-nitro-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
726	Pyrogene Direct Blue Pyrogene Blue	I '14:—10,934 I '20:— 2,498	[Alcohol; S+Na_2S]	S
730	Pyrogene Black G	I '14:— 8,725	[S+Na_2S; *It is not certain that the amino-hydroxy-nitro-diphenylamine referred to is the one with the positions given above*]	S
736	Thion Blue B	I '14:— 7,353 I '20:—11,855	[CS_2; S+Na_2S]	S

2-Amino-8-hydroxy-phenazine

2-Amino-7-hydroxy-diphenylenazine

8-Amino-2-phenazinol (*C. A. nomen.*)



$= C_{12}H_9N_3O = 211$

FORMATION.—1-Chloro-2:4-dinitro-benzene condensed with *p*-aminophenol, the product reduced, and the resulting diamino-hydroxy-diphenylamine oxidized in alkaline solution with manganese dioxide

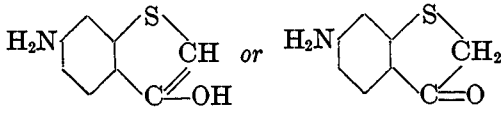
LITERATURE.—Lange, Zwischenprodukte, #1969
Cain, Intermediate Products (2d Ed.), 83

Dye Derived from 2-Amino-8-hydroxy-phenazine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
739	Immedial Bordeaux G Immedial Maroon B	I '14:—15,496	[S+Na_2S]	S

5-Amino-2-hydroxy-thionaphthene (*C. A. numbering*)

6-Amino-3-hydroxy-thionaphthene (*German numbering*)



$= C_8H_7NOS = 165$

FORMATION.—4-Acetamido-2-amino-benzoic acid is diazotized, reacted first with potassium xanthate (C_2H_5O . CS . SK) and then with chloro-acetic acid, forming 4-acetamido-2-thioglycolic-benzoic acid, which by melting forms the desired 5-amino-2-hydroxy-thionaphthene

LITERATURE.—Lange, Zwischenprodukte, #2166
Ullmann, Enz. tech. Chemie, **3**, 568

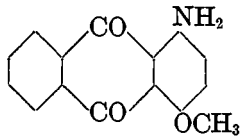
Dyes Derived from 5-Amino-2-hydroxy-thionaphthene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
902	Helindone Brown 2R	I '14:— 876 I '20:— 1,778	2-Isatin-anilide [Bromination; ? classification]	V
903	Helindone Brown 5R		2-Isatin-anilide [Bromination]	V
904	Helindone Brown G	I '14:—13,086 I '20:— 2,200	Isatin [Bromination]	V
911	Ciba Orange G	I '14:— 222	Acenaphthenequinone [Bromination]	V
914	Helindone Orange D	I '20:— 17	5-Amino-2-hydroxy-thionaphthene (2 mols) [Bromination]	V

6-Amino-3-hydroxy-thionaphthene (*German numbering*)

See, 5-Amino-2-hydroxy-thionaphthene (*C. A. numbering*)

1-Amino-4-methoxy-anthraquinone



$= C_{15}H_{11}NO_3 = 253$

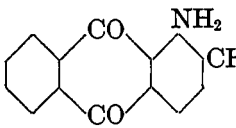
FORMATION.—Probably by the nitration and subsequent reduction of 1-methoxy-anthraquinone. The 1-methoxy-anthraquinone is obtained from 1-nitro-anthraquinone by heating with an alcoholic solution of potassium methylate with exclusion of water

LITERATURE.—*Cf.* Barnett, Anthracene and Anthraquinone, 169, 279, 280, 287

Dyes Derived from 1-Amino-4-methoxy-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
815	Algol Scarlet G	I '20:—959	Benzoyl chloride	V
829	Algol Bordeaux 3B	I '20:— 61	1-Amino-4-methoxy-anthraquinone (2 mols) 2:6-Dichloro-anthraquinone	V

1-Amino-2-methyl-anthraquinone



$= C_{15}H_{11}NO_2 = 237$

FORMATION.—2-Methyl-anthraquinone is dissolved in sulfuric acid solution and nitrated with sodium nitrate. The nitro compound is then separated and reduced with sodium sulfide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 260
Lange, Zwischenprodukte, #3209

Dye Derived from 1-Amino-2-methyl-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
868	Cibanone Brown B	I '14:—399	[Sulfur]	V

3-Amino-4-methyl-diphenylamine

See, N^1-Phenyl-4-*m*-tolylene-diamine

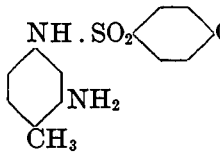
IV-Amino-5-methyl-2-phenyl-thiazol-sulfonic Acid

See, Dehydro-thio-*p*-toluidine-sulfonic Acid

***N*-(3-Amino-4-methyl-phenyl)-*p*-toluene-sulfamide**

3′-Amino-(*p*-toluene-sulfo)-*p*-toluide (*C. A. nomen.*)

(*Example of m-amino-aryl-sulfamide*)



$= C_{14}H_{16}N_2O_2S = 276$

FORMATION.—3-Nitro-*p*-toluidine ($NH_2 = 1$) is suspended in water, *p*-toluene-sulfochloride and soda added. The reaction product is purified by solution in dilute caustic soda and precipitation with hydrochloric acid. This nitro body is now reduced with zinc dust and hydrochloric acid to the amino-sulfamide

LITERATURE.—Lange, Zwischenprodukte, #1801
Schultz-Heumann, Anilinfarben, **4**, 2103
Ger. Pat. 135,016

Dyes Derived from *N*-(3-Amino-4-methyl-phenyl)-*p*-toluene-sulfamide

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
92	Metachrome Bordeaux R		Picramic Acid	M

α-Amino-naphthalene
See, α-Naphthylamine

β-Amino-naphthalene
See, β-Naphthylamine

3-Amino-2: 7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, Amino-R Acid

4-Amino-1: 5-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-4: 8-disulfonic Acid

4-Amino-1: 6-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-4: 6-*and*-4: 7-disulfonic Acids

4-Amino-1: 7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-4: 6-*and*-4: 7-disulfonic Acids

4-Amino-2:-7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, Freund's Acid

5-Amino-1: 3-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-5: 7-disulfonic Acid

6-Amino-1: 3-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, 2-Naphthylamine-5: 7-disulfonic Acid

7-Amino-1: 3-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, Amino-G Acid

8-Amino-1: 6-*n*apthalene-disulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-3: 8-disulfonic Acid

1-Amino-naphthalene-4-sulfonic Acid
See, Naphthionic Acid

1-Amino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-2-sulfonic Acid

2-Amino-1-*naphthalene*-sulfonic Acid (*C. A. nomen.*)
See, 2-Naphthylamine-1-sulfonic Acid

4-Amino-1-*naphthalene*-sulfonic Acid (*C. A. nomen.*)
See, Naphthionic Acid

5-Amino-1-*naphthalene*-sulfonic Acid (*C. A. nomen.*)
See, Laurent's Acid

5-Amino-2-*naphthalene*-sulfonic Acid (*C. A. nomen*)
See, 1-Naphthylamine-6-sulfonic Acid

5-*and*-8-Amino-2-*naphthalene*-sulfonic Acids (*C. A. nomen.*)
See, 1-Naphthylamine-6-*and*-7-sulfonic Acids

6-Amino-2-*naphthalene*-sulfonic Acid (*C. A. nomen.*)
See, Broenner's Acid

6-*and*-7-Amino-1-*naphthalene*-sulfonic Acids (*C. A. nomen.*)
See, 2-Naphthylamine-5-*and*-8-sulfonic Acids

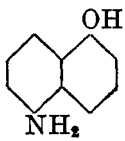
7-Amino-2-*naphthalene*-sulfonic Acid (*C. A. nomen.*)
See, 2-Naphthylamine-7-sulfonic Acid

8-Amino-1-*naphthalene*-sulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-8-sulfonic Acid

8-Amino-1:3:5-*naphthalene*-trisulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-4:6:8-trisulfonic Acid

8-Amino-1:3:6-*naphthalene*-trisulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-3:6:8-trisulfonic Acid

5-Amino-1-*naphthol*



$= C_{10}H_9NO = 159$

FORMATION.—From 1-amino-naphthalene-5-sulfonic acid by fusion with caustic soda at 250°

LITERATURE.—Lange, Zwischenprodukte, #2335

Dye Derived from 5-Amino-1-naphthol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
187	MONOAZO DYE Lanacyl Blue BB	I '14:—4,200	H Acid	A

Amino-naphthol δ

1-Amino-7-naphthol (*not considered herein*)

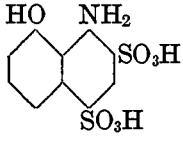
1-Amino-8-naphthol-2: 4-disulfonic Acid

8-Amino-1-naphthol-5: 7-disulfonic Acid (*C. A. nomen.*)

SS Acid *or* 2S Acid

Chicago Acid

Amino-naphthol-disulfonic Acid SS



$= C_{10}H_9NO_7S_2 = 319$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By caustic fusion at 180–190° of sodium 1: 8-naphthasultam-2: 4-disulfonate (anhydride of 1-amino-naphthalene-2: 4: 8-trisulfonic acid), which in turn is made from 1-naphthylamine-4: 8-disulfonic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 236
Lange, Zwischenprodukte, #2719
Thorpe, Dic. Chemistry, 3, 641

Dyes Derived from 1-Amino-8-naphthol-2: 4-disulfonic Acid

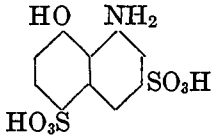
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
419	Chicago Blue RW	I '14:— 15,176 M '19:— ? I '20:— 150	Dianisidine β-Naphthol	D
422	Chicago Blue 4B	I '14:— 8,269	Dianisidine 1- Amino-8-naphthol-4-sulfonic Acid	D
424	Chicago Blue 6B	I '14:—118,542 M '19:— ? I '20:— 7,480 M '20:— ?	Dianisidine 1-Amino-8-naphthol-2: 4-disulfonic Acid (2 mols)	D

1-Amino-8-naphthol-3: 5-disulfonic Acid

8-Amino-1-naphthol-4: 6-disulfonic Acid (*C. A. nomen.*)

Amino-naphthol-disulfonic Acid B

B Acid



$= C_{10}H_9NO_7S_2 = 319$

FORMATION.—By sulfonation of 1-amino-8-naphthol-3-sulfonic acid

LITERATURE.—Amer. Pat. 606,437
Ger. Pat. A. F. 8626

Dyes Derived from 1-Amino-8-naphthol-3: 5-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
216	Domingo Blue Black B		Aniline *p*-Nitro-aniline	A
389	Eboli Blue B		Tolidine 1-Amino-8-naphthol-3: 5-disulfonic Acid (2 mols)	D
	TRISAZO DYE			
466	Eboli Green CW		Benzidine Salicylic Acid Sulfanilic Acid	D

1-Amino-8-naphthol-3: 6-disulfonic Acid

See, H Acid

1-Amino-8-naphthol-4: 6-disulfonic Acid

See, K Acid

2-Amino-8-naphthol-3: 6-disulfonic Acid

See, 2R Acid

7-Amino-1-naphthol-3: 6-disulfonic Acid (*C. A. nomen.*)

See, 2R Acid

8-Amino-1-naphthol-3: 5-disulfonic Acid (*C. A. nomen.*)

See, K Acid

8-Amino-1-naphthol-3: 6-disulfonic Acid (*C. A. nomen.*)

See, H Acid

8-Amino-1-naphthol-4: 6-disulfonic Acid (*C. A. nomen.*)

See, 1-Amino-8-naphthol-3: 5-disulfonic Acid

8-Amino-1-naphthol-5: 7-disulfonic Acid (*C. A. nomen.*)

See, 1-Amino-8-naphthol-2: 4-disulfonic Acid

Amino-naphthol-disulfonic Acid B

See, 1-Amino-8-Naphthol-3: 5-disulfonic Acid

Amino-naphthol-disulfonic Acid H

See, H Acid

Amino-naphthol-disulfonic Acid K

See, K Acid

Amino-naphthol-disulfonic Acid RR

See, 2R Acid

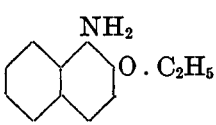
Amino-naphthol-disulfonic Acid SS

See, 1-Amino-8-naphthol-2: 4-disulfonic Acid

1-Amino-2-naphthol Ethyl Ether

Naphthylamine Ether

2-Ethoxy-1-naphthylamine (*C. A. nomen.*)



$= C_{12}H_{13}NO = 187$

FORMATION.—1-Nitro-2-naphthol ethyl ether is reduced in an alcoho solution with iron turnings and hydrochloric acid

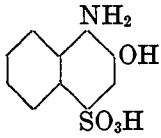
LITERATURE.—Lange, Zwischenprodukte, #2345, 2333

Dyes Derived from 1-Amino-2-naphthol Ethyl Ether

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
268	Naphthyl Blue Black N		1-Naphthylamine-4: 6- *and* 4: 7- disulfonic acids α- Naphthylamine	A
271	Diamine Blue 6 G		Amino-G acid β-Naphthol	D

1-Amino-2-*naphthol*-4-sulfonic Acid (*C. A. nomen.*)

1: 2: 4 Acid



$= C_{10}H_9NO_4S = 239$

STATISTICS.—Manufactured '18:—169,999 lbs.
Manufactured '19:—837,384 lbs.
Manufactured '20:—971,370 lbs.

FORMATION.—β-Naphthol is changed to the 1-nitroso-β-naphthol, which is treated with sodium bisulfite. Upon acidification the free sulfurous acid effects simultaneous reduction and sulfonation

LITERATURE.—Cain, Intermediate Products (2d Ed.), 233
Lange, Zwischenprodukte, #2507

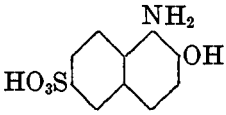
Dyes Derived from 1-Amino-2-naphthol-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
29	Eriochrome Red B	I '14:— 5,491	3-Methyl-1-phenyl-5-pyrazolone	ACr

Dyes Derived from 1-Amino-2-naphthol-4-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermcdiates Uscd and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
180	Erichrome Blue Black B	I '14:— 57,000 M' 17:— 9,326 M '18:— ? M '19:— ? I '20:— 20,317 M '20:— 29,255	α-Naphthol	ACr
181	Palatine Chrome Black 6B Salicine Black	I '14:—248,721 M '17:— ? M '18:—469,159 M '19:—739,372 I '20:— 2,001 M '20:— 1,074,248	β-Naphthol	ACr

1-Amino-2-naphthol-6-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_4S = 239$

FORMATION.—Schaeffer's acid is treated with nitrous acid resulting in 1-nitroso-2-naphthol-6-sulfonic acid. This latter is reduced with zinc and hydrochloric acid

LITERATURE.—Meldola, Chem. Soc. Trans. **39**, 47 (1881)
Thorpe, Dic. Chemistry, **3**, 637

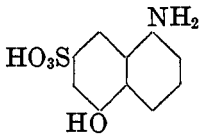
Dye Derived from 1-Amino-2-naphthol-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYE			
656	Alizarin Green G	M '19:— ?	1: 2-Naphthoquinone-4-sulfonic acid	M

1-Amino-5-naphthol-7-sulfonic Acid

5-Amino-1-*naphthol*-3-sulfonic Acid (*C. A. nomen.*)

M Acid



$= C_{10}H_9NO_4S = 239$

FORMATION.—By fusing 1-naphthylamine-5: 7-disulfonic acid with caustic soda at 160–220°

LITERATURE.—Cain, Intermediate Products (2d Ed.) 234
Thorpe, Dic. Chemistry, **3**, 638

Dyes Derived from 1-Amino-5-naphthol-7-sulfonic Acid

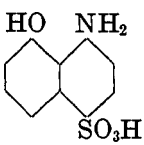
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
345	Oxamine Maroon		Benzidine Salicylic Acid	D
421	Oxamine Blue B	I '14:—35,891 I '20:— 13	Dianisidine Nevile-Winther's Acid	D

1-Amino-8-naphthol-4-sulfonic Acid

8-Amino-1-*naphthol*-5-sulfonic Acid (*C. A. nomen.*)

Amino-naphthol-sulfonic Acid S

S Acid



$= C_{10}H_9NO_4S = 239$

STATISTICS.—Manufactured '20:— ?

FORMATION.—By caustic soda fusion of 1-naphthylamine-4: 8-disulfonic acid at 200–230°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 234
Thorpe, Dic. Chemistry, **3**, 638
Lange, Zwischenprodukte, #2524 *et seq.*

Dyes Derived from 1-Amino-8-naphthol-4-sulfonic Acid

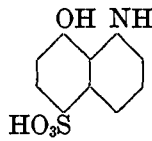
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
220	Palatine Black	I '14:—299,274 I '20:— 200	α-Naphthylamine Sulfanilic Acid	A
324	Chicago Blue 4R	I '14:— 1,199	Benzidine Croceine Acid	D
325	Columbia Blue R	I '14:— 3,071	Benzidine 1-Naphthol-3: 8-disulfonic Acid	D
336	Benzo Cyanine R	I '14:— 201	Benzidine H Acid	D
384	Chicago Blue 2R Diamine Blue C 2R	I '14:— 23,877	Tolidine Croceine Acid	D
387	Columbia Blue G	I '14:— 7,094	Tolidine 1-Naphthol-3: 8-disulfonic Acid	D
388	Chicago Blue R		Tolidine 1-Amino-8-naphthol-4-sulfonic Acid (2 mols)	D
390	Benzo Cyanine B	I '14:— 201	Tolidine H Acid	D
420	Azidine Wool Blue B		Dianisidine Croceine Acid	D
422	Chicago Blue 4B	I '14:— 8,269	Dianisidine 1-Amino-8-naphthol-2: 4-disulfonic Acid	D

Dyes Derived from 1-Amino-8-naphthol-4-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
423	Chicago Blue B	M '18:— ?	Dianisidine 1-Amino-8-naphthol-4-sulfonic Acid (2 mols)	D
425	Benzo Cyanine 3B	I '14:— 1,001	Dianisidine H Acid	D
	TRISAZO DYE			
465	Columbia Black Green D		Benzidine Salicylic Acid Aniline	D
478	Columbia Green	I '14:— 45,162 M '18:— ? I '20:— 7,555	Benzidine Salicylic Acid Sulfanilic Acid	D

1-Amino-8-naphthol-5-sulfonic Acid

8-Amino-1-naphthol-4-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_4S = 239$

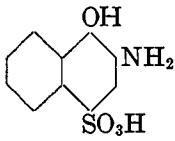
FORMATION.—By heating 1-naphthylamine-5:8-disulfonic acid with 75 per cent caustic potash at about 150°

LITERATURE.—Ger. Pat. 75,055
Thorpe, Dic. Chemistry, **3**, 639
Lange, Zwischenprodukte, #2450

Dye Derived from 1-Amino-8-naphthol-5-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
218	Nigrophor BASF		*p*-Nitro-aniline 2:5-Dichloro-aniline	MF

2-Amino-1-*naphthol*-4-sulfonic Acid



$= C_{10}H_9NO_4S = 239$

FORMATION.—By heating 2-nitroso-1-naphthol with 35 per cent sodium bisulfite solution

LITERATURE.—Schmidt, J. pr. Chem [II], **44**, 531 (1891)
Thorpe, Dic. Chemistry, **3**, 639

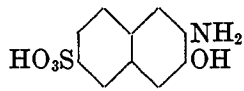
Dye Derived from 2-Amino-1-naphthol-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
657	OXAZINE DYE Alizarine Green B	I '14:—551	1:2-Naphthoquinone-4-sulfonic Acid	M

2-Amino-3-naphthol-6-sulfonic Acid

Amino-naphthol-sulfonic Acid R

3-Amino-2-*naphthol*-7-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_4S = 239$

FORMATION.—From Amino-R acid (2-naphthylamine-3:6-disulfonic acid) by caustic soda fusion at 240°

LITERATURE.—Lange, Zwischenprodukte, #2534
Thorpe, Dic. Chemistry, **3**, 639

Dye Derived from 2-Amino-3-naphthol-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
185	MONOAZO DYE Anthracene Chrome Black	I '14:—51,577 I '20:— 2,339	β-Naphthol	M

2-Amino-5-naphthol-7-sulfonic Acid
See, J Acid

2-Amino-8-naphthol-6-sulfonic Acid
See, Gamma Acid

3-Amino-2-*n*aphthol-7-sulfonic Acid (*C. A. nomen.*)
See, 2-Amino-3-naphthol-6-sulfonic Acid

5-Amino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)
See, 1-Amino-5-naphthol-7-sulfonic Acid

6-Amino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)
See, J Acid

7-Amino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)
See, Gamma Acid

8-Amino-1-*n*aphthol-4-sulfonic Acid (*C. A. nomen.*)
See, 1-Amino-8-naphthol-5-sulfonic Acid

8-Amino-1-*n*aphthol-5-sulfonic Acid (*C. A. nomen.*
See, 1-Amino-8-naphthol-4-sulfonic Acid

Amino-naphthol-sulfonic Acid G
See, Gamma Acid

Amino-naphthol-sulfonic Acid J
See, J Acid

Amino-naphthol-sulfonic Acid R
See, 2-Amino-3-naphthol-6-sulfonic Acid

Amino-naphthol-sulfonic Acid S
See, 1-Amino-8-naphthol-4-sulfonic Acid

Amino-naphthol-sulfonic Acid γ
See, Gamma Acid

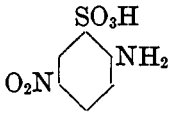
p-(2-Amino-4-nitro-anilino)-phenol (*C. A. nomen.*)

See, 2-Amino-4′-hydroxy-4-nitro-diphenylamine

2-Amino-5-nitro-benzene-sulfonic Acid (*C. A. nomen. $SO_3H = 1$*)

p-Nitro-aniline-*o*-sulfonic Acid ($NH_2 = 1$)

4-Nitro-aniline-2-sulfonic Acid ($NH_2 = 1$)



$= C_6H_6N_2O_5S = 218$

STATISTICS.—Manufactured 1918; amount not disclosed

FORMATION.—2-Chloro-5-nitro-benzene-sulfonic acid (by oleum sulfonation of *p*-chloro-nitro-benzene) is heated in an autoclave at 120–140° with alcoholic ammonia

LITERATURE.—Cain, Intermediate Products (2d Ed.), 56

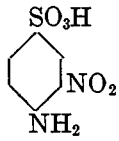
Dyes Derived from 2-Amino-5-nitro-benzene-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
132	Lake Red P	I '14:—60,345 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,750	β-Naphthol	CL
133	Eriochrome Phosphine R	I '14:— 1,433	Salicylic Acid	ACr
	TRISAZO DYES			
458	Carbon Black		1-Naphthylamine-6-*or*-7-sulfonic Acid *m*-Phenylene-diamine *or* *m*-Tolylene-diamine *or* 1:3-Naphthylene-diamine-6-sulfonic Acid	D

4-Amino-3-nitro-*b*enzene-sulfonic Acid (*C. A. nomen.*)

o-Nitro-aniline-*p*-sulfonic Acid ($NH_2=1$)

2-Nitro-aniline-4-sulfonic Acid ($NH_2=1$)



$= C_6H_6N_2O_5S = 218$

STATISTICS.—Manufactured '17:— ?

FORMATION.—From chloro-benzene-*p*-sulfonic acid by nitration, followed by amidation with ammonia

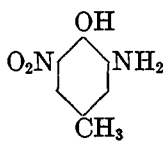
LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 443

Dye Derived from 4-Amino-3-nitro-benzene-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
148	MONOAZO DYE Fast Orange O	I '14:—1,250 M '17:— ?	β-Naphthol	CL

2-Amino-6-nitro-*p*-cresol (*C. A. nomen. OH=1*)

o-Nitro-*o*-amino-*p*-cresol



$= C_7H_8N_2O_3 = 168$

FORMATION.—The above cresol derivative is obtained by partially reducing the 2:6-dinitro-*p*-cresol. This latter results either from the direct dinitration of *p*-cresol; or by the dinitration of *p*-toluidine, and subsequent hydrolysis with alkali

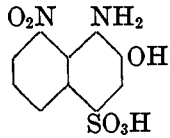
LITERATURE.—Ber. **15**, 1859

Dye Derived from 2-Amino-6-nitro-*p*-cresol (*OH = 1*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
S5	Omega Chrome Black PV		Phenyl-1-naphthyl-amine-8-sulfonic Acid	ACr

1-Amino-8-nitro-2-naphthol-4-sulfonic Acid

Nitro-1: 2: 4 Acid



$= C_{10}H_8N_2O_6S = 284$

FORMATION.—From 1-amino-2-naphthol-4-sulfonic Acid by nitration

LITERATURE.—Lange, Zwischenprodukte, #2688

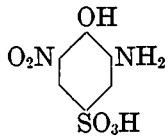
Dyes Derived from 1-Amino-8-nitro-2-naphthol-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONAZO DYES			
183	Eriochrome Black T	I '14:—129,550 M '18:— ? M '19:— ? I '20:—2,624 M '20:— ?	α-Naphthol	ACr
184	Eriochrome Black A	I '14:— 96,570 M '17:— ? M '18:— ? M '19:—686,710 I '20:— 14,262 M '20:— ?	β-Naphthol	ACr

2-Amino-6-nitro-1-*p*henol-4-sulfonic Acid (*C. A. nomen. OH = 1*)

6-Nitro-2-amino-phenol-4-sulfonic Acid

2-Nitro-6-amino-phenol-4-sulfonic Acid



$= C_6H_6N_2O_6S = 234$

FORMATION.—From phenol by sulfonation, dinitration and partial reduction with sodium sulfide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 129
Lange, Zwischenprodukte, #1130

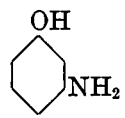
Dye Derived from 2-Amino-6-nitro-phenol-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
159	Acid Alizarin Black R	I '14:—16,800 M '19:— ? I '20:— 439 M '20:— ?	β-Naphthol	M

6-Amino-5-nitroso-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

See, 1-Nitroso-2-naphthylamine-6-sulfonic Acid

***m*-Amino-phenol**



$= C_6H_7NO = 109$

FORMATION.—By the fusion of Metanilic Acid (3-amino-benzene-sulfonic acid) with caustic soda at about 280–290°

LITERATURE.—Ber. **32**, 2112–2124
Lange, Zwischenprodukte, #582–584

Dyes Derived from *m*-Amino-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
90	Chrome Brown P		Picramic Acid	M
	ANILINE BLACK GROUP			
923	Fuscamine	I '14:— 54,005 M '19:— ? I '20:— 1,600 (M '20:—168,459)	*m*-Amino-phenol (x mols) [Oxidation on hair]	Fur

***p*-Amino-phenol**

$= C_6H_7NO = 109$

STATISTICS.—Imported '14:— 10,631 lbs.
Manufactured '17:— ?
Manufactured '18:—113,428 lbs.
Manufactured '19:—128,627 lbs.
Manufactured '20:— 41,474 lbs.

FORMATION.—Phenol is treated with sodium nitrite in the cold and the resulting *p*-nitroso-phenol is reduced with sodium sulfide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 117
Lange, Zwischenprodukte, #585–589

Dyes Derived from *p*-Amino-phenol

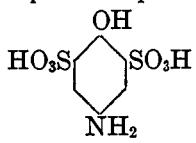
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	STILBENE DYE			
14	Diphenyl Chrysoine	I '14:— 9,898	*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols)	D
	MONOAZO DYE			
84	Azo Chromine		Pyrogallol	M

Dyes Derived from *p*-Amino-phenol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
709	Italian Green	I '14:— 298 M'18:— ? I '20:— 2,603	[Sulfur, etc.]	S
717	Vidal Black I	I '14:— 7,495	[Na_2S+S]	S
724	Immedial Black	I '14:— 54,696 M'18:— ?	1-Chloro-2: 4-dinitro-benzene [S+Na_2S]	S
725	Immedial Dark Brown A Immedial Brown B	I '14:— 23,887 M'18:— ?	1-Chloro-2: 4-dinitro-benzene [NaOH; S+Na_2S]	S
726	Pyrogene Direct Blue Pyrogene Blue	I '14:— 10,934 I '20:— 2,498	1-Chloro-2: 4-dinitro-benzene [Alcohol; S+Na_2S]	S
733	Immedial Indone	I '14:— 4,236	*o*-Toluidine [S+Na_2S]	S
734	Pyrogene Yellow	I '14:— 18,515 I '20:— 2,701	*p*-Nitro-benzyl chloride	S
	ANILINE BLACK GROUP			
923	Ursol P	I '14:— 54,005 M'19:— ? I '20:— 1,600 M'20:—168,459	*p*-Amino-phenol (x mols) [Oxidation]	Fur

4-Amino-1-*p*henol-2: 6-disulfonic Acid (*OH* = *1*) (*C. A. nomcn.*)

p-Amino-phenol-*o*-disulfonic Acid



$= C_6H_7NO_7S_2 = 269$

Note.—Position of the sulfonic groups not fully established.

FORMATION.—Nitroso-dimethyl-aniline hydrochloride or nitroso-phenol is introduced into a solution of sodium bisulfite, and warmed to effect solution. Then concentrated hydrochloric is added and the liquor boiled for two hours, using direct steam

LITERATURE.—Ger. Pat. 65,236
Beil. spl. II, 492
Lange, Zwischenprodukte, #1154

Dye Derived from 4-Amino-1-phenol-2: 6-disulfonic Acid

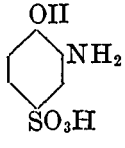
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
158	MONOAZO DYE Chrome Brown RR	I '14:—7,241 M '17:— ? I '20:—2,183	Pyrogallol	M

p-Amino-phenol Ethyl Ether

See, *p*-Phenetidine

2-Amino-1-phenol-4-sulfonic Acid (*C. A. nomen. OH = 1*)

o-Amino-phenol-*p*-sulfonic Acid



$= C_6H_7NO_4S = 189$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—Chloro-benzene is sulfonated and nitrated. The chloro-body is then hydrolyzed to the phenol by boiling with caustic soda, and finally reduced to 2-amino-phenol-4-sulfonic acid by means of sodium sulfide

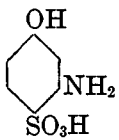
LITERATURE.—Cain, Intermediate Products (2d Ed.), 129

Dyes Derived from 2-Amino-1-phenol-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
154	Acid Alizarin Brown B Palatine Chrome Brown W	I '14:— 18,264 M '17:— ? M '18:— ? M '19:— ? I '20:— 845 M '20:— ?	*m*-Phenylene-diamine	M
155	Acid Alizarin Garnet R	I '20:— 201 M '20:— ?	Resorcinol	M
156	Acid Alizarin Violet N Palatine Chrome Violet	I '14:— 1,199 M '19:— ? M '20:— ?	β-Naphthol	ACr
157	Diamond Black PV	I '14:—285,074 M '20:— ?	1:5-Dihydroxy-naphthalene	M

3-Amino-1-phenol-4-sulfonic Acid (*C. A. nomen. OH = 1.*)

Amino-phenol-sulfonic Acid III



$= C_6H_7NO_4S = 189$

FORMATION.—By fusion with caustic soda of the aniline-disulfonic acid prepared by sulfonation of metanilic acid.

Note.—Amino-phenol-sulfonic acid III is not 5-amino-phenol-2-sulfonic acid

LITERATURE.—Ber. **39**, 3345

Lange, Zwischenprodukte, #942

Dyes Derived from 3-Amino-1-phenol-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
339	Brilliant Orange G	I '14:—6,321 M '17:— ?	Benzidine Salicylic Acid	D
	TRISAZO DYE			
481	Azo Corinth		Tolidine Naphthionic Acid Resorcinol	D

o-Amino-phenol-p-sulfonic Acid

See, 2-Amino-1-phenol-4-sulfonic Acid

Amino-phenol-sulfonic Acid III

See, 3-Amino-1-phenol-4-sulfonic Acid (OH = 1)

Amino-phenol-sulfonic Acid IV

3-Amino-1-phenol-6-sulfonic Acid (*not considered herein*)

Amino-phenol-sulfonic Acid V

3-Amino-1-phenol-5-sulfonic Acid (*not considered herein*)

p-(p-Amino-phenyl-azo)-benzene-sulfonic Acid

See, Amino-azo-benzene-sulfonic Acid

1-(p-Amino-phenyl)-5-methyl-benzothiazole (*C. A. nomen.*)

See, Dehydro-thio-p-toluidine

IV-Amino-2-phenyl-5-methyl-thiazol

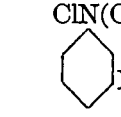
See, Dehydro-thio-p-toluidine

p-Amino-phenyl-toluthiazole

See, Dehydro-thio-p-toluidine

(m-Amino-phenyl)-trimethyl-ammonium Chloride

Trimethyl-m-amino-phenyl-ammonium chloride



$= C_9H_{15}N_2Cl = 186.5$

FORMATION.—*m*-Nitro-aniline by heating in methanol (methyl alcohol) solution, with hydrochloric acid is transformed into *m*-nitro-phenyl-trimethyl-ammonium chloride (and *m*-nitro-dimethyl-aniline). The *m*-nitro-phenyl-trimethyl-ammonium chloride is dissolved in water and reduced with zinc dust and hydrochloric acid

LITERATURE.—Lange, Zwischenprodukte, #549,564
Green, Organic Coloring Matters (1908), 12

Dyes Derived from (*m*-Amino-phenyl)-trimethyl-ammonium Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
60	Azo Phosphine GO	I '14:— 50	Resorcinol	B
	DISAZO DYES			
222	Janus Yellow G	I '14:—2,250 I '20:— 758	Resorcinol *m*-Nitro-aniline	B
240	Janus Red B	I '14:— 250 I '20:— 176	*m*-Toluidine β-Naphthol	B
	TRISAZO DYE			
435	Janus Brown B		α-Naphthylamine *or m*-Toluidine Aniline *m*-Phenylene-diamine	B

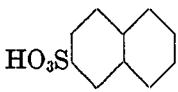
Amino-R Acid

2-Naphthylamine-3: 6-disulfonic Acid

β-Naphthylamine-disulfonic Acid R

β-Naphthylamine-α-disulfonic Acid

3-Amino-2: 7-naphthalene-disulfonic Acid (*C. A nomen.*)



$= C_{10}H_9NO_6S_2 = 303$

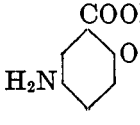
FORMATION.—By heating R salt with ammonia in an autoclave, in presence of ammonium bisulfite

LITERATURE.—Cain, Intermediate Products (2d Ed.), 207
Lange, Zwischenprodukte, #2594
Thorpe, Dic. Chemistry, 3, 604

Dyes Derived from Amino-R Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
120	Salmon Red	M '20:— ?	Dehydro-thio-*m*-xylidine	D
	DISAZO DYES			
314	Pyramine Orange 2R	I '14:— 2,789	Benzidine Nitro-*m*-phenylenediamine	D
315	Congo Orange R	I '14:— 1,623 I '20:— 75	Benzidine Phenol [Ethylation]	D
316	Brilliant Congo G		Benzidine Broenner's Acid	D
332	Dianil Garnet B Benzo Fast Red	I '14:— 5,985 I '20:— 3,799	Benzidine Gamma Acid	D
358	Brilliant Dianol Red R Diphenyl Red	I '14:—14,305 I '20:— 3,704	Dichloro-benzidine Amino-R Acid (2 mols)	D
359	Trypan Red		Benzidine-sulfonic Acid Amino-R Acid (2 mols)	Medicinal
369	Brilliant Purpurin R	I '14:— 8,051	Tolidine Naphthionic Acid	D
370	Brilliant Congo R	I '14:—19,133 I '20:—11,129	Tolidine Broenner's Acid	D
373	Congo Orange R	I '14:— 7,027 I '20:— 254	Tolidine Phenol [Ethylation]	D

5-Amino-salicylic Acid



$= C_7H_7NO_3 = 153$

STATISTICS.—Imported '14:— 9,188 lbs.
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—37,769 lbs.
Manufactured '20:— ?

FORMATION.—(1) From the corresponding nitro-salicylic acid by reduction. (2) By reducing the azo-dye, benzene-azo-salicylic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 150

Dyes Derived from 5-Amino-salicylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
275	Diamond Black F	I '14:—462,306 M '17:— ? M '18:— ? M '19:—222,938 I '20:— 2,226 M '20:— ?	α-Naphthylamine Nevile-Winther Acid *or* 1-naphthol-5-sulfonic Acid	ACr
276	Diamond Green B	I '14:— 8,622 M '18:— ? I '20:— 4,016	α-Naphthylamine 1: 8-Dihydroxy-naphthalene- 4- sulfonic Acid	ACr
277	Anthracene Acid Black DSF	I '14:— 17,793	1-Naphthylamine-6- *and* 7-sulfonic Acids, etc.	M
	TETRAKISAZO DYE			
492	Anthracene Acid Brown B		1-Naphthylamine-6-sulfonic Acid (2 mols) *m*-Phenylene-diamine Amino-salicylic Acid (2 mols)	M ACr
	TRIPHENYL-METHANE DYE			
550	Chrome Bordeaux		Hydrol [Oxidation]	M

Amino-Schaeffer's Acid

See, Broenner's Acid

1-(4-Amino-?-sulfo-phenyl)-5-methyl-benzothiazole (*C. A. nomen.*)

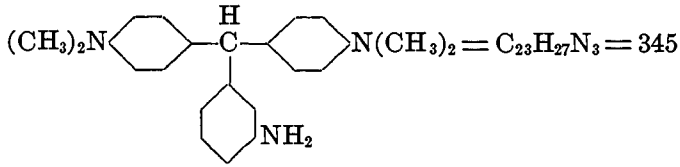
See, Dehydro-thio-*p*-toluidine-sulfonic Acid

4-Amino-4: 5-sultam-1: 3: 5-naphthalene-trisulfonic Acid (*C. A. nomen.*)

See, 1: 8-Naphthasultam-2: 4-disulfonic Acid

***m*-Amino-tetramethyl-*p'*: *p''*-diamino-triphenyl-methane**

N': *N'*: *N''*: *N''*-Tetramethyl-*m*: *p'*: *p''*-methenyl-trisaniline (*C. A. nomen.*)



$= C_{23}H_{27}N_3 = 345$

FORMATION.—*m*-Nitro-benzaldehyde and dimethyl-aniline are condensed in the presence of acids or zinc chloride to *m*-nitro-tetramethyl-*p*: *p*-diamino-triphenyl-methane, which by reduction gives the *m*-amino-derivative

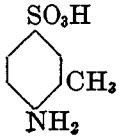
LITERATURE.—Schultz, Chemie Steinkohlenteers (3 aufl.), **1**, 115, 116.

Dye Derived from *m*-Amino-tetramethyl-*p'*: *p''*-diamino-triphenyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
510	Azo Green		Salicylic Acid	M

4-Amino-*m*-toluene-sulfonic Acid (*C. A. nomen. $SO_3H = 1$*)

o-Toluidine-*m*-sulfonic Acid ($CH_3 = 1$)



$= C_7H_9NO_3S = 187$

FORMATION.—From *o*-toluidine acid sulfate by heating in an oven

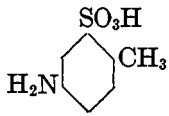
LITERATURE.—Cain, Intermediate Products (2d Ed.), 57

Dyes Derived from 4-Amino-*m*-toluene-sulfonic Acid ($SO_3H=1$)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYE			
24	Pigment Fast Yellow R		3-Methyl-1-phenyl-5-pyrazolone	CL
	MONOAZO DYE			
151	Orange RO, T	I '14:—90,747 M '17:— ? M '19:— ? I '20:— 20 M '20:— ?	β-Naphthol	A

5-Amino-*o*-toluene-sulfonic Acid (*C. A. nomen.* $SO_3H=1$)

p-Toluidine-*o*-sulfonic Acid ($CH_3=1$)



$=C_7H_9NO_3S=187$

STATISTICS.—Manufactured '20:— ?

FORMATION.—From *p*-toluidine sulfate by heating in oven (baking process)

LITERATURE.—Green, Organic Coloring Matters (1908), 22
Lange, Zwischenprodukte, #839,237

Dyes Derived from 5-Amino-*o*-toluene-sulfonic Acid ($SO_3H=1$)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
150	Fast Yellow N		Diphenylamine	A
152	Lithol Rubine B Permanent Red 4B	I '14:—101,395 M '19:— ? I '20:— 2,983 M '20:— ?	3-Hydroxy-2-naphthoic Acid	CL

Dyes Derived from 5-Amino-*o*-toluene-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
852	Alizarin Direct Violet R	I '20:— 251	Quinizarin	A
865	Alizarin Direct Green G	I '14:— 2,000 I '20:— 31,851 M '20:— ?	Quinizarin *p*-Toluidine-3-sulfonic Acid (2 mols)	ACr

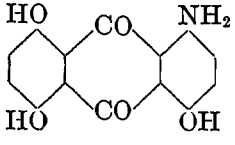
3′-Amino-(*p*-toluene-sulfo)-*p*-toluide (*C. A. nomen.*)
See, *N*-(3-Amino-4-methyl-phenyl)-*p*-toluene-sulfamide

4-(4-Amino-*m*-tolyl-azo)-*m*-toluene-sulfonic Acid (*C. A. nomen.*)
See, *o*-Amino-azo-toluene-sulfonic Acid

1-(4-Amino-*m*-tolyl)-3: 5-dimethyl-benzothiazole (*C. A. nomen.*)
See, Dehydro-thio-*m*-xylidine

1-(6-Amino-*m*-tolyl)-3: 5-dimethyl-benzothiazole (*C. A. nomen.*)
See, *iso*-Dehydro-thio-*m*-xylidine

1-Amino-4: 5: 8-trihydroxy-anthraquinone
8-Amino-1: 4: 5-trihydroxy-anthraquinone (*C. A. nomen.*)



$= C_{14}H_9NO_5 = 271$

FORMATION.—4: 8-Dinitro-anthrarufin (*p*-dinitro-anthrarufin) is heated with sulfuric and boric acids at temperature of water bath, forming 1-nitro-4: 5: 8-trihydroxy-anthraquinone. (At higher temperatures the 1: 4: 5: 8-tetrahydroxy-anthraquinone is formed.) By reduction of the 1-nitro-derivative, the desired amino-derivative results.

LITERATURE.—Ger. Pat. 125,579; Frdl. **6**, 335; Chem. Zen. 1901, II, 1189

Dye Derived from 1-Amino-4: 5: 8-trihydroxy-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
823	Algol Violet B	I '20:—69	Benzoyl chloride	V

Andresen's Acid

See, 1-Naphthol-3: 8-disulfonic Acid

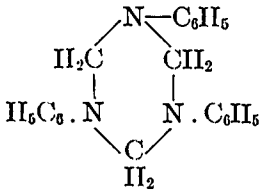
This trivial name also applied to:—

2-Naphthylamine-4: 7-disulfonic Acid

Anhydro-formaldehyde-aniline

1: 3: 5-Triphenyl-hexahydro-*s*-triazine (*C. A. nomen.*)

Formaniline



$= C_{21}H_{21}N_3 = 315$

Note.—Some of the older books give the formula as $C_6H_5N{:}CH_2$

STATISTICS.—Manufactured 1920, but in an undisclosed amount.

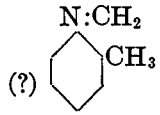
FORMATION. By condensation of aniline and formaldehyde

LITERATURE. —Beilstein, Organische Chemie (3d auf.), **2**, spl. 233
Cain and Thorpe, Synthetic Dyestuffs, 90

Dye Derived from Anhydro-formaldehyde-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
511	Parafuchsine	M '14:—65,026	Aniline	B
	Paramagenta	M '18:— ?	Aniline hydrochloride	
		M '19:— ?	[Nitro-benzene and	
		M '20:— ?	ferric chloride]	

Anhydro-formaldehyde-*o*-toluidine



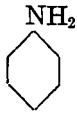
$= C_8H_9N = 119$

FORMATION.—By condensation of *o*-toluidine and formaldehyde

Dyes Derived from Anhydro-formaldehyde-*o*-toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dy App cati Cla*
	TRIPHENYL-METHANE DYE			
513	New Fuchsine O	I '14:—300 M '18:— ? M '19:— ? M '20:— ?	*o*-Toluidine *o*-Toluidine hydrochloride [*o*-Nitro-toluene and ferrous chloride]	B

Aniline



$= C_6H_7N = 93$

STATISTICS.—Imported '14:— 4,553,028 lbs.
Manufactured '17:—30,149,397 lbs.
Manufactured '18:—25,867,488 lbs.
Manufactured '19:—25,792,695 lbs.
Manufactured '20:—41,259,142 lbs.

FORMATION.—Benzene is nitrated to nitro-benzene with mixed nit and sulfuric acid. The nitro-benzene is reduced to aniline wi iron turnings and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 40
Lange, Zwischenprodukte, #69–82

Dyes Derived from Aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	STILBENE DYE			
12	Diphenyl Citronine G		Aniline (2 mols) Dinitro-dibenzyl-disulfonic Acid *or* Dinitro-distilbene-disulfonic Acid *or* *p*-Nitro-toluene-*o*-sulfonic Acid (2 mols)	D
	PYRAZOLONE DYES			
19	Flavazine L Fast Light Yellow	I '14:— 38,908 I '20:— 9,327	3-Methyl-1-*p*-sulfophenyl-5-pyrazolone *or* Phenyl-hydrazine-*p*-sulfonic Acid Aceto-acetic Ethyl Ester	A
20	Flavazine S	I '14:— 81,375 I '20:— 1,500	1-*p*-Sulfophenyl-5-pyrazolone-3-carboxylic Acid *or* Phenyl-hydrazine-*p*-sulfonic Acid Oxal-acetic Ester	A
	MONOAZO DYES			
31	Amino-azo-benzene Spirit Yellow	M '17:— ? M '18:— 52,283 M '19:— ? M '20:— ?	Aniline (2 mols)	ss
32	Butter Yellow Oil Yellow	I '14:— 4,062 M '17:— 33,180 M '18:— 27,669 M '19:— 31,156 M '20:— 74,182	Dimethyl-aniline	ss
33	Chrysoidine	I '14:— 63,303 M '17:—195,756 M '18:—376,495 M '19:—314,581 M '20:—585,648	*m*-Phenylene-diamine	B

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
34	Chrysoidine R	I '14:—111,006 M '17:— 58,115 M '18:—137,035 M '19:—220,542 M '20:—186,793 I '20:— 1,102	*m*-Tolylene-diamine	B
35	Sudan G	I '14:— 798	Resorcinol	ss
36	Sudan I Oil Orange	I '14:— 4,554 M '17:— 32,455 M '18:— 29,670 M '19:— 75,868 M '20:—116,624	β-Naphthol	ss
37	Ponceau 4 GB Croceine Orange	I '14:— 13,046 M '17:— ? M '18:— 30,824 M '19:— 17,274 M '20:— 96,573	Schaeffer's Acid	A
38	Orange G	I '14:— 48,456 M '17:— ? M '18:— ? M '19:— ? M '20:—120,874 I '20:— 100	G Acid	A
39	Ponceau G	M '17:— ? M '19:— ?	R Acid	A
40	Chromotrope 2R	I '14:— 5,000 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Chromotropic Acid	A
41	Fast Acid Fuchsine B	M '18:— ? M '19:— 26,699 M '20:— 30,678	H Acid	A

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
42	Amido Naphthol Red G	I '14:— 3,500 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,028 M '20:—132,637	Acetyl-H Acid	A
43	Tolane Red B, G		K Acid	A
44	Azo Archil R		2 R Acid	A
45	Brilliant Lake Red R	I '14:— 31,674 I '20:— 1,071	3-Hydroxy-2-naphthoic Acid	CL
58	Alizarin Yellow R	I '14:— 97,057 M '17:—215,468 M '18:—385,910 M '19:—130,424 I '20:— 860 M '20:— 83,334	Salicylic Acid [Nitration]	M
124	Diazine Green S	I '14:— 1,340	*o*-Toluidine *p*-Tolylene-diamine [*or* Safranine] Dimethyl-aniline	B
125	Diazine Black	I '14:— 2,630 I '20:— 701	*o*-Toluidine *p*-Tolylene-diamine [*or* Safranine] Phenol	B
126	Indoine Blue R Union Blue R	I '14:— 15,353 M '17:— ? M '18:— ?	*o*-Toluidine *p*-Tolylene-diamine [*or* Safranine] β-Naphthol	B
127	Methyl Indone B	M '17:— ?	*o*-Toluidine *p*-Tolylene-diamine [*or* Safranine] ["Amino-naphthols"]	B

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
128	Janus Gray B		*o*-Toluidine *p*-Tolylene-diamine [*or* Safranine], etc.	B
182	Fast Sulfon Violet 5BS Brilliant Sulfon Red B	I '14:— 4,871 I '20:— 4,740	H Acid Benzene- (*or* Toluene-) sulfonyl Chloride	A
	DISAZO DYES			
215	Blue Black N	I '14:— 2,653	K Acid *p*-Nitro-aniline	A
216	Domingo Blue Black B		1-Amino-8-naphthol-3: 5-disulfonic Acid *p*-Nitro-aniline	A
217	Naphthol Blue Black	I '14:—431,027 M '17:—620,218 M '18:— 1,158,309 M '19:— 1,877,860 I '20:— 340 M '20:— 2,608,864	H Acid *p*-Nitro-aniline	A
219	Chrome Patent Green N		K Acid Picramic Acid	ACr
241	Neutral Gray G	I '14:— 2,546 M '19:— ? I '20:— 3,472 M '20:— ?	*α*-Naphthylamine Gamma Acid	D
242	Sulfone Black G		1-Naphthylamine-6-*and* 7-sulfonic Acid 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	A
270	Brilliant Croceine 9B		Amino-G Acid R *and* G Acids	A

Dyes Derived from Aniline *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES *(continued)*			
279	Benzo Fast Scarlet	I '14:— 36,674 M '19:— ? I '20:— 24,153	J Acid Phosgene	D
	TRISAZO DYES			
435	Janus Brown B		Trimethyl-*m*-amino-phenyl-ammonium chloride *or* *p*-Amino-benzyl-diethylamine α-Naphthylamine *or* *m*-Toluidine *m*-Phenylene-diamine	B
444	Crumpsall Direct Fast Brown B		Benzidine Salicylic Acid Gamma Acid	D
445	Crumpsall Direct Fast Brown O		Benzidine Salicylic Acid Phenyl-gamma Acid	D
462	Erie Direct Black GX Direct Deep Black E, EW	I '14:— 1,246,536 M '17:— ? M '18:— ? M '19:— 7,250,007 M '20:— 7,736,994	Benzidine H Acid *m*-Phenylene-diamine	D
463	Erie Direct Black RX Cotton Black E	I '14:—248,567 M '19:— ? M '20:— 2,050,741	Benzidine H Acid *m*-Tolylene-diamine	D
464	Erie Direct Green ET	M '17:— ? M '18:— ? M '19:— 69,700 M '20:— ?	Benzidine H Acid Phenol	D
465	Columbia Black Green D		Benzidine Salicylic Acid 1-Amino-8-Naphthol-4-sulfonic Acid	D

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
482	Alizarin Yellow FS		*o*-Toluidine *and* *p*-Toluidine [*or* Fuchsine] Salicylic Acid (3 mols)	M
	TRIPHENYL-METHANE DYES			
511	Parafuchsine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	*p*-Toluidine Aniline (2 mols) [Iron and nitro-benzene or arsenic Acid] *or* *p*-Nitro-benzaldehyde Aniline sulfate (2 mols) [Zinc chloride; ferrous chloride] *or* *p*: *p*'Diamino-diphenyl-methane *or* anhydro-formaldehyde-aniline [Nitro-benzene and ferric chloride]	B
512	Fuchsine Magenta	I '14:— 87,102 M '17:— 17,739 M '18:— 71,675 M '19:—155,830 I '20:— 189 M '20:—284,285	*p*-Toluidine *o*-Toluidine [Nitro-benzene, iron and zinc chloride or arsenic acid]	B
514	Red Violet 5R	I '14:— 331 I '20:— 750	[Magenta methylated or ethylated] *or* *o*-Toluidine *p*-Toluidine [Nitro-benzene, iron and zinc chloride or arsenic acid] [Methylation or ethylation]	B

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
520	Light Blue Superfine Spirit Soluble Diphenylamine Blue	I '14:— 2,149	[Para-rosaniline triphenylated] *or* Aniline (5 mols) *p*-Toluidine [Benzoic Acid]	ss
521	Spirit Blue Aniline Blue	I '14:— 50,563 M '17:— ? M '18:— ? M '19:— ? I '20:— 723 M '20:— ?	[Magenta phenylated] *or* Aniline (2-4 mols) *o*-Toluidine *p*-Toluidine [Benzoic Acid]	ss
524	Fuchsine S Acid Magenta	I '14:— 19,098 I '20:— 524 M '20:— ?	[Magenta sulfonated] *or* *o*-Toluidine *p*-Toluidine [sulfonation]	A
525	Red Violet 5RS		[Magenta ethylated and sulfonated] *or* *o*-Toluidine *p*-Toluidine [Ethylation and sulfonation]	A
526	Acid Violet 4RS		[Magenta dimethylated, trisulfonated] *or* *o*-Toluidine *p*-Toluidine [Dimethylation, Trisulfonation]	A
535	Methyl Alkali Blue	I '14:— 273 M '18:— ? M '19:— ? I '20:— 29	[Triphenyl-*p*-rosaniline sulfonated] *or* *p*-Toluidine Aniline (5 mols) [Sulfonation]	A

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
536	Alkali Blue	I '14:—286,751 M '17:— ? M '18:— 43,184 M '19:— 77,796 I '20:— 6,778 M '20:— 74,253	[Spirit Blue *or* Triphenyl-*p*-rosaniline+di-phenyl-rosaniline sulfonated] *or* *o*-Toluidine *p*-Toluidine Aniline (3-5 mols) [Sulfonation]	A
537	Methyl Blue for Silk Marine Blue B	I '14:— 34,867 M '18:— ? M '19:— ? I '20:— 2,395 M '20:— ?	[Triphenyl-*p*-rosaniline mono- *and* di-sulfonated] *or* *o*-Toluidine *p*-Toluidine Aniline (4 mols) [Sulfonation]	A
538	Methyl Blue Cotton Blue	I '14:— 50,255	[Triphenyl-*p*-rosaniline di- *and* tri-sulfonated] *or* *o*-Toluidine *p*-Toluidine Aniline (4 mols) [Di-and Tri-sulfonation]	B
539	Water Blue Soluble Blue	I '14:— 91,152 M '18:— ? M '19:— 16,315 I '20:— 1,387 M '20:— 98,770	[Spirit Blue *or* Triphenyl-*p*-rosaniline+diphenyl-rosaniline di- *and* tri-sulfonated] *or* *o*-Toluidine *p*-Toluidine Aniline (3-5 mols) [Di- *and* tri-sulfonation]	A

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
540	Pacific Blue		[*p*-Rosaniline + diamino-diphenyl-methane and sulfonation] *or* *o*-Toluidine *p*-Toluidine Diamino-diphenyl-methane [Sulfonation]	D
541	Brilliant Dianil Blue 6G		[β-Naphthyl-rosaniline sulfonated] *or* β-Naphthylamine (3 mols) *o*-Toluidine *p*-Toluidine [Disulfonation]	B
	XANTHONE DYES			
572	Rhodamine G	I '14:— 2,648 I '20:— 517	[Rhodamine B heated with aniline to remove one C_2H_5 group] *or* Phthalic anhydride Diethyl-*m*-amino-phenol (2 mols)	B
580	Fast Acid Violet B	I '14:— 20,688 M '19:— ? I '20:— 2,907	[Dichloro-fluoresceine and aniline *or* *p*-toluidine; sulfonation] *or* Aniline (2 mols) Phthalic Anhydride Resorcinol [PCl_5; Sulfonation]	A
	ACRIDINE DYE			
606	Phosphine	I '14:—168,175 M '17:— ? M '18:— ? M '19:— 14,648 I '20:— 19,259 M '20:— ?	[Magenta by-product] *or* *p*-Toluidine *o*-Toluidine	B

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES			
622	Delphine Blue B	M '17:— ? M '18:— ? M '19:— 43,827 I '20:— 29,643 M '20:— 76,719	Nitroso-dimethyl-aniline Gallic Acid [Sulfonation] *or* [Gallocyanine treated with aniline; Sulfonation]	M
630	Cyanazurine		Nitroso-dimethyl-aniline Gallamide [Reduction]	M
640	Modern Azurine DH		Gallic Acid Methyl Ester Nitroso-dimethyl-aniline	M
646	Coreine AR		Gallamide Nitroso-diethyl-aniline *or* Diethyl-amino-azo- benzene [Sulfonation] *or* [Coreine RR; Sulfonation]	M
	AZINE DYES			
672	Azo Carmine G	I '14:— 17,500 M '17:— ? M '18:— ? M '19:— ? I '20:— 196 M '20:— ?	Aniline (3 mols) α-Naphthylamine [Disulfonation]	A
673	Azo Carmine B	I '20:— 549	Aniline (3 mols) α-Naphthylamine [Trisulfonation]	A

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES (*continued*)			
674	Rosinduline 2G	I '20:— 201	Aniline (3 mols) α-Naphthylamine [Trisulfonation; heated to 160°]	A
675	Rosinduline G	I '20:— 40	Aniline (2 mols) 1-Nitroso-2-naphthyl-amine-6-sulfonic Acid	A
679	Safranine	I '14:— 59,921 M '17:— ? M '18:—106,591 M '19:—131,042 I '20:— 386 M '20:—149,629	*p*-Tolylene-diamine *o*-Toluidine	B
680	Methylene Violet BN	I '14:— 1,521 M '17:— ? I '20:— 33	Aniline (2 mols) Dimethyl-*p*-phenylene-diamine [Oxidation]	B
682	Nigramine		Nitroso-dimethyl-aniline	B
683	Safranine MN	I '14:— 198 M '18:— ? M '19:— ? M '20:— ?	Dimethyl-*p*-phenylene-diamine *o*- *or* *p*-Toluidine [Oxidation]	B
684	Brilliant Rhoduline Red		N^3-Ethyl-4-*m*-tolylene-diamine Methyl-*o*-toluidine	B
686	Amethyst Violet		Diethyl-*p*-phenylene-diamine Diethyl-aniline [Oxidation]	A

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES (*continued*)			
687	Rosolane O	I '20:— 1,083	*p*-Amino-diphenyl-amine *o*-Toluidine [Oxidation]	B
688	Rosolane Mauve	I '14:— 796 I '20:— 3	Toluidines (3 mols) [Oxidation]	B
693	Milling Blue	I '14:— 3,082	Aniline (3 mols) α-Naphthylamine (2 mols) [Sulfonation] *or* Aniline (2 mols) Phenyl-α-naphthyl-amine (2 mols) Phenol [Sulfonation]	M
696	Indamine Blue		Aniline (excess) Amino-azo-benzene	B
697	Induline, Spirit Soluble	I '14:— 25,342 M '17:— ? M '18:— 8,589 M '19:—436,201 M '20:—140,400	Aniline (excess) Amino-azo-benzene	ss
698	Nigrosine, Spirit Soluble	I '14:—186,595 M '17:—302,706 M '18:—314,151 M '19:—346,167 M '20:—919,242	Aniline (excess) Nitro-benzene [Iron] *or* Aniline (excess) Nitro-phenol	ss
699	Induline, Water Soluble	I '14:— 29,177 M '17:—183,739 M '18:— 91,724 M '19:—130,704 I '20:— 500 M '20:—168,048	Aniline (excess) Amino-azo-benzene [Sulfonation]	A

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES (*continued*)			
700	Nigrosine, Water Soluble	I '14:—398,112 M '17:— 1,968,458 M '18:— 1,191,343 M '19:— 1,660,149 I '20:— 501 M '20:— 2,743,021	Aniline (excess) Nitro-benzene [Iron; Sulfonation] *or* Aniline (excess) Nitro-phenol [Sulfonation]	A
702	Para Blue		Aniline (3-4 mols) *o*-Toluidine *p*-Toluidine *p*-Phenylene-diamine *or* [Spirit Blue and *p*-Phenylene-diamine]	B
	SULFUR DYES			
719	Thional Black	I '14:— 16,865	*p*- (*o*- *or m*-)Nitro-aniline *o*-Nitro-phenol (2 mols) [Na_2S+S]	S
729	Kryogene Pure Blue R		Aniline (2 mols) Dimethyl-*p*-phenylene-diamine [Na_2S+S] *or* [Methylene Violet; S, Na_2S]	S
	ANTHRAQUINONE AND ALLIED DYES			
851	Alizarin Direct Blue B	I '14:— 10,201 I '20:— 2,982	1:5- (*and* 1:8-) Amino-anthraquinone-sulfonic Acid [Dibromination, Sulfonation]	A
857	Erweco Alizarin Acid Blue R		Dinitro-anthraflavin-disulfonic Acid Aniline (2 mols) [Sulfonation]	ACr

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
861	Anthraquinone Blue SR	I '20:— 917	Aniline (2 mols) Tetrabromo-1: 5-diamino-anthraquinone [Sulfonation]	ACr
862	Alizarin Blue Black B	I '14:— 54,706 I '20:— 28,802	Purpurin [*or* through Alizarin, *or* 2-Anthraquinone-sulfonic acid] [Sulfonation]	M
864	Anthraquinone Green GX	I '14:— 1,709 I '20:— 2,531	1-Nitro-anthraquinone-6-sulfonic Acid [Halogenation] *p*-Toluidine	ACr
	INDIGO GROUP DYES			
874	Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 I '20:—520,347 M '20:— 18,178,231	Aniline (2 mols) [Chloro-acetic, Sodamide] [*or* CS_2, KCN, etc.]	V
876	Indigo MLB Indigo White		Aniline (2 mols) [Chloro-acetic, Sodamide, Reduction] [*or* CS_2, KCN, etc., Reduction] [*or* Indigo, Reduction]	V

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 I '20:— 5,512 M '20:— 1,395,000	Aniline (2 mols) etc. [*or* Indigo, Sulfonation]	A
878	Indigotine P		Aniline (2 mols), etc. [*or* Indigo, Sulfonation]	A
879	Brom Indigo Rathjen Indigo MLB/RR	I '14:— 53,610 M '20:— ?	Aniline (2 mols), etc. [*or* Indigo, Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 M '20:— ?	Aniline (2 mols), etc. [*or* Indigo, Bromination]	V
881	Dianthrene Blue 2B Bromo Indigo Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Aniline (2 mols), etc. [*or* Indigo, Bromination]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	Aniline (2 mols), etc. [*or* Indigo, Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Aniline (2 mols), etc. [*or* Indigo, Bromination]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Aniline (2 mols), etc. [*or* Indigo, Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	Aniline (2 mols), etc. [*or* Indigo, Chlorination]	V

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
886	Brilliant Indigo BASF/G	I '14:— 12,057	Aniline (2 mols), etc. [*or* Indigo, Chlorination, Bromination]	V
889	Indigo Yellow 3G		Aniline (2 mols), etc. Benzoyl chloride [*or* Indigo, Benzoyl chloride]	V
890	Ciba Yellow G	I '14:— 48	Aniline (2 mols), etc. Benzoyl Chloride [Bromination] [*or* Indigo Yellow 3G, Bromination]	V
	ANILINE BLACK GROUP			
922	Aniline Black	I '14:— 1,470 M '19:— ? M '20:— ?	Aniline (x mols) [Oxidation on fiber]	MF

Aniline-2: 4-disulfonic Acid

See, 4-Amino-*m*-benzene-disulfonic Acid

Aniline-2: 5-disulfonic Acid

See, 2-Amino-*p*-benzene-disulfonic Acid

Aniline-*p*-sulfonic Acid

See, Sulfanilic Acid

2-Anilino-5-amino-benzene-sulfonic Acid (*C. A. nomen.*)

See, *p*-Amino-diphenylamine-2-sulfonic Acid

4-(*p*-Anilino-anilino)-*o*-cresol (*C. A. nomen.*)

See, 4-Phenylamino-4'-hydroxy-(phenyl-3'-tolylamine)

***p*-(*p*-Anilino-anilino)-phenol** (*C. A. nomen.*)

See, 4-Phenylamino-4'-hydroxy-diphenylamine

Anilino-benzene-sulfonic Acid (*C. A. nomen.*)

See, Diphenylamine-sulfonic Acid

8-Anilino-5-(*p*-hydroxy-anilino)-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

See, 4-(*p*-Hydroxy-phenyl-amino)-1-phenylamino-naphthalene-8-sulfonic Acid

8-Anilino-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

See, Phenyl-1-naphthylamine-8-sulfonic Acid

7-Anilino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)

See, Phenyl-gamma Acid

***m*-Anilino-phenol** (*C. A. nomen.*)

See, *m*-Hydroxy-diphenylamine

2-Anilino-3-pseudoindolone (*C. A. nomen.*)

See, 2-Isatin Anilide

Aniline Salt

Note.—This is Aniline Hydrochloride.

See, Aniline

***o*-Anisidine** (*$NH_2=1$*)

$= C_7H_9NO = 123$

STATISTICS.—Imported '14:—1,411 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

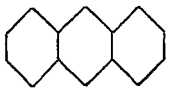
FORMATION.—*o*-Nitro-anisole is reduced at 100–110° by means of iro and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 71

Dyes Derived from *o*-Anisidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
93	Pigment Purple A Sudan R	I '14:— 99	β-Naphthol	CL
94	Azo Eosine	I '14:—1,001 M '18:— ? M '19:— ?	Nevile Winther Acid	A
95	Azo Cochineal Cochineal Scarlet B	I '14:— 952	1-Naphthol-4: 8-disulfonic Acid	A
96	Chrome Fast Yellow GG	I '14:— 150 I '20:— 500	Salicylic Acid	M
	DISAZO DYE			
259	Ponceau 10 RB	I '14:— 201	Sulfanilic Acid Croceine Acid	A

Anthracene



$=C_{14}H_{10}=178$

STATISTICS.—Imported '14:—$37,240 in value
Manufactured '17:— ?
Manufactured '18:— 225,552 lbs.
Manufactured '19:—1,381,944 lbs.
Imported '19:— 51,895 lbs.
Manufactured '20:— 711,258 lbs.
Imported '20:— 648,095 lbs.

FORMATION.—From coal-tar by extraction and purification

LITERATURE.—Cain, Intermediate Products (2d Ed.), 244

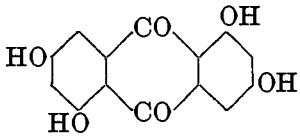
USES.—For manufacture of anthraquinone and anthraquinone derivatives

Dye Derived from Anthracene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
791	Indanthrene Olive G	I '20:—11 M '18:— ?	[Sulfur]	V

Anthrachrysone

1:3:5:7-Tetrahydroxy-anthraquinone



$= C_{14}H_8O_6 = 272$

FORMATION.—From 3:5-Dihydroxy-benzoic acid by heating with concentrated sulfuric acid

LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 483
Beil. III, 436; III spl. 312

Dyes Derived from Anthrachrysone

Schultz Number for Dyes	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
790	Acid Alizarin Blue BB	I '14:—26,642 I '20:— 3,539	[Sulfonation, Nitration, Reduction, etc.]	ACr
796	Acid Alizarin Green G	I '20:— 1,334	[Sulfonation, Nitration, Sodium sulfide reduction]	ACr

1:9-Anthradiol (*C. A. nomen.*)

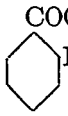
See, 1-Hydroxy-anthranol

Anthraflavic Acid

2:6-Dihydroxy-anthraquinone (*not considered herein*)

Anthranilic Acid (*C. A. nomen. COOH=1*)

o-Amino-benzoic Acid



$= C_7H_7NO_2 = 137$

STATISTICS.—Imported '14:— 106 lbs.
Manufactured '17:— ?
Manufactured '18:—11,826 lbs.
Manufactured '19:—22,976 lbs.
Manufactured '20:— ?

FORMATION.—Phthalic anhydride is melted and heated to 240°, whereupon ammonia gas is introduced, forming phthalimide. This latter is treated with sodium hypochlorite, forming anthranilic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 147
Lange, Zwischenprodukte, #357–367, 1619

Dyes Derived from Anthranilic Acid

Schultz Number for Dye	*Ordi ary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
200	Lake Red D	I '14:— 2,428 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	β-Naphthol	CL
201	Pigment Scarlet G	M '17:— ? M '18:— ? M '19:— ?	Schaeffer's Acid	CL
202	Acid Alizarin Red B Palatine Chrome Red B	I '14:— 7,374 M '18:— ? M '19:—28,081 I '20:— 1,342 M '20:—67,817	R-Acid	ACr CL

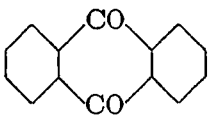
Dyes Derived from Anthranilic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
832	Indanthrene Violet RN	I '14:—11,667 I '20:— 49	Anthranilic Acid (2 mols) 1:5-Dichloro-anthraquinone	V

Anthrano

See, 9-Anthrol

Anthraquinone



$= C_{14}H_8O_2 = 208$

STATISTICS.—Imported '14:— 29,850 lbs.
Manufactured '18:— ?
Manufactured '19:—294,260 lbs.
Manufactured '20:—539,619 lbs.

FORMATION.—(1) From anthracene by appropriate oxidation means; for example, chromic acid. (2) From *o*-benzoyl-benzoic acid by action of sulfuric acid. The *o*-benzoyl-benzoic acid is prepared by reacting together phthalic anhydride, benzene and aluminum chloride

LITERATURE.—Cain, Intermediate Products (2d Ed.), 244
Lange, Zwischenprodukte, #23, 648, 3065–3080

Dye Derived from Anthraquinone

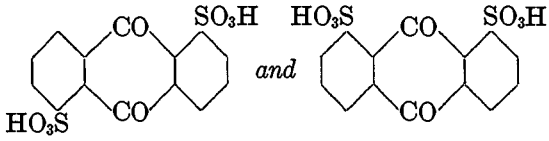
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
863	Anthraquinone Blue Green BXO	I '14:—6,552 I '20:— 849	[?]	A

Note.—Most of the dyes listed in the class "Anthraquinone and Allied Dyes" (*Schultz, #758–873*) *are derived indirectly from anthraquinone. These dyes are, however, not tabulated under anthraquinone, but under that intermediate from which directly derived.*

Anthraquinone-1: 5-*and*-1: 8-disulfonic Acids

Rho Acid *is trivial name for the 1: 5-disulfonic Acid*

Chi Acid *is trivial name for the 1: 8-disulfonic Acid*



$= C_{14}H_8O_8S_2 = 368$

STATISTICS.—The anthraquinone-1: 5-disulfonate was manufactured in 1918, 1919, 1920 by one company. Amount was not disclosed

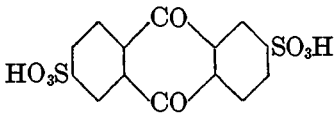
FORMATION.—Anthraquinone is sulfonated with strong oleum in the presence of mercury or mercuric oxide to a mixture of the 1: 5- *and* 1: 8-disulfonic acids, which are separated by crystallization

LITERATURE.—Cain, Intermediate Products (2d Ed.), 252
Lange, Zwischenprodukte, #3290–3293

USES.—The 1: 5-acid is employed for making anthrarufin, 1:5-dichloroanthraquinone, etc.

Anthraquinone-2: 6-disulfonic Acid

α-Anthraquinone-disulfonic Acid



$= C_{14}H_8O_8S_2 = 368$

FORMATION.—From anthraquinone by heating with 45 per cent oleum to 160–170° C., dilution with water, neutralization with caustic soda and evaporation until the 2: 6 acid crystallizes out (2: 7 acid in mother liquor)

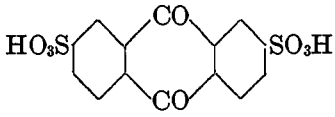
LITERATURE.—Cain, Intermediate Products (2d Ed.), 253
Lange, Zwischenprodukte, #3290

Dyes Derived from Anthraquinone-2: 6-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
785	Alizarin GI Flavopurpurin	I '14:—49,021	[Alkaline Fusion]	M
786	Alizarine Red 3WS		[Alkaline fusion, sulfonation]	M

Anthraquinone-2: 7-disulfonic Acid

β-Anthraquinone-disulfonic Acid



$= C_{14}H_8O_8S_2 = 368$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—From anthraquinone by heating with 45 per cent Oleum, dilution with water, neutralization with caustic soda, and evaporation until the 2: 6 disulfonic acid crystallizes out. The 2: 7 disulfonic acid is then obtained (as sodium salt) by evaporating this mother liquor to dryness

LITERATURE.—Cain, Intermediate Products (2d Ed.), 253
Lange, Zwischenprodukte, #3290

Dye Derived from Anthraquinone-2: 7-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
784	Alizarin SX Isopurpurin	I '14:—14,273 M '19:— ? I '20:— 49 M '20:— ?	[Alkaline fusion]	M

α-Anthraquinone-disulfonic Acid

See, Anthraquinone-2: 6-disulfonic Acid

β-Anthraquinone-disulfonic Acid

See, Anthraquinone-2: 7-disulfonic Acid

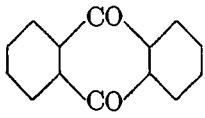
Anthraquinone-2-sulfonic Acid

Anthraquinone-β-sulfonic Acid

β Acid *or* Beta Acid

Silver salt (Sodium derivative)

β-Sulfonic Acid



$= C_{14}H_8O_5S = 288$

STATISTICS.—Manufactured 1918:— ?
Manufactured 1919:— ?
Manufactured 1920:— ?

FORMATION.—From anthraquinone by sulfonating with an equal weight of 45–50 per cent oleum and heating up to 160° C., diluting, neutralizing with caustic soda, and evaporating to crystallization of the sodium salt ("Silver salt")

LITERATURE.—Cain, Intermediate Products (2d Ed.), 251
Lange, Zwischenprodukte, #3156–3163

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
778	Alizarin	I '14:—202,392 M '17:— ? M '18:— ? M '19:— ? I '20:— 8,575 M '20:— ?	[Oxidation]	M
779	Alizarin Orange	I '14:— 14,239 M '19:— ? I '20:— 500 M '20:— ?	[Alizarin, Nitration]	M
780	Alizarin Red	I '14:— 81,919 M '17:— ? I '20:— 12,628	[Alizarin, Sulfonation]	M
781	Erweco Alizarin Acid Red BS		[Alizarin, Sulfonation]	M
783	Purpurin		[Alizarin, Oxidation]	M
787	Alizarin Bordeaux B	I '20:— 20	[Alizarin, Oxidation]	M
788	Alizarin Cyanine R	I '20:— 16,781	[Alizarin Bordeaux B, Oxidation]	M
797	Alizarin Garnet R	I '14:— 720	[4-Nitro-alizarin, Reduction]	M
798	Alizarin Maroon W	I '20:— 2,014	[Crude Nitro-alizarin, Reduction]	M
799	Alizarin Cyanine G	I '20:— 339	[Alizarin Cyanine R, Amidation]	M
854	Alizarin Viridine DG	I '20:— 11,397	[Alizarin Bordeaux B] *p*-Toluidine (2 mols) [Sulfonation]	M
862	Alizarin Blue Black B	I '14:— 54,706 I '20:— 28,802	[Purpurin] Aniline [Sulfonation]	M

Anthraquinone-β-sulfonic Acid

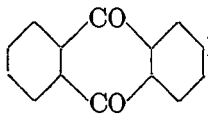
See, Anthraquinone-2-sulfonic Acid

2-Anthraquinone-urea Chloride

See, 2-Anthraquinonyl-urea Chloride

2-Anthraquinonyl-urea Chloride

2-Anthraquinone-urea Chloride



$= C_{15}H_8ClNO_3 = 286$

FORMATION.—From 2-Amino-anthraquinone in nitro-benzene solution by action of phosgene at 50°

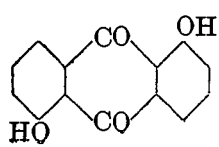
LITERATURE.—Lange, Zwischenprodukte, #3123

Dyes Derived from 2-Anthraquinonyl-urea Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
835	Helindone Orange GRN	I '20:— 74	2-Anthraquinonyl-urea chloride (2 mols)	V
836	Helindone Brown 2GN	I '20:—15,238	2-Anthraquinonyl-urea chloride (2 mols) Diamino-anthraquinones, [various]	V

Anthrarufin

1 : 5-Dihydroxy-anthraquinone



$= C_{14}H_8O_4 = 240$

STATISTICS.—Manufactured 1918:— ?
Manufactured 1919:— ?
Manufactured 1920:— ?

FORMATION.—This compound is obtained by the action of milk of lime on either anthraquinone-1: 5-disulfonic acid or on 1: 5-dinitro-anthraquinone

LITERATURE.—Cain, Intermediate Products (2d Ed.), 257
Ullmann, Enzy. tech. Chemie, **1**, 481
Lange, Zwischenprodukte, #3269, 3272, 3287

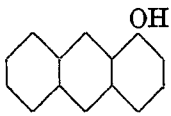
Dye Derived from Anthrarufin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
858	Alizarin Saphirol B	M '18:— ? M '19:— ? I '20:— 28,210 M '20:— ?	[Sulfonation, Nitration, Reduction]	ACr

1-Anthrol (*C. A. nomen.*)

α-Anthrol

1-Hydroxy-anthracene



$= C_{14}H_{10}O = 194$

FORMATION.—From 1-anthracene-sulfonic acid by fusion with 5 parts of caustic soda at about 250°

LITERATURE.—Schmidt, Ber. **37**, 66 (1904)
Thorpe, Dic. Chemistry, **1**, 274; (1921 Ed.), **1**, 352

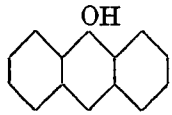
Dye Derived from 1-Anthrol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYE			
893	Alizarin Indigo G	I '20:—1,596	Dibromo-isatin chloride	V

9-Anthrol (*C. A. nomen.*)

9-Hydroxy-anthracene

Anthranol



$= C_{14}H_{10}O = 194$

FORMATION.—Anthraquinone is reduced with tin in boiling glacial acetic acid solution, or with iron and ferrous chloride solution

LITERATURE.—Cain, Intermediate Products (2d Ed.), 262
Thorpe, Dic. Chemistry, **1**, 272; (1921 Ed.), **1**, 349
Lange, Zwischenprodukte, #3038–3040

Dyes Derived from 9-Anthrol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
763	Indanthrene Dark Blue BO	I '14:—11,096 I '20:—13,917 M '20:— ?	9-Anthrol (2 mols) [Glycerol (2 mols)]	V
764	Indanthrene Violet RT		9-Anthrol (2 mols) [Glycerol (2 mols), Halogenation] *or* [Indanthrene Dark Blue BO *and* Halogenation]	V
765	Indanthrene Green B	I '14:—72,251 M '19:— ? I '20:— 6,765 M '20:— ?	9-Anthrol (2 mols) [Glycerol (2 mols), Nitration] *or* [Indanthrene Dark Blue BO *and* Nitration]	V
872	Leucol Brown B	I '20:— 22		V

Armstrong's Acid

See, Naphthalene-1: 5-disulfonic Acids

Armstrong's δ Acid

See, Naphthalene-1: 5-disulfonic Acid

Armstrong and Wynne's Acid

1-Naphthol-3-sulfonic Acid (*not considered herein*)

Armstrong and Wynne's Acid II

See, 2-Naphthylamine-5: 7-disulfonic Acid

5: 5′-A oxy-bis-*o*-toluidine (*C. A. nomen.*)

See, Diamino-azoxy-toluene

***p*-Azoxy-*o*-toluidine**

See, Diamino-azoxy-toluene

B Acid

See, 1-Amino-8-naphthol-3: 5-disulfonic Acid

This trivial name also applied to

1-Amino-7-naphthol-3-sulfonic Acid

2: 3-Dihydroxy-naphthalene-6: 8-disulfonic Acid

Badische Acid

See, 2-Naphthylamine-8-sulfonic Acid

Baum's Acid

1-Naphthol-2-sulfonic Acid (*not considered herein*)

Bayer's Acid

See, Croceine Acid

See, 2-Naphthylamine-7-sulfonic Acid

Benzal-bisxylidine (*C. A. nomen.*)

See, Diamino-dixylyl-phenyl-methane

Benzaldehyde

$= C_7H_6O = 106$

STATISTICS.—Imported '14:— 20,475 lbs.
Manufactured '17:—132,336 lbs.
Manufactured '18:—360,591 lbs.
Manufactured '19:—518,634 lbs.
Manufactured '20:—702,543 lbs.

FORMATION.—(1) From toluene by chlorination to benzylidine chloride, $C_6H_5CHCl_2$, and by heating this with milk of lime under pressure. (2) From toluene by oxidation with manganese dioxide and sulfuric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 138
Lange, Zwischenprodukte, #20–41

Dyes Derived from Benzaldehyde

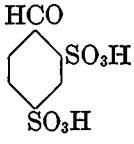
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
495	Malachite Green	I '14:—183,852 M '17:—130,229 M '18:—290,416 M '19:—560,301 I '20:— 100 M '20:—654,237	Dimethyl-aniline (2 mols) [Oxidation]	B
499	Brilliant Green	I '14:— 73,904 M '18:— ? M '19:— ? I '20:— 25 M '20:— ?	Diethyl-aniline (2 mols) [Oxidation]	B
502	Guinea Green B Acid Green 3BG	I '14:— 49,971 M '17:— ? M '18:— ? M '19:— ? I '20:— 278 M '20:— ?	Ethyl-sulfobenzyl-aniline (2 mols) [Oxidation]	A

Dyes Derived from Benzaldehyde (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
504	Light Green SF Bluish	I '14:— 6,693 M '17:— ? M '18:— ?	Benzyl-methyl-aniline (2 mols) [Sulfonation and Oxidation]	A
505	Light Green SF Yellowish	I '14:— 71,462 M '19:— ? I '20:— 7,490 M '20:— ?	Benzyl-ethyl-aniline (2 mols) [Sulfonation and Oxidation]	A
	ACRIDINE DYES			
604	Acridine Orange R		Dimethyl-*m*-phenylene-diamine (2 mols) [Ammonia removal; Oxidation]	B
605	Benzoflavine	I '14:— 600	*m*-Tolylene-diamine (2 mols) [Ammonia removal, Oxidation]	B

Benzaldehyde-disulfonic Acid

4-Formyl-*m*-benzene-disulfonic Acid (*C. A. nomen.*)



$= C_7H_6O_7S_2 = 266$

FORMATION.—Toluene is sulfonated with oleum to the 2:4-disulfonic acid, which is then oxidized with manganese dioxide

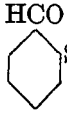
LITERATURE.—Lange, Zwischenprodukte, #899

Dye Derived from Benzaldehyde-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
579	Sulfo Rhodamine B Xylene Red B	I '14:—1,698	Diethyl-*m*-amino-phenol (2 mols) [Oxidation]	A

Benzaldehyde-*o*-sulfonic Acid

o-Formyl-benzene-sulfonic Acid (*C. A. nomen.*)



$= C_7H_6O_4S = 186$

FORMATION.—By heating *o*-chloro-benzaldehyde with Na_2SO_3 at around 170–180° under pressure

LITERATURE.—Cain, Intermediate Products (2d Ed.), 146
Lange, Zwischenprodukte, #504–506

Dyes Derived from Benzaldehyde-*o*-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
506	Erioglaucine	I '14:—66,526 M '19:— ? I '20:— 6,160 M '20:— ?	Ethyl-sulfobenzyl-aniline *or* Benzyl-ethyl-aniline (2 mols) [and sulfonation] [Oxidation]	A
553	Eriochrome Cyanine R	I '14:— 2,249 I '20:— 2,205	*o*-Cresotic Acid (2 mols) [Oxidation]	ACr

Benzamido- (*C. A. nomen. for* $C_6H_5CO.NH$)

See, Benzoylamino-

Note.—The C. A. name for this radical is the scientific one, and it is listed as an alternate, but in view of the widespread use of benzoylamino-, the latter is given precedence at the present time.

1-Benzamido-4-chloro-anthraquinone (*C. A. nomen.*)

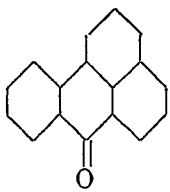
See, 1-Benzoylamino-4-chloro-anthraquinone

7-*meso*-Benzanthren-7-one (*C. A. nomen.*)

See, Benzanthrone

Benzanthrone

7-*meso*-Benzanthren-7-one (*C. A. nomen.*)



$= C_{17}H_{10}O = 230$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—(1) From anthranol and glycerol by condensation by means of sulfuric acid. (Anthranol is made from anthraquinone.) (2) From anthracene in sulfuric acid solution, by addition of glycerol and heating to 100–110° C. until the anthracene disappears. The reaction mass is then diluted with water, salted out and purified

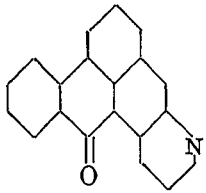
LITERATURE.—Cain, Intermediate Products (2d Ed.), 262
Lange, Zwischenprodukte, #3584

Dyes Derived from Benzanthrone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
763	Indanthrene Dark Blue BO	I '14:— 11,096 I '20:— 13,917	Benzanthrone (2 mols)	V
764	Indanthrene Violet RT		Benzanthrone (2 mols) [Halogenation] [*or* Indanthrene Dark Blue BO *and* halogenation]	V
765	Indanthrene Green B	I '14:—72,251 M '19:— ? I '20:— 6,765 M '20:— ?	Benzanthrone (2 mols) [Nitration] [*or* Indanthrene Dark Blue BO *and* Nitration]	V

Benzanthrone-quinoline

Phenanthroquinolinone (*C. A. nomen.*)



$= C_{20}H_{11}NO = 281$

FORMATION.—From 2-amino-anthraquinone and glycerol by warming with condensing agents, for example, sulfuric acid

LITERATURE.—Lange, Zwischenprodukte, #3596
Ullmann, Enzy. tech. Chemie, **3**, 314

Dye Derived from Benzanthrone-quinoline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
846	Indanthrene Dark Blue BT		Benzanthrone-quinoline (2 mols)	V

Benzene-azo-diethylaniline

See, p-Diethylamino-azo-benzene

Benzene-sulfonyl Chloride

$= C_6H_5ClO_2S = 176.5$

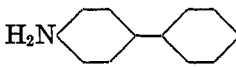
FORMATION.—From benzene-sulfonic acid by treatment with phosphorus pentachloride

LITERATURE.—Bucherer, Farbenchemie, 78, 150

Dye Derived from Benzene-sulfonyl Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
182	Fast Sulfon Violet Brilliant Sulfon Red B	I '14:—4,871 I '20:—4,740	H Acid Aniline	A

Benzidine



$= C_{12}H_{12}N_2 = 184$

STATISTICS.—Imported '14:— 55,245 lbs.
Manufactured '17:—1,766,582 lbs.
Manufactured '18:—2,501,887 lbs.
Manufactured '19:—1,319,629 lbs.
Manufactured '20:—2,183,583 lbs.

FORMATION.—Nitro-benzene is reduced to hydrazo-benzene with zinc or iron in presence of caustic soda; the hydrazo-benzene is rearranged to benzidine by treatment with acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 89
Lange, Zwischenprodukte, #1204

Dyes Derived from Benzidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
15	Chicago Orange G		*p*-Nitro-toluene-*o*-sulfonic Acid	D
102	Diamond Flavine G	I '14:— 23,089 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Salicylic Acid	M
103	Dutch Yellow		Salicylic Acid [Sodium sulfite]	M
	DISAZO DYES			
306	Pyramine Orange 3G	I '14:— 7,863 I '20:— 396	Nitro-*m*-phenylene-diamine *m*-Phenylene-diamine-disulfonic Acid	D
307	Congo Red	I '14:— 20,629 M '17:— ? M '18:—587,153 M '19:—873,734 M '20:— 1,502,630	Naphthionic Acid (2 mols)	D
308	Diazo Black B	I '14:— 62,854	Laurent's Acid (2 mols)	D
309	Glycine Red		α-Naphthyl-glycine Naphthionic Acid	D
310	Glycine Corinth		α-Naphthyl-glycine (2 mols)	D
311	Orange TA	I '14:— 602 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Naphthionic Acid Cresol	D
312	Congo Corinth G	I '14:— 44,157 M '17:— ? M '18:— ? M '19:—137,704 M '20:—242,503	Nevile Winther's Acid Naphthionic Acid	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
313	Congo Rubine	I '14:— 46,213 M '17:— ? M '18:— ? I '20:— 2,601	Croceine Acid Naphthionic Acid	D
314	Pyramine Orange RR	I '14:— 2,789	Nitro-*m*-phenylene-diamine Amino-R Acid	D
315	Congo Orange G	I '14:— 1,623 I '20:— 75	Phenol Amino-R Acid [Ethylation]	D
316	Brilliant Congo G		Amino-R Acid Broenner's Acid	D
317	Pyramidol Brown BG		Resorcinol (2 mols)	D
318	Benzidine Puce		β-Naphthol	MF
319	Diamine Scarlet	I '14:— 41,175 I '20:— 11,340	Phenol G Acid [Ethylation]	D
320	Bordeaux	I '14:— 1,335 M '18:— ? M '19:— ? M '20:— ?	Croccine Acid (2 mols)	D
321	Heliotrope 2B	I '14:— 1,473 I '20:— 60	Croccine Acid 1-Naphthol-4: 8-disulfonic Acid	D
322	Trisulfon Violet B	I '14:— 1,124 M '17:— ? M '18:— ? M '19:— ? I '20:— 7,927 M '20:— ?	β-Naphthol 1-Naphthol-3: 6: 8-trisulfonic Acid	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
323	Dianil Blue R	M '20:— ?	Chromotropic Acid (2 mols)	D
324	Chicago Blue 4R	I '14:— 1,199	Croceine Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
325	Columbia Blue R	I '14:— 3,071	1-Naphthol-3: 8-disulfonic Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
326	Oxamine Violet Oxydiamine Violet BF	I '14:— 23,981 I '20:— 732	J Acid (2 mols)	D
327	Diamine Violet N	I '14:— 18,263 M '19:— ? M '20:— 92,503	Gamma Acid (2 mols)	D
328	Diamine Black RO Dianol Black RW	I '14:— 8,253	Gamma Acid (2 mols)	D
329	Diamine Brown V	M '19:— ?	*m*-Phenylene-diamine Gamma Acid	D
330	Zambesi Brown G	I '14:— 4,028 I '20:— 1,104	Gamma Acid 2: 7-Naphthylene-diamine-sulfonic Acid	D
331	Alkali Dark Brown GV		Nitroso-β-naphthol Gamma Acid	D
332	Dianil Garnet B Benzo Fast Red	I '14:— 5,985 I '20:— 3,799	Gamma Acid Amino-R Acid	D
333	Diamine Black BH Oxamine Black BHN	I '14:—619,430 M '17:— ? M '18:— ? M '19:—485,046 I '20:— 5,512 M '20:—803,501	Gamma Acid H Acid	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
334	Diphenyl Blue Black	I '14:— 26,240	Ethyl-gamma Acid H Acid	D
335	Naphthamine Black RE	I '14:— 49,016	Gamma Acid K Acid	D
336	Benzo Cyanine R	I '14:— 201	H Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
337	Diamine Blue BB Benzo Blue BB	I '14:— 19,035 M '17:— 1,445,059 M '18:— 1,523,985 M '19:— 1,380,335 M '20:— 1,789,774	H Acid (2 mols)	D
338	Naphthamine Blue 2B	I '14:— 11,707 I '20:— 400	K Acid (2 mols)	D
339	Brilliant Orange G	I '14:— 6,321 M '17:— ?	Salicylic Acid 3-Amino-phenol-4-sulfonic Acid	D
340	Benzo Orange R	I '14:— 1,073 M '17:— ? M '18:— 50,422 M '19:— 42,807 I '20:— 220 M '20:— 86,210	Salicylic Acid Naphthionic Acid	D
340 (1)	Chlorazol Orange 2R		Salicylic Acid 2-Naphthylamine-7-sulfonic Acid	D
341	Crumpsall Direct Fast Red R	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Salicylic Acid R Salt	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
342	Chrysamine G	I '14:— 608 M '17:— 26,061 M '18:— 28,846 M '19:— 54,279 I '20:— 9,810 M '20:— 49,342	Salicylic Acid (2 mols)	D
343	Diamine Fast Red F	I '14:— 50,479 M '19:— 56,864 I '20:— 4,040 M '20:—115,865	Gamma Acid Salicylic Acid	D
344	Diamine Brown M	I '14:— 65,396 M '18:— ? M '19:— 15,957 M '20:—257,872	Salicylic Acid Gamma Acid	D
345	Oxamine Maroon		Salicylic Acid 1-Amino-5-naphthol-7-sulfonic Acid	D
346	Oxamine Red	I '14:— 11,636 I '20:— 848	J Acid Salicylic Acid	D
347	Diphenyl Brown RN		Salicylic Acid Methyl-gamma Acid	D
348	Diphenyl Brown BN	I '14:— 13,471	Salicylic Acid Dimethyl-gamma Acid	D
349	Diamine Brown B	I '20:— 24	Salicylic Acid Phenyl-gamma Acid	D
350	Alkali Yellow R		Salicylic Acid Dehydrothio-*p*-toluidine-sulfonic Acid	D
351	Cresotine Yellow G	I '14:— 1,748 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	*o*-Cresotic Acid (2 mols)	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
352	Direct Violet R	I '14:— 661 M '19:— ?	*m*-Tolylene-diamine I: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid	D
353	Direct Indigo Blue BN	I '14:— 6,000	1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid H Acid	D
354	Direct Gray R	I '20:— 4,927	1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid (2 mols)	D
	TRISAZO DYES			
438	Melogene Blue BH	M '17:— ? M '18:— ?	H Acid (2 mols) *p*-Xylidine	D
439	Direct Indigo Blue A	M '18:— ?	H Acid (2 mols) *m*-Amino-*p*-cresol Methyl Ether	D
440	Direct Indigo Blue BK		Gamma Acid (2 mols) *m*-Amino-*p*-cresol Methyl Ether	D
441	Diazo Blue Black RS	M '19:— ? M '20:— ?	H Acid (2 mols) *α*-Naphthylamine	D
442	Direct Black V	I '14:—145,738	Gamma Acid *α*-Naphthylamine 2 R Acid	D
443	Direct Indone Blue R		*α*-Naphthylamine H Acid 2 R Acid	D
444	Crumpsall Direct Fast Brown B		Salicylic Acid Aniline Gamma Acid	D
445	Crumpsall Direct Fast Brown O		Salicylic Acid Aniline Phenyl-gamma Acid	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
446	Benzo Olive	I '14:— 1,149	Salicylic Acid α-Naphthylamine H Acid	D
447	Benzo Gray S Extra	I '14:— 802	Salicylic Acid α-Naphthylamine Nevile Winther's Acid	D
448	Diamine Bronze G	I '14:— 4,495	Salicylic Acid H Acid *m*-Phenylene-diamine	D
449	Trisulfon Brown B	I '14:— 16,781 I '20:— 38,616	2 R Acid Salicylic Acid *m*-Phenylene-diamine	D
462	Erie Direct Black GX Direct Deep Black EW	I '14:— 1,246,536 M '17:— ? M '18:— ? M '19:— 7,250,007 M '20:— 7,736,994	Aniline H Acid *m*-Phenylene-diamine	D
463	Erie Direct Black RX Cotton Black E	I '14:—248,567 M '19:— ? M '20:— 2,050,741	Aniline H Acid *m*-Tolylene-diamine	D
464	Erie Direct Green E T	M '17:— ? M '18:— ? M '19:— 69,700 M '20:— ?	Aniline H Acid Phenol	D
465	Columbia Black Green D		Salicylic Acid Aniline 1: 8-Amino-naphthol-4-sulfonic Acid	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
466	Eboli Green		1-Amino-8-naphthol-3: 5-disulfonic Acid Salicylic Acid Sulfanilic Acid	D
467	Diphenyl Green G	I '20:— 2,205	Phenol H Acid *o*-Chloro-*p*-nitro-aniline	D
468	Diphenyl Green 3G		Salicylic Acid H Acid *o*-Chloro-*p*-nitro-aniline	D
469	Chloramine Black N	I '14:— 39,600 M'19:— ? I '20:— 1,763 M'20:— ?	*m*-Phenylene-diamine H Acid 2: 5-Dichloro-aniline	D
470	Chloramine Green B	I '14:— 1,675 M'19:— ?	Phenol H Acid 2: 5-Dichloro-aniline	D
471	Chloramine Blue 3G	I '14:— 286 M'19:— ? I '20:— 882	H Acid (2 mols) 2:5-Dichloro-aniline	D
472	Chloramine Blue HW		Gamma Acid H Acid 2: 5-Dichloro-aniline	D
473	Diamine Black HW	I '20:— 342	Gamma Acid H Acid *p*-Nitro-aniline	D
474	Diamine Green B Oxamine Green B	I '14:— 77,100 M'17:— ? M'18:—295,147 M'19:—305,854 I '20:— 2,460 M'20:—420,138	Phenol H Acid *p*-Nitro-aniline	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
475	Diamine Green G Oxamine Green G	I '14:— 7,329 M '17:— ? M '18:— 29,118 M '19:—136,638 I '20:— 1,332 M '20:— 53,292	Salicylic Acid H Acid *p*-Nitro-aniline	D
476	Benzamine Brown 3GO	I '14:— 16,988 M '17:— ? M '18:— ? M '19:— ? M '20:—623,757	Sulfanilic Acid *m*-Phenylene-diamine Salicylic Acid	D
477	Congo Brown G Naphthamine Brown 4G	I '14:— 52,141 M '17:— ? M '18:— ? M '19:— ? I '20:— 443 M '20:—229,489	Sulfanilic Acid Resorcinol Salicylic Acid	D
478	Columbia Green	I '14:— 45,162 M '18:— ? I '20:— 7,555	Salicylic Acid Sulfanilic Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
479	Dianil Black R		Chromotropic Acid Naphthionic Acid *m*-Phenylene-diamine	D
480	Congo Brown R	I '14:— 3,045	Resorcinol Salicylic Acid Laurent's Acid	D
	TETRAKISAZO DYES			
489	Hessian Brown BBN		Sulfanilic Acid (2 mols) Resorcinol (2 mols)	D
490	Cotton Brown A	I '14:— 29,074	Naphthionic Acid (2 mols) *m*-Phenylene-diamine (2 mols)	D

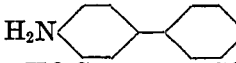
Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
712	Kyrogene Yellow G	I '14:— 1,126 I '20:— 1,543	*m*-Tolylene-dithio-urea [Sulfur]	S
714	Thiophor Yellow Bronze G		*p*-Phenylene-diamine *p*-Amino-acetanilide [Sulfur]	S

Benzidine-disulfonic Acid

6: 6′-Diamino-*m*: *m*′-bi(benzene-sulfonic) Acid (*C. A. nomen.*)

4: 4′-Diamino-diphenyl-3: 3′-disulfonic Acid



$= C_{12}H_{12}N_2O_6S_2 = 344$

FORMATION.—From benzidine sulfate by heating with 2 parts of sulfuric acid at about 210° for forty-eight hours

LITERATURE.—Cain, Intermediate Products (2d Ed.), 94
Griess and Duisberg, Ber, **22**, 2464 (1889)
Cf. Griess, Ber., **14**, 300 (1881)
Cf. Farbenfabriken, Ger. Pat. 27954

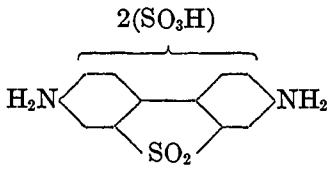
Dyes Derived from Benzidine-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
360	Pyramine Orange R	I '14:— 21,329 I '20:— 7,821	Nitro-*m*-phenylene-diamine	D
	TRISAZO DYES			
459	Benzo Black Blue G		Nevile-Winther's Acid (2 mols) α-Naphthylamine	D
460	Benzo Black Blue 5G	I '14:— 602	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols) α-Naphthylamine	D

Benzidine-sulfon-disulfonic Acid

4: 4′-Diamino-diphenyl-2: 2′-sulfon-disulfonic Acid

2: 7-Diamino-9-dioxide-? :?-*d*ibenzothiophene-disulfonic Acid (*C. A. nomen.*)



$= C_{12}H_{10}N_2O_8S_3 = 406$

FORMATION.—Benzidine sulfate is heated with 40 per cent oleum for 1 hour at 100° in an autoclave, and then at 150° until a sample dissolves in hot water and does not give a yellow precipitate with alkali

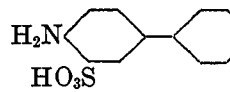
LITERATURE.—Lange, Zwischenprodukte, #1275

Dyes Derived from Benzidine-sulfon-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
361	Sulfonazurine	I '14:—300	Phenyl-α-naphthyl-amine (2 mols)	D

Benzidine-sulfonic Acid

2-Amino-5-(*p*-amino-phenyl)-*b*enzene-sulfonic Acid (*C. A. nomen* $SO_3H = 1$)



$= C_{12}H_{12}N_2O_3S = 264$

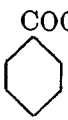
FORMATION.—From benzidine sulfate by evaporating to dryness with dilute sulfuric acid (1½ mols), and then heating in air bath at about 170° for 24 hours

LITERATURE.—Ullmann, Enzy. tech. Chemie, **2**, 318

Dyes Derived from Benzidine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
359	Trypan Red		Amino-R Acid (2 mols)	Medicinal
	TETRAKISAZO DYE			
491	Dianil Black PR		Gamma Acid (2 mols) *m*-Phenylene-diamine (2 mols)	D

Benzoic Acid



$= C_7H_6O_2 = 122$

STATISTICS.—Imported '14:—352,201 lbs.
Manufactured '17:—219,210 lbs.
Manufactured '18:—282,212 lbs.
Manufactured '19:—720,320 lbs.
Manufactured '20:—743,113 lbs.

FORMATION.—(1) From toluene by chlorination to benzo-trichloride, and hydrolysis with milk of lime. (2) From toluene by direct oxidation with nitric acid

LITERATURE.—Ullmann, Enzy. tech. Chemie, **2**, 325
Lange, Zwischenprodukte, #24, 59

Dyes Derived from Benzoic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYLMETHANE DYES			
509	Chrome Green		Hydrol [Oxidation]	M
520	Light Blue Superfine Spirit Soluble Diphenylamine Blue	I '14:— 2,149	Aniline (5 mols) *p*-Toluidine *or* [*p*-Rosaniline triphenylated]	ss
521	Spirit Blue Aniline Blue	I '14:— 50,563 M '17:— ? M '18:— ? M '19:— ? I '20:— 723 M '20:— ?	Aniline (2–4 mols) *o*-Toluidine *p*-Toluidine *or* [Fuchsine *or* Rosaniline base phenylated]	ss
	ANTHRAQUINONE AND ALLIED DYES			
770	Alizarin Yellow A		Pyrogallol	M
782	Anthracene Brown Alizarin Brown	I '14:—115,586 M '17:— ? M '18:— ? M '19:— 40,426 I '20:— 2,728 M '20:— 42,840	Gallic Acid	M

Benzo-trichloride

α-Trichloro-*t*oluene (*C. A. nomen.*)

$= C_7H_5Cl_3 = 195.5$

STATISTICS.—Imported '14:—very small
Manufactured '18:— ?
Manufactured '20;— ?

FORMATION.—From toluene by treatment with chlorine, preferably in presence of catalyst

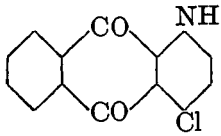
LITERATURE.—Cain, Intermediate Products (2d Ed.), 19

Dyes Derived from Benzo-trichloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	QUINOLINE DYE			
610	Quinoline Red		Quinaldine Isoquinoline	B
	ANTHRAQUINONE AND ALLIED DYES			
770	Alizarin Yellow A		Pyrogallol	M

1-Benzoylamino-4-chloro-anthraquinone

1-Benzamido-4-chloro-anthraquinone (*C. A. nomen.*)



$= C_{21}H_{12}ClNO_3 = 361.5$

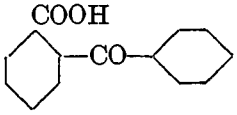
FORMATION.—By heating 1-Amino-4-chloro-anthraquinone with benzoyl chloride

LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 164

Dye Derived from 1-Benzoylamino-4-chloro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
833	Algol Olive R	I '14:— 13,334 I '20:— 461	1-Benzoylamino-4-amino-anthraquinone [Chloro-sulfonic acid]	V

o-Benzoyl-*benzoic* Acid



$= C_{14}H_{10}O_3 = 226$

STATISTICS.—Manufactured 1920:— ?

FORMATION.—By condensation of phthalic anhydride and benzene in presence of aluminum chloride

LITERATURE.—Heller, Zeit. angew. Chem., **19**, 669 (1906)
Heller, Ber., **41**, 3631 (1908)
Cain, Intermediate Products (2d Ed.), 249

USES.—For synthesis of anthraquinone

Benzoyl Chloride

$= C_7H_5ClO = 140$

STATISTICS.—Manufactured '17:—20,621 lbs.
Manufactured '18:— 6,585 lbs.
Manufactured '19:— ?
Manufactured '20:—14,277 lbs.

FORMATION.—From benzoic acid by action of sulfuryl chloride

LITERATURE.—Ullmann, Enzy. tech. Chemie, **2**, 329
Lange, Zwischenprodukte, #42

Dyes Derived from Benzoyl Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
814	Algol Yellow WG	I '14:— 5,185 I '20:— 4	1-Amino-anthraquinone	V
815	Algol Scarlet G	I '20:— 959	1-Amino-4-methoxy-anthraquinone	V

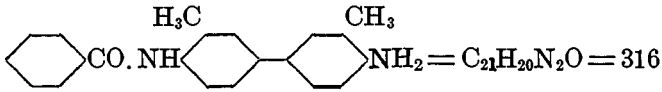
Dyes Derived from Benzoyl Chloride (*continued*)

chultz umber r Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
816	Algol Red 5G	I '14:— 1,338 I '20:— 51	1: 4-Diamino-anthraquinone Benzoyl chloride (2 mols)	V
817	Algol Yellow R	I '14:— 4,887 I '20:— 2,299 M '20:— ?	1: 5-Diamino-anthraquinone Benzoyl chloride (2 mols)	V
818	Algol Pink R	I '14:— 126 I '20:— 1,368	1-Amino-4-hydroxy-anthraquinone	V
819	Algol Red R	I '14:— 2,322 I '20:— 7,335	1: 5-Diamino-anthraquinone Benzoyl chloride (2 mols) [Oxidation]	V
821	Algol Brilliant Violet 2B	I '14:— 3,893 I '20:— 827	Diamino-anthrarufin Benzoyl chloride (2 mols)	V
822	Algol Brilliant Orange FR	I '14:— 6,195 I '20:— 482	1: 2: 4-Triamino-anthraquinone (?)	V
823	Algol Violet B	I '20:— 69	1-Amino-4: 5: 8-trihydroxy-anthraquinone	V
870	Algol Corinth R	I '20:— 134	1-Amino-anthraquinone 2-Chloro-anthraquinone [Nitration, Reduction]	V

Dyes Derived from Benzoyl Chloride (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
889	Indigo Yellow 3G		Indigo *or* Phenyl-glycine *or* Phenyl-glycine-*o*-carboxylic acid *or* Thiocarbanilide *or* Aniline *or* Phthalic Anhydride	
890	Ciba Yellow G	I '14:— 48	Indigo *or* Phenyl-glycine *or* Phenyl-glycine-*o*-carboxylic acid *or* Thiocarbanilide *or* Aniline *or* Phthalic Anhydride [Bromination]	

***N*-Benzoyl-*o*-tolidine**



$= C_{21}H_{20}N_2O = 316$

STATISTICS.—Manufactured 1919:— ?

FORMATION.—Tolidine is heated in toluene solution with benzoyl chloride under a reflux condenser

LITERATURE.—Lange, Zwischenprodukte, #1281

Dyes Derived from *N*-Benzoyl-*o*-tolidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
104	Benzoyl Pink		Nevile-Winther's Acid	D

[(*N*-Benzyl-anilino) -methyl]-benzene-sulfonic Acid (*C. A. nomen.*)

See Dibenzyl-aniline-sulfonic Acid

Benzyl Chloride

α-Chloro-*toluene* (*C. A. nomen.*)

$= C_7H_7Cl = 126.5$

STATISTICS.—Imported '14:— 4,589 lbs.
Manufactured '17:— 136,179 lbs.
Manufactured '18:— 690,930 lbs.
Manufactured '19:— 720,953 lbs.
Manufactured '20:—1,246,412 lbs.

FORMATION.—From boiling toluene by passing in chlorine until the theoretical amount (37.5%) has been absorbed

LITERATURE.—Cain, Intermediate Products (2d Ed.), 15
Lange, Zwischenprodukte, #5

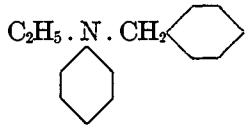
Dyes Derived from Benzyl Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
517	Methyl Violet 5B Benzyl Violet	I '14:— 22,387 M '17:— ? I '20:— 3,313	[Benzylation of Methyl Violet] *or* Dimethyl-aniline (3 mols) Phenol	B
523	Fast Green	I '14:— 14,347 I '20:— 3,612	*m*-Nitro-benzaldehyde Dimethyl-aniline (2 mols) Benzyl chloride (2 mols) [Sulfonation, Oxidation]	A
	XANTHONE DYE			
586	Chrysoline	I '20:— 1,402	Phthalic Anhydride Resorcinol (2 mols)	A

Benzyl-ethyl-aniline

Ethyl-benzyl-aniline

N-Ethyl-*N*-phenyl-benzylamine (*C. A. nomen.*)



$= C_{15}H_{17}N = 211$

STATISTICS.—Imports 1914:—small amount
Manufactured 1917:— ?
Manufactured 1918:— ?
Manufactured 1919:— ?
Manufactured 1920:—159,636 lbs.

FORMATION.—From one part of ethyl-aniline and two parts of benzyl chloride, by boiling under a reflux condenser for four hours

LITERATURE.—Cain, Intermediate Products (2d Ed.), 69

Dyes Derived from Benzyl-ethyl-aniline

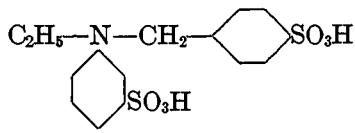
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
505	Light Green SF Yellowish	I '14:— 71,462 M '19:— ? I '20:— 7,490 M '20:— ?	Benzyl-ethyl-aniline (2 mols) Benzaldehyde [Sulfonation; Oxidation]	A
506	Erioglaucine	I '14:— 66,526 M '19:— ? I '20:— 6,160 M '20:— ?	Benzyl-ethyl-aniline (2 mols) Benzaldehyde-*o*-sulfonic acid [Sulfonation; Oxidation]	A
508	Xylene Blue AS	I '14:— 8,238 I '20:— 5,573	Benzyl-ethyl-aniline (2 mols) 3-Methyl-benzaldehyde-4:6-disulfonic Acid [Oxidation]	A

Dyes Derived from Benzyl-ethyl-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
545	Patent Blue A	I '14:— 63,744 M'18:— ? I '20:— 44,801	Benzyl-ethyl-aniline (2 mols) *m*-Nitro-benzaldehyde *or m*-Hydroxy-benzaldehyde [Sulfonation; Oxidation]	A

Benzyl-ethyl-aniline-disulfonic Acid

N-Ethyl-*N*-(*p*-sulfo-benzyl)-*m*etanilic Acid (*C. A. nomen.*)



$= C_{15}H_{17}NO_6S_2 = 371$

Note.—Position of sulfonic group in the benzyl radical is not fully determined

STATISTICS.—Manufactured in 1919 and 1920 in undisclosed amounts

FORMATION.—Benzyl-ethyl-aniline is dissolved with cooling in two parts of 20 per cent oleum, and is then treated with two and a half parts of 80 per cent oleum, and the mixture warmed at 60° until the sulfonation is complete

LITERATURE.—Cain, Intermediate Products (2d Ed.), 70
Lange, Zwischenprodukte, #1500

Dye Derived from Benzyl-ethyl-aniline-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TREPHENYL-METHANE DYES			
528	Fast Acid Violet 10B	I '14:— 12,919 M '17:— ? M '18:— ? M '19:— ? I '20:— 10,086 M '20:— ?	Hydrol [Oxidation]	A

Benzyl-ethyl-aniline-sulfonic Acid[1]

See, Ethyl-sulfobenzyl-aniline

Benzyl-ethyl-*p*-phenylene-diamine-sulfonic Acid

See, Ethyl-sulfobenzyl-*p*-phenylene-diamine

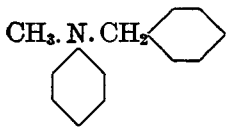
3-Benzylimino-4-methyl-diphenylamine

See, N^3-Benzyl-N^1-phenyl-4-*m*-tolylene-diamine

Benzyl-methyl-aniline

Methyl-benzyl-aniline

N-Methyl-*N*-phenyl-*b*enzylamine (*C. A. nomen.*)



$= C_{14}H_{15}N = 197$

FORMATION.—From methyl-aniline and benzyl chloride by heating together on a water bath for a few hours

LITERATURE.—Cain, Intermediate Products (2d Ed.), 69

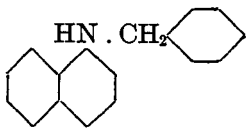
[1] The data and the dye table should have been placed here rather than under ethyl-sulfobenzyl-aniline. — The Author.

Dyes Derived from Benzyl-methyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
504	Light Green SF Bluish	I '14:— 6,693 M '17:— ? M '18:— ?	Benzyl-methyl-aniline (2 mols) Benzaldehyde [Sulfonation; Oxidation]	A
527	Acid Violet 4BN	I '14:— 29,184 I '20:— 23,335 M '20:— ?	Ketone [Sulfonation]	A

Benzyl-α-naphthylamine

N-Benzyl-1-naphthylamine (*C. A. nomen.*)



$= C_{17}H_{15}N = 233$

FORMATION.—α-Naphthylamine is heated in an autoclave with benzyl chloride in the presence of a catalyst

LITERATURE.—Lange, Zwischenprodukte, #1363

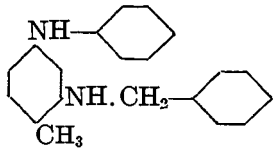
Dye Derived from Benzyl-α-naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYE			
654	Nile Blue 2B		5-Diethylamino-2-nitroso-phenol	B

N^3-Benzyl-N^1-phenyl-4-*m*-tolylene-diamine (*C. A. nomen* $NH_2=1$)

Phenyl-*p*-amino-benzyl-*o*-toluidine ($CH_3=1$)

3-Benzylimino-4-methyl-diphenylamine



$=C_{20}H_{20}N_2=288$

FORMATION.—4-*m*-Tolylene-diamine hydrochloride is melted with aniline at 220–270°, forming N^1-phenyl-4-*m*-tolylene-diamine. This latter body upon being warmed with benzyl chloride with or without a diluent such as alcohol forms the benzyl-derivative desired

LITERATURE.—Lange, Zwischenprodukte, #1621, 1622, 1734

Dyes Derived from N^3-Benzyl-N^1-phenyl-4-*m*-tolylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
684	Rhoduline Violet	I '14:— 2,751 I '20:— 35	Nitroso-dimethyl-aniline	B
684	Rhoduline Red B		Nitroso-ethyl-aniline	B
684	Rhoduline Red G		Nitroso-ethyl-*o*-toluidine	B

Beta = β

Note.—This is not considered in the alphabetical arrangement, e.g. beta-Naphthol is indexed as β-Naphthol under "N". However β-Naphthol is placed after α-Naphthol

Beta Acid

See, Anthraquinone-2-sulfonic Acid

Beta-Naphthol

See, β-Naphthol *under N*

Bi-compounds

See, Di-compounds, *e.g.*, for binitro-benzol (or -benzene), see dinitro-benzene

p*:*p'*-Bis(diethylamino)-*benzohydrol (*C. A. nomen.*)

See, *p*:*p'*-Tetraethyl-diamino-benzohydrol

p*:*p'*-Bis(diethylamino)-*benzophenone (*C. A. nomen.*)

See, *p*:*p'*-Tetraethyl-diamino-benzophenone

p*:*p'*-Bis(dimethylamino)-*benzohydrol (*C. A. nomen.*)

See, Hydrol

p*:*p'*-Bis(dimethylamino)-*benzophenone (*C. A. nomen.*)

See, Ketone

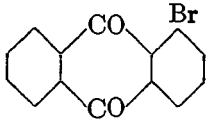
3:5-Bis[β-(5-hydroxy-7-sulfo-2-naphthyl)-carbamido]-*p*-toluene-sulfonic Acid (*C. A. nomen.*)

See, Sulfo-*m*-tolylene-diamine-bis(carbonyl-amino-naphthol-sulfonic Acid)

Broenner's Acid

See, page 152

1-Bromo-*anthraquinone*



$= C_{14}H_7BrO_2 = 287$

FORMATION.—From potassium salt of anthraquinone-1-sulfonic acid, by treatment with bromine and acid

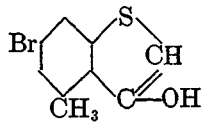
LITERATURE.—Lange, Zwischenprodukte, #3083

Dye Derived from 1-Bromo-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
873	Helindone Brown AN	I '14:— 2,831 I '20:— 16,290	1-Bromo-anthraquinone (2 mols) 1:4-Diamino-anthraquinone	V

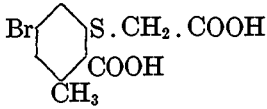
5-Bromo-2-hydroxyl-3-methy.-thionaphthene (*C. A. and English numbering*)

6-Bromo-3-hydroxyl-4-methyl-(1)-thionaphthene (*German numbering*)



$= C_9H_7BrOS = 243$

FORMATION.—4-Bromo-6-nitro-2-methyl-benzoic acid is reduced with Na_2S_2; the amino-compound diazotized, and then treated with potassium xanthogenate (potassium ethyl xanthate). The xanthogenate compound upon being treated with chloro-acetic acid forms bromo-methyl-phenyl-thioglycol-*o*-carboxylic acid



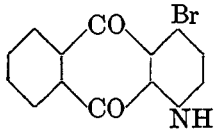
This compound upon being fused with caustic alkali, forms the carboxylic acid of 5-bromo-2-hydroxy-3-methyl-thionaphthene. The carboxylic acid decomposes, evolving CO_2, when its solution is acidified and warmed

LITERATURE.—Lange, Zwischenprodukte, ℔2169
Georgievics and Grandmougin, Dye Chemistry, 433, 437
Cf. Cain, Intermediate Products (2d Ed.), 158, 159

Dye Derived from 5-Bromo-2-hydroxyl-3-methyl-thionaphthene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYE			
910	Helindone Pink BN	I '14:— 41,699 I '20:— 17,162	5-Bromo-2-hydroxyl-3-methyl-thionaphthene (2 mols) [Oxidation]	V

1-Bromo-4-methylamino-anthraquinone



$= C_{15}H_{10}BrNO_2 = 316$

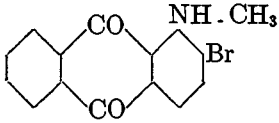
FORMATION.—From 1-methylamino-anthraquinone by treating its pyridine solution with bromine and warming on the water bath

LITERATURE.—Lange, Zwischenprodukte, #3190

Dye Derived from 1-Bromo-4-methylamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
856	Alizarin Astrol B	I '14:— 10,907 I '20:— 15,518	*p*-Toluidine [Sulfonation] [? Classification]	ACr

2-Bromo-1-methylamino-anthraquinone



$= C_{15}H_{10}BrNO_2 = 316$

FORMATION.—From 1-amino-2-bromo-anthraquinone by methylation with dimethyl-sulfate

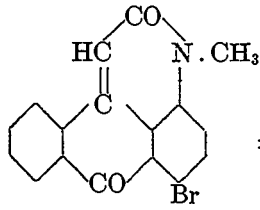
LITERATURE.—Lange, Zwischenprodukte, #3191

Dye Derived from 2-Bromo-1-methylamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
839	Algol Blue K	I '14:—150 I '20:—218	2-Bromo-1-methyl-amino-anthraquinone (2 mols)	V

4-Bromo-*N*-methyl-anthrapyridone

6-Bromo-3-methyl-3:7-*peri*-naphthoquinoline-2(3):7-dione (*C.A. nomen.*)



$= C_{17}H_{10}BrNO_2 = 340$

FORMATION.—(1) From 1-methylamino-anthraquinone, by acetylation of amino group, and condensation to the *N*-methyl-anthrapyridone. Bromination of this latter compound in the 4 position results in 4-bromo-*N*-methyl-anthrapyridone. (2) From 4-bromo-1-methylamino-anthraquinone by acetylation and closing the ring

LITERATURE.—Lange, Zwischenprodukte, #3609
Georgievics and Grandmougin, Dye Chemistry, 464–465
Ullmann, Enzy. tech. Chemie, **1**, 192

Dye Derived from 4-Bromo-*N*-methyl-anthrapyridone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
825	Algol Red B	I '14:— 2,399 I '20:— 4,151	2-Amino-anthraquinone	V

6-Bromo-3-methyl-3:7-*peri*-naphthoquinoline-2(3):7-dione (*C.A nomen.*)

See, 4-Bromo-*N*-methyl-anthrapyridone

Broenner's Acid

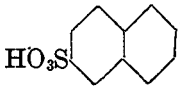
2-Naphthylamine-6-sulfonic Acid

6-Amino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)

Naphthylamine-sulfonic Acid Br.

β-Naphthylamine-β-sulfonic Acid

Amino-Schaeffer's Acid



$= C_{10}H_9NO_3S = 223$

STATISTICS.—Imported '14:—2,316 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By heating the sodium salt of Schaeffer's Acid with concentrated ammonia in an autoclave at 180°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 206
Lange, Zwischenprodukte, #2371–2376
Thorpe, Dic. Chemistry, **3**, 601

Dyes Derived from Broenner's Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
172	Fast Brown 3B	I '14:— 1,477	α-Naphthol	A
174	Double Brilliant Scarlet G	I '14:—210,429 M '17:— ? M '20:— ?	β-Naphthol	A
176	Double Scarlet Extra S Scarlet 2R	I '14:— 10,182 M '17:— ? I '20:— 1,653	Nevile-Winther's Acid	A
177	Chrome Yellow D Mordant Yellow O	I '14:—129,651 M '17:— ? M '18:— 32,011 M '19:— ? I '20:— 1,389 M '20:— ?	Salicylic Acid *or* o-Cresotic Acid	M
	DISAZO DYES			
230	Cloth Red 3G, 3GA	I '14:— 251	o-Amino-azo-toluene	M
302	Hessian Brilliant Purple		Diamino-stilbene-disulfonic Acid Broenner's Acid (2 mols)	D

Dyes Derived from Broenner's Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
316	Brilliant Congo G		Benzidine Amino-R Acid	D
357	Dianol Red B		Dichloro-benzidine Broenner's Acid (2 mols)	D
365	Benzo Purpurin B	I '14:— 21,090 M '17:— ? M '18:— ? M '19:— ?	Tolidine Broenner's Acid (2 mols)	D
366	Diamine Red B Delta Purpurin 5B	I '14:— 21,058 M '17:— ? M '18:— ? I '20:— 1,896	Tolidine 2-Naphthylamine-7-sulfonic Acid	D
368	Brilliant Purpurin 4B	I '14:— 6,634	Tolidine Naphthionic Acid	D
370	Brilliant Congo R	I '14:— 19,133 I '20:— 11,129	Tolidine Amino-R Acid	D

C Acid

1: 5-Dihydroxy-naphthalene-2-sulfonic Acid

2-Naphthol-4: 8-disulfonic Acid

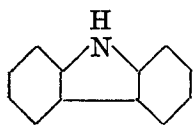
2-Naphthylamine-4: 8-disulfonic Acid

(*These intermediates not considered herein*)

Carbazole

Dibenzo-pyrrole

Diphenylene-imide



$= C_{12}H_9N = 167$

STATISTICS.—Imported '14:—very small
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By extraction from coal-tar or crude anthracene

LITERATURE.—Ullmann, Enzy. tech. Chemie, **3**, 274
Lange, Zwischenprodukte, page 308

Dyes Derived from Carbazole

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
748	SULFUR DYE Hydron Blue	I '14:—296,723 I '20:— 19,210 M '20:— ?	*p*-Nitroso-phenol [S+Na_2S]	V

Carbolic Acid

See, Phenol

Carbonyl Chloride

See, Phosgene

2-Carboxy-5-chloro-phenyl-thioglycolic Acid

See, 5-Chloro-phenyl-thioglycol-*o*-carboxylic Acid

***N*-(Carboxy-methyl)-anthranilic Acid** (*C. A. nomen.*)

See, Phenyl-glycine-*o*-carboxylic Acid

2-(Carboxy-methyl-mercapto)-4-chloro-benzoic Acid (*C. A. nomen.*)

See, 5-Chloro-phenyl-thioglycol-*o*-carboxylic Acid

Cassella's Acid

See, 2-Naphthol-7-sulfonic Acid

Cassella's Acid F

See, 2-Naphthylamine-7-sulfonic Acid

Chi Acid

See, Anthraquinone-1: 8-disulfonic Acid

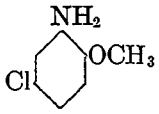
Chicago Acid

See, 1-Amino-8-naphthol-2: 4-disulfonic Acid

3-Chloro-aniline-2-sulfonic Acid

See, 2-Amino-6-chloro-benzene-sulfonic Acid

5-Chloro-*o*-anisidine (*NH_2=1*)



$= C_7H_8ClNO = 157.5$

FORMATION.—1: 4-Dichloro-3-nitro-benzene is boiled with caustic potash and methyl alcohol and the resulting chloro-nitro-anisol is reduced with iron and acetic acid

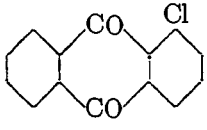
LITERATURE.—J. Soc. Chem. Ind. **21**, 610 (1902)
U. S. Pat. 695,812
Lange, Zwischenprodukte, #1034

Dye Derived from 5-Chloro-*o*-anisidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
97	MONOAZO DYE Chloranisidine Scarlet		β-Naphthol	MF

1-Chloro-anthraquinone (*C. A. nomen.*)

α-Chloro-anthraquinone



$= C_{14}H_7ClO_2 = 242.5$

FORMATION.—From potassium anthraquinone-1-sulfonate by treatment at 100° with chlorine and dilute hydrochloric acid

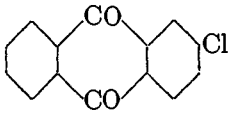
LITERATURE.—Lange, Zwischenprodukte, #3081, 3083, 3086

Dye Derived from 1-Chloro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
834	Algol Gray B	I '14:— 4,192 I '20:— 890	1-Amino-anthraquinone [Nitration, Reduction]	V

2-Chloro-*anthraquinone* (*C. A. nomen.*)

β-Chloro-anthraquinone



$= C_{14}H_7ClO_2 = 242.5$

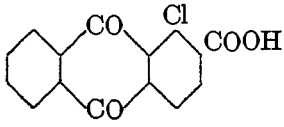
FORMATION.—(1) From sodium anthraquinone-2-sulfonate in aqueous solution, by adding hydrochloric acid, and by passing in chlorine until all the 2-chloro-anthraquinone is precipitated out. (2) From phthalic anhydride and chloro-benzene by first condensing in presence of $AlCl_3$ to chloro-benzoyl-benzoic acid, and then by warming with sulfuric acid to 2-chloro-anthraquinone

LITERATURE.—Lange, Zwischenprodukte, 3082, 3083
Ullmann, Enzy. tech. Chemie, **1**, 472

Dyes Derived from 2-Chloro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
824	Algol Orange R	I '14:— 51 I '20:— 406	1-Amino-anthraquinone	V
828	Indanthrene Bordeaux B	I '20:—2,741	2-Chloro-anthraquinone (2 mols) 1:5-Diamino-anthraquinone	V
870	Algol Corinth R	I '29:— 134	1-Amino-anthraquinone [Nitration, Reduction] Benzoyl chloride	V

1-Chloro-anthraquinone-2-carboxylic Acid



$= C_{15}H_7ClO_4 = 286.5$

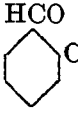
FORMATION.—2-Methyl-1-nitro-anthraquinone is treated with chlorine in nitro-benzene solution, whereby the nitro group is substituted by chlorine and the methyl group oxidized, thus forming 1-chloro-anthraquinone-2-carboxylic acid

LITERATURE.—Lange, Zwischenprodukte, #3171
Ullmann, Enzy tech. Chemie, **1**, 484

Dye Derived from 1-Chloro-anthraquinone-2-carboxylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
831	Indanthrene Red BN	I '14:—6,056 I '20:—4,766	β-Naphthylamine	V

o-Chloro-benzaldehyde



$= C_7H_5ClO = 140.5$

STATISTICS.—Manufactured '20:— ?

FORMATION.—From *o*-chloro-benzyl alcohol by oxidation with nitric acid in a sulphuric acid solution at about 40° C.

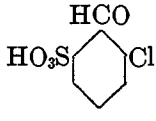
LITERATURE.—J. Soc. Chem. Ind. **18**, 576 (1899)
Lange, Zwischenprodukte, #179–184

Dyes Derived from *o*-Chloro-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE-DYES			
496	Setoglaucine	I '20:— 1,102	Dimethyl-aniline (2 mols) [Oxidation]	B
500	Setocyanine O	I '14:— 923 I '20:— 1,102	Ethyl-*o*-toluidine (2 mols) [Oxidation]	B
503	Night Green A Neptune Green Brilliant Milling Green B	I '14:— 40,868 M '19:— ? I '20:— 10,940 M '20:— ?	Ethyl-sulfobenzyl-aniline (2 mols) [Oxidation]	A
551	Eriochrome Azurol B	I '14:— 21,060 I '20:— 7,275	*o*-Cresotic acid (2 mols) [Oxidation]	ACr

2-Chloro-benzaldehyde-6-sulfonic Acid

3-Chloro-2-formyl-benzene-sulfonic Acid (*C. A. nomen.*)



$= C_7H_5ClO_4S = 220.5$

FORMATION.—(1) 1:3-Dichloro-2-benzaldehyde is treated with one mol of sodium sulfite under pressure. (2) 3-Chloro-2-toluene-1-sulfonic acid is oxidized with manganese dioxide and sulfuric acid

LITERATURE.—Lange, Zwischenprodukte, #710

Dye Derived from 2-Chloro-benzaldehyde-6-sulfonic Acid

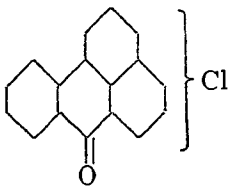
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
554	Chrome Azurol S	I '14:— 2,469 I '20:— 551	*o*-Cresotic Acid (2 mols) [Oxidation]	ACr

?-Chloro-7-*meso*-benzanthren-7-one (*C. A. nomen.*)

See, Chloro-benzanthrone

Chloro-benzanthrone

?-Chloro-7-*meso*-benzanthren-7-one (*C. A. nomen.*)



$= C_{17}H_9ClO = 264.5$

STATISTICS.—Manufactured '19:— ?

FORMATION.—From benzanthrone in acetic acid solution by treatment with chlorine

LITERATURE.—Addition #6719 to French Patent 349,531 of Oct. 1,1906

Dyes Derived from Chloro-benzanthrone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
766	Indanthrene Violet R	I '14:— 1,590 M '19:— ? I '20:— 941	Chloro-benzanthrone (2 mols)	V
767	Indanthrene Violet 2R	I '14:— 68,419 I '20:— 40,782 M '20:— ?	Chloro-benzanthrone (2 mols) [Dichlorination] [*or* Indanthrene Violet R, chlorinated]	V
768	Indanthrene Violet B	I'20:—84,165(?)	Chloro-benzanthrone (2 mols) [Dibromination] [*or* Indanthrene Violet R, brominated]	V

Chloro-benzene (*C. A. nomen.*)

Monochlor-benzene

$= C_6H_5Cl = 112.5$

STATISTICS.—Manufactured 1917:—24,624,099 lbs.
Manufactured 1918:—20,530,639 lbs.
Manufactured 1919:— 4,116,666 lbs.
Manufactured 1920:— 4,829,142 lbs.

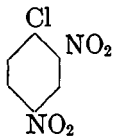
FORMATION.—By passing chlorine through benzene in the presence of a catalyst (iron) and at a relatively low temperature

LITERATURE.—Cain, Intermediate Products (2d Ed.), 6–11
Lange, Zwischenprodukte, #2

USES.—For technical preparation of *o- and p*-chloro-nitro-benzene, chloro-dinitro-benzene, *o*-amino-phenol-*p*-sulfonic acid and many other intermediates

1-Chloro-2: 4-dinitro-benzene (*C. A. nomen.*)

2: 4-Dinitro–chloro-benzene



$= C_6H_2ClN_2O_4 = 202.5$

STATISTICS.—Manufactured 1917:—6,078,637 lbs.
Manufactured 1918:— ?
Manufactured 1919:—4,428,730 lbs.
Manufactured 1920:—5,947,791 lbs.

FORMATION.—From chloro-benzene by dinitration with mixed nitric and sulphuric acids

LITERATURE.—Cain, Intermediate Products (2d Ed.), 14
Lange, Zwischenprodukte, #723

Dyes Derived from 1-Chloro-2: 4-dinitro-benzene

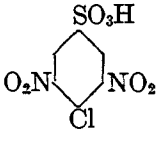
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
724	Immedial Black	I '14:— 54,696 M '18:— ?	*p*-Amino-phenol [S+Na_2S]	S
725	Immedial Dark Brown A Immedial Brown B	I '14:— 23,887 M '18:— ?	*p*-Amino-phenol [NaOH; S+Na_2S]	S
726	Pyrogene Direct Blue Pyrogene Blue	I '14:— 10,934 I '20:— 2,498	*p*-Amino-phenol [Alcohol; S+Na_2S]	S
727	Auronal Black B		*p*-Phenylene-diamine [Glycerol; S+Na_2S]	S
738	Cotton Black		Sulfanilic or Metanilic acid [S+Na_2S]	S

1-Chloro-2: 6-dinitro-benzene-4-sulfonic Acid

See, 4-Chloro-3: 5-dinitro-benzene-sulfonic Acid

4-Chloro-3: 5-dinitro-*benzene*-sulfonic Acid (*C. A. nomen.*)

I-Chloro-2: 6-dinitro-benzene-4-sulfonic Acid



$= C_6H_3ClN_2O_7S = 282.5$

FORMATION.—34 Parts of chloro-benzene are dissolved in a mixture of 72 parts of monohydrate and 30 parts of 25% oleum, by aid of heat. When cold, there is added 26 parts of 87% nitric acid which causes the temperature to rise to 40° where it is held for 2 hours. Then a further addition of oleum is made,—100 parts of 60% followed by 40 parts of potassium nitrate, and the mixture heated for several hours at 120–130°.

LITERATURE.—Lange, Zwischenprodukte, #1037

Dye Derived from 4-Chloro-3: 5-dinitro-benzene-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dy- Application Class*
	TRIPHENYL-METHANE DYE			
542	Agalma Green B	I '14:— 2,294	Hydrol Metanilic acid [Oxidation]	A

3-Chloro-2-formyl-benzene-sulfonic Acid (*C. A. nomen.*)

See, 2-Chloro-benzaldehyde-6-sulfonic Acid

Chloro-H Acid

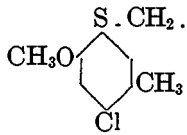
See, 1-Chloro-8-naphthol-3: 6-disulfonic Acid

(4-Chloro-6-methoxy-3-methyl-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)

See, 4-Chloro-6-methoxy-3-methyl-phenyl-thioglycolic Acid

4-Chloro-6-methoxy-3-methyl-phenyl-thioglycolic Acid

(4-Chloro-6-methoxy-3-methyl-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)



$= C_{10}H_{11}ClO_3S = 246.5$

FORMATION.—4-Chloro-6-methoxy-*m*-toluidine ($NH_2 = 1$) is dissolved in hydrochloric acid and diazotized. The diazo solution, warmed to 70°, is introduced into an alkaline solution of potassium xanthate ($C_2H_5O . CS . SK$), the condensation product extracted and saponified to the mercaptan. The mercaptan is reacted with chloro-acetic acid, forming the above thioglycolic acid

LITERATURE.—Ger. Pat. 245,544; 241,910
Frdl. 10, 507, 502
Lange, Zwischenprodukte, #1043, 688
Cf. Georgievics and Grandmougin, Dye Chemistry, 436–7

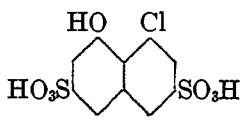
Dye Derived from 4-Chloro-6-methoxy-3-methyl-phenyl-thioglycolic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYE			
920	Helindone Violet BB	I '14 — 28,607 I '20 — 16,882	4-Chloro-6-methoxy-3-methyl-phenyl-thioglycolic acid (2 mols) [Chloro-sulfonic acid]	V

1-Chloro-8-naphthol-3: 6-disulfonic Acid

8-Chloro-1-*naphthol*-3: 6-disulfonic Acid (*C. A. nomen.*)

Chloro-H Acid



$= C_{10}H_7ClO_7S_2 = 338.5$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—H acid is diazotized; and the yellow diazo body is filtered off, mixed with 10 per cent hydrochloric acid, cooled to 10°, and a solution of cuprous chloride added. This product is now heated to complete the reaction, purified, and the chloro-body isolated. (Sandmeyer Reaction)

LITERATURE.—Cain, Intermediate Products (2d Ed.), 238
Lange, Zwischenprodukte, #2451, 2671
Thorpe, Dic. Chemistry, 3, 628

Dyes Derived from 1-Chloro-8-naphthol-3: 6-disulfonic Acid

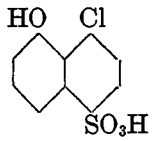
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
119	Diamine Rose	I '14:— 5,269 M '18:— ? M '19:— ? M '20:— ?	Dehydro-thio-*p*-toluidine	D
	DISAZO DYE			
418	Diamine Brilliant Blue G	I '14:— 11,592 I '20:— 51	Dianisidine 1-Chloro-8-naphthol-3: 6-disulfonic Acid (2 mols)	D

8-Chloro-1-*naphthol*-3: 6-disulfonic Acid (*C. A. nomen.*)

See, 1-Chloro-8-naphthol-3: 6-disulfonic Acid

1-Chloro-8-naphthol-4-sulfonic Acid

8-Chloro-1-*naphthol*-5-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_7ClO_4S = 258.5$

FORMATION.—1-Chloro-naphthalene-4-sulfonic acid is nitrated and reduced, forming 1-chloro-8-naphthylamine-4-sulfonic acid; which is diazotized and added slowly to a boiling hot solution of 10 per cent sulfuric acid and the boiling continued until the nitrogen evolution ceases

LITERATURE.—Eng. Pat., 12085 of 1898

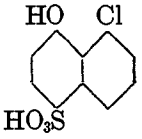
Cf. Lange, Zwischenprodukte, #2451

Dye Derived from 1-Chloro-8-naphthol-4-sulfonic acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
417	DISAZO DYE Chlorazol Blue R	I '14:— 10,151	Dianisidine 1-Chloro-8-naphthol-5-sulfonic Acid (2 mols)	D

1-Chloro-8-naphthol-5-sulfonic Acid

8-Chloro-1-naphthol-4-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_7ClO_4S = 258.5$

FORMATION.—1-Chloro-naphthalene-5-sulfonic acid is nitrated and reduced, forming 1-chloro-8-naphthylamine-5-sulfonic acid; which is diazotized and added slowly to a boiling hot solution of 10 per cent sulfuric acid, and the boiling continued until the evolution of nitrogen ceases.

LITERATURE.—Eng. Pat., 12085 of 1898
Cf. Lange, Zwischenprodukte, #2451

Dye Derived from 1-Chloro-8-naphthol-5-sulfonic acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
417	DISAZO DYE Chlorazol Blue 3G	I '14:— 10,151	Dianisidine 1-Chloro-8-naphthol-5-sulfonic Acid (2 mols)	D

8-Chloro-1-naphthol-4-sulfonic Acid (*C. A. nomen.*)

See, 1-Chloro-8-naphthol-5-sulfonic Acid

8-Chloro-1-naphthol-5-sulfonic Acid (*C. A. nomen.*)

See, 1-Chloro-8-naphthol-4-sulfonic Acid

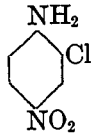
1-Chloro-3-nitro-6-aniline

See, 2-Chloro-4-nitro-aniline (*C. A. nomen.*)

2-Chloro-4-nitro-aniline (*C. A. nomen.*)

o-Chloro-*p*-nitro-aniline

1-Chloro-3-nitro-6-aniline



$=C_6H_5ClN_2O_2=172.5$

FORMATION.—*p*-Nitro-aniline is dissolved in concentrated hydrochloric acid or in sulfuric acid, ice added to cool under 0°, and chlorine is conducted into the solution under 0°, until the proper increase in weight has taken place

LITERATURE.—Lange, Zwischenprodukte, #724

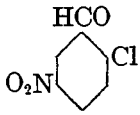
Dyes Derived from 2-Chloro-4-nitro-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	FRISAZO DYES			
467	Diphenyl Green G	I '20:— 2,205	Benzidine Phenol H Acid	D
468	Diphenyl Green 3G		Benzidine Salicylic Acid H Acid	D

o-Chloro-p-nitro-aniline

See, 2-Chloro-4-nitro-aniline (*C. A. nomen.*)

2-Chloro-5-nitro-benzaldehyde



$= C_7H_4ClNO_3 = 185.5$

FORMATION.—*o*-Chloro-benzaldehyde is dissolved in sulfuric acid, and nitrated cold with mixed acid

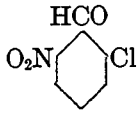
LITERATURE.—Beil., III, 16

Dye Derived from 2-Chloro-5-nitro-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
552	TRIPHENYLMETHANE DYE Chromal Blue G	I '14:— 1,335	*o*-Cresotic Acid (2 mols) [Oxidation]	M

2-Chloro-6-nitro-benzaldehyde (*C. A. nomen.*)

o-Chloro-*o*-nitro-benzaldehyde



$= C_7H_4ClNO_3 = 185.5$

FORMATION.—This can be prepared from 2-chloro-6-nitro-benzyl bromide by action of strong nitric acid, or from 2-chloro-6-nitro-benzyl alcohol by oxidation

LITERATURE.—Lange, Zwischenprodukte, #699
Beil. III,, spl. 11

Dye Derived from 2-Chloro-6-nitro-benzaldehyde

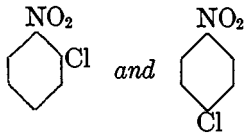
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
887	INDIGO GROUP DYES Brilliant Indigo BASF/4G	I '20:— 1,207	2-Chloro-6-nitro-benzaldehyde (2 mols) [Acetone; Bromination]	V

o-Chloro-o-nitro-benzaldehyde

See, 2-Chloro-6-nitro-benzaldehyde (*C. A. nomen.*)

***o- and p*-Chloro-nitro-benzenes** (*C. A. nomen.*)

o- and p-Nitro-chloro-benzenes



$= C_6H_4ClNO_2 = 157.5$

STATISTICS.—	*Mixed*	*orth.*	*para*
Manufactured 1917:—	602,192 lbs.		
Manufactured 1918:—	?		
Manufactured 1919:—	2,520,991 lbs.		
Manufactured 1920:—		349,386 lbs.	959,405 lbs.

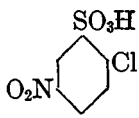
FORMATION.—Chloro-benzene, upon being nitrated, gives a mixture o about 30 per cent of *o*-chloro-nitro-benzene and about 70 per cent of *p*-chloro-nitro-benzene. The separation is carried out by alternate crystallization (of the *p*-compound) and fractional distillation

LITERATURE.—Cain, Intermediate Products (2d Ed.), 11–13
Lange, Zwischenprodukte, #193, 194

USES.—*o*-Chloro-nitro-benzene is employed for preparation of *o*-nitro-anisole, which in turn leads to *o*-anisidine and dianisidine. It is also used for 4-chloro-3-nitro-benzene-sulfonic acid

p-Chloro-nitro-benzene is employed for preparation of substituted diphenylamines (Sulfur Dyes), and for 2-chloro-5-nitro-benzene-sulfonic acid

2-Chloro-5-nitro-benzene-sulfonic Acid



$= C_6H_4ClNO_5S = 237.5$

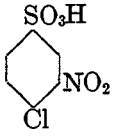
STATISTICS.—Manufactured 1920:— ?

FORMATION.—By sulfonation of *p*-chloro-nitro-benzene with 10–12 per cent oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 14

USES.—For preparation of 4-nitro-aniline-2-sulfonic acid (*p*-nitro-aniline-*o*-sulfonic acid)

4-Chloro-3-nitro-*b*enzene-sulfonic Acid



$= C_6H_4ClNO_5S = 237.5$

FORMATION.—By sulfonation of *o*-chloro-nitro-benzene with 5 parts of 30 per cent oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 13

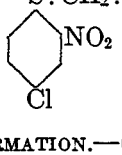
USES.—For preparation of aniline-2: 5-disulfonic acid

(4-Chloro-2-nitro-phenyl-mercapto)-*a*cetic Acid (*C. A. nomen.*)

See 4-Chloro-2-nitro-phenyl-thioglycolic Acid

4-Chloro-2-nitro-phenyl-thioglycolic Acid

(4-Chloro-2-nitro-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)



$= C_8H_6ClNO_4S = 247.5$

FORMATION.—(1) 4-Chloro-2-nitro-phenyl-mercaptan is reacted with chloro-acetic acid in an alkaline solution. (2) Probably also by reacting the nitro-derivative of *p*-dichloro-benzene (1:4-dichloro-3-nitro-benzene) with thioglycolic acid

LITERATURE.—*Cf.* Lange, Zwischenprodukte, #2171, 611, 1041, 674

Dye Derived from 4-Chloro-2-nitro-phenyl-thioglycolic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
921	Helindone Gray BR, 2B	I '14:—470 I '20:—508	4-Chloro-2-nitro-phenyl-thioglycolic acid (2 mols) [Chloro-sulfonic acid; Reduction]	V

α-Chloro-*p*-nitro-toluene (*C. A. nomen.*)

See, *p*-Nitro-benzyl Chloride

(*m*-Chloro-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)

See, *m*-Chloro-phenyl-thioglycolic Acid

m-Chloro-phenyl-thioglycolic Acid

(*m*-Chloro-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)

$= C_8H_7ClO_2S = 202.5$

FORMATION.—*m*-Chloro-aniline is diazotized, coupled with potassium xanthate (C_2H_5O . CS . SK), hydrolyzed to the mercapto-derivative, and condensed with chloro-acetic acid

LITERATURE.—*Cf.* Lange, Zwischenprodukte, #688

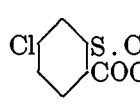
Dye Derived from *m*-Chloro-phenyl-thioglycolic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
917	INDIGO GROUP DYES Helindone Red B	I '14:—100 I '20:—200	*m*-Chloro-phenyl-thioglycolic Acid (2 mols) [Oleum Condensation]	V

5-Chloro-phenyl-thioglycol-*o*-carboxylic Acid

2-Carboxy-5-chloro-phenyl-thioglycolic Acid

2-(Carboxy-methyl-mercapto)-4-chloro-benzoic Acid (*C. A. nomen.*)



$= C_9H_8O_4S = 212$

FORMATION.—4-Chloro-anthranilic acid is diazotized, and reacted with potassium ethyl xanthate, and then with chloro-acetic acid, resulting in the formation of the chloro-phenyl-thioglycol-o-carboxy acid

LITERATURE.—Lange, Zwischenprodukte, #2170; *cf.* #518

Dye Derived from 5-Chloro-phenyl-thioglycol-*o*-carboxylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
909	INDIGO GROUP DYE Ciba Red B		5-Chloro-phenyl-thioglycol-*o*-carboxylic acid (2 mols)	V

α-Chloro-toluene (*C. A. nomen.*)

See, Benzyl Chloride

2-Chloro-5-toluidine-4-sulfonic Acid ($CH_3=1$)

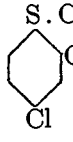
See, 2-Amino-5-chloro-*p*-toluene-sulfonic Acid (*C. A. nomen* $SO_3H=1$)

(4-Chloro-*o*-tolyl-mercapto)-acetic Acid (*C. A. nomen.*)

See, 4-Chloro-2-tolyl-thioglycolic Acid

4-Chloro-2-tolyl-thioglycolic Acid

(4-Chloro-*o*-tolyl-mercapto)-acetic Acid (*C. A. nomen.*)



$= C_9H_9ClO_2S = 216.5$

FORMATION.—4-Chloro-*o*-toluidine ($NH_2=1$) is diazotized, coupled with potassium xanthate (C_2H_5O . CS . SK), hydrolyzed to the mercapto-derivative, and condensed with chloro-acetic acid

LITERATURE.—Lange, Zwischenprodukte, #688

Cf. Geogievics and Grandmougin, Dye Chemistry, 437

Dye Derived from 4-Chloro-2-tolyl-thioglycolic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
918	INDIGO GROUP DYE Helindone Red 3B	I '14:— 27,874 I '20:— 4,385	4-Chloro-2-tolyl-thioglycolic Acid (2 mols) [Oleum Condensation] [There is some question as to the Cl- and CH_3-positions of that chloro-tolyl-thioglycolic acid used]	V

Chromogen I

See, Chromotropic Acid

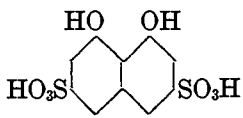
Chromotrope Acid

See, Chromotropic Acid

Chromotropic Acid

1: 8-Dihydroxy-naphthalene-3: 6-disulfonic Acid

4: 5-Dihydroxy-2: 7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
Chromotrope Acid
Chromogen I



$= C_{10}H_8O_8S_2 = 320$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:—164,654 lbs.
Manufactured '20:—152,352 lbs.

FORMATION.—(1) From 1-Naphthol-3: 6: 8-trisulfonic acid by fusion of the sodium salt of this acid with caustic soda at 170–220°. (2) From H acid by heating with a dilute caustic soda solution in an autoclave at about 265°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 232
Lange, Zwischenprodukte, #2775, 2670

Dyes Derived from Chromotropic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
40	Chromotrope 2R	I '14:— 5,000 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Aniline	A
57	Chromotrope 2B	I '14:— 7,970 M '18:— ? M '19:— ? M '20:— ?	*p*-Nitro-aniline	ACr
61	Victoria Violet	I '14:— 52,365 M '17:— ? M '18:— ? M '19:—105,086 I '20:— 2,182 M '20:— ?	*p*-Phenylene-diamine *actually from* *p*-Nitro-aniline and Reduction *or* *p*-Amino-acetanilide and Saponification	A
67	Chromotrope 6B	I '14:— 2,818 M '17:— ? M '18:— ? M '19:— 77,481 M '20:— ?	*p*-Amino-acetanilide	A
114	Chromotrope 10B	M '19:— ?	*α*-Naphthylamine	A
129	Chromazone Red A	I '14:— 243	*p*-Amino-benzaldehyde	M
130	Chromazone Blue R		*p*-Amino-benzaldehyde Ethyl-phenyl-hydrazine *or* *p*-Amino-benzylidine-ethyl-phenyl-hydrazone	M
171	Chromotrope 8B	M '18:— ?	Naphthionic Acid	A

Dyes Derived from Chromotropic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
292	Acid Alizarine Black I		*p*-Phenylene-diamine Salicylic Acid	M
323	Dianil Blue R	M '20:— ?	Benzidine Chromotropic Acid (2 mols)	D
379	Dianil Blue 2R Benzo New Blue 2B	I '14:— 14,434	Tolidine Nevile-Winther's Acid	D
380	Dianil Blue B		Tolidine Chromotropic Acid (2 mols)	D
415	Dianil Blue G	M '19:— ? M '20:— ?	Dianisidine Chromotropic Acid (2 mols)	D
	TRISAZO DYE			
479	Dianil Black R		Benzidine Naphthionic Acid *m*-Phenylene-diamine	D
	ANTHRAQUINONE AND ALLIED DYES			
777	Chromogen I		[Oxidation on fiber]	ACr

Chrysazin

1: 8-Dihydroxy-anthraquinone (*not considered herein*)

Chryseic Acid

4-Nitro-1-naphthol (*not considered herein*)

Cincholepidine

See, Lepidine

Cleve's Acid

See, 1-Naphthol-5-sulfonic Acid

See, 1-Naphthylamine-6-sulfonic Acid

See, 1-Naphthylamine-7-sulfonic Acid

Cleves α Acid

See, Laurent's Acid (1-Naphthylamine-5-sulfonic Acid)

Cleve's β Acid

See, 1-Naphthylamine-6-sulfonic Acid

Also applied to 1-Nitro-naphthalene-6-sulfonic acid

Cleve's γ Acid

1-Naphthylamine-3-sulfonic Acid (*not considered herein*)

Cleve's δ Acid

See, 1-Naphthylamine-7-sulfonic Acid

This trivial name also applied to

1-Nitro-naphthalene-7-sulfonic Acid (*not considered herein*)

Cleve's θ Acid

See, 1-Naphthylamine-7-sulfonic Acid

This trivial name also applied to

1-Nitro-naphthalene-6-sulfonic Acid (*not considered herein*)

1-Nitro-naphthalene-7-sulfonic Acid (*not considered herein*)

Cleve's Acids

See, 1-Naphthylamine-6-*and*-7-sulfonic Acids

Cleve's α-Nitro-naphthalene-sulfonic Acid

1-Nitro-napthalene-5-sulfonic Acid (*not considered herein*)

Cleve's γ-Nitro-naphthalene-sulfonic Acid

1-Nitro-naphthalene-3-sulfonic Acid (*not considered herein*)

Cleve's δ-Nitro-naphthalene-sulfonic Acid

1-Nitro-naphthalene-8-sulfonic Acid (*not considered herein*)

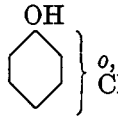
Cleve's θ-Nitro-naphthalene-sulfonic Acid

1-Nitro-naphthalene-6-sulfonic Acid (*not considered herein*)

1-Nitro-naphthalene-7-sulfonic Acid (*not considered herein*)

Cresol

Note.—C. A. practice is to start the numbering of cresols from the OH group unless there is present a substituent of "higher order" as SO_3H. European practice is generally to start numbering with CH_3



$= C_7H_9O = 108$

STATISTICS.—Imported '14:—245,835 lbs.
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—Extracted from coal tar

LITERATURE.—Lange, Zwischenprodukte, #438–452

Dye Derived from Cresol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
311	DISAZO DYE Orange TA	I '14:—602 M'17:— ? M'18:— ? M'19:— ? M'20:— ?	Benzidine Naphthionic Acid	D

2: 3-Cresotic Acid (*C. A. nomen.*)

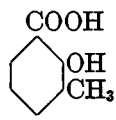
See, o-Cresotic Acid

***o*-Cresotic Acid**

o-Cresotinic Acid

2: 3-Cresotic Acid (*C. A. nomen.*)

o-Homo-salicylic Acid



$= C_8H_8O_3 = 152$

STATISTICS.—Imported '14:—very small
Manufactured '20:— ?

FORMATION.—By dissolving *o*-cresol in caustic soda, evaporating to a dry powder; then by treating this powder with carbon dioxide under pressure

LITERATURE.—Cain, Intermediate Products (2d Ed.), 153
Lange, Zwischenprodukte, #775

Dyes Derived from *o*-Cresotic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
177	Chrome Yellow D		Broenner's Acid	M
	DISAZO DYES			
351	Cresotine Yellow G	I '14:— 1,748 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine *o*-Cresotic Acid (2 mols)	D
392	Toluylene Orange G	I '14:— 67,022 M '18:— ? M '19:— ? I '20:— 273 M '20:— ?	Tolidine 4:6-Diamino-*m*-toluene-sulfonic Acid	D
395	Cresotine Yellow R		Tolidine *o*-Cresotic acid (2 mols)	D
	TRIPHENYL-METHANE DYES			
551	Eriochrome Azurol B	I '14:— 21,060 I '20:— 7,275	*o*-Chloro-benzaldehyde [*or* other halogen] *o*-Cresotic Acid (2 mols) [Oxidation]	ACr
552	Chromal Blue G	I '14:— 1,335	2-Chloro-5-nitro-benzaldehyde *o*-Cresotic Acid (2 mols) [Oxidation]	M

Dyes Derived from *o*-Cresotic Acid (*continued*)

Schultz Number or Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
553	Eriochrome Cyanine R	I '14:— 2,249 I '20:— 2,205	Benzaldehyde-*o*-sulfonic Acid *o*-Cresotic Acid (2 mols) [Oxidation]	ACr
554	Chrome Azurol S	I '14:— 2,469 I '20:— 551	2-Chloro-benzaldehyde-6-sulfonic Acid *o*-Cresotic Acid (2 mols) [Oxidation]	ACr

***o*-Cresotinic Acid**

See, *o*-Cresotic Acid

Croceine Acid

2-Naphthol-8-sulfonic Acid (*C. A. nomen.*)

Bayer's Acid

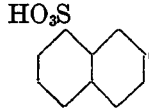
β-Naphthol-sulfonic Acid B (*of Schultz*)

β-Naphthol-α-sulfonic Acid (*of Bayer & Co.'s Patents*)

Croceine Sulfonic Acid

o-Acid (*of Claus and Voltz*) [1]

Rumpff Acid



$= C_{10}H_8O_4S = 224$

STATISTICS.—Manufactured 1919:— ?
Manufactured 1920:— ?

FORMATION.—β-Naphthol is sulfonated at a low temperature, forming mostly croceine acid, but accompanied by some Schaeffer's acid. They are generally separated by crystallization of their salts

LITERATURE.—Cain, Intermediate Products (2d Ed.), 225
Lange, Zwischenprodukte, #2435–2439
Thorpe, Dic. Chemistry, **3**, 625

[1] Claus and Voltz incorrectly assigned to this acid the constitution, 2-naphthol-3-sulfonic acid.

Dyes Derived from Croceine Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
167	Croceine Scarlet 3 BX	I '14:— 3,101 M '17:— ? M '18:— ? M '19:— ? I '20:— 650 M '20:— ?	Naphthionic Acid	A
	DISAZO DYES			
249	Croceine Scarlet 3B	I '14:— 9,613	Amino-azo-benzene-sulfonic Acid	A
251	Croceine Scarlet O	I '20:— 100	Amino-azo-benzene-disulfonic Acid	A
255	Croceine Scarlet 8B Ponceau 6 RB	I '14:— 2,379 I '20:— 154	Amino-azo-toluene-sulfonic Acid	A
259	Ponceau 10 RB	I '14:— 201	Sulfanilic Acid *o*-Anisidine	A
313	Congo Rubine	I '14:— 46,213 M '17:— ? M '18:— ? I '20:— 2,601	Benzidine Naphthionic Acid	D
320	Bordeaux	I '14:— 1,335 M '18:— ? M '19:— ? M '20:— ?	Benzidine Croceine Acid (2 mols)	D
321	Heliotrope 2B	I '14:— 1,473 I '20:— 60	Benzidine 1-Naphthol-4: 8-disulfonic Acid	D
324	Chicago Blue 4R	I '14:— 1,199	Benzidine 1-Amino-8-naphthol-4-sulfonic Acid	D

Dyes Derived from Croceine Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
384	Chicago Blue 2R Diamine Blue C2R	I '14:— 23,877	Tolidine 1-Amino-8-naphthol-4-sulfonic Acid	D
420	Azidine Wool Blue B		Dianisidine 1-Amino-8-naphthol-4-sulfonic Acid	D

Croceine-sulfonic Acid

See, Croceine Acid

ψ Cumidine

See, Pseudocumidine (*C. A. nomen.*)

Dahl's Acid

See, 2-Naphthylamine-5-sulfonic Acid

Dahl's Acid II

See, 1-Naphthylamine-4:6-disulfonic Acid

Dahl's Acid III

See, 1-Naphthylamine-4:7-disulfonic Acid

Dahl's Acids

1-Naphthol-4:6-and-4:7-disulfonic Acids (*not considered herein*)

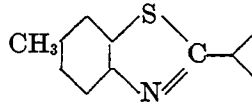
Dehydro-thio-*p*-toluidine

IV-Amino-5-methyl-2-phenyl-thiazol

Amino-benzenyl-*o*-amino-thio-cresol

p-Amino-phenyl-toluthiazole

1-(*p*-Amino-phenyl)-5-methyl-benzothiazole (*C. A. nomen.*)



$= C_{14}H_{12}N_2S = 240$

FORMATION.—By heating together 3⅓ parts of *p*-toluidine with 1 part of sulfur, gradually raising the temperature to the boiling point, and finally fractionally distilling off the dehydro-thio-*p*-toluidine in a vacuum

LITERATURE.—Cain, Intermediates (2d Ed.), 77
Lange, Zwischenprodukte, #2219–2223

Dyes Derived from Dehydro-thio-*p*-toluidine

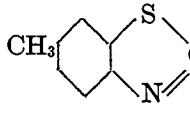
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
117	Erica 2GN	I '14:— 1,171 M '19:— ? I '20:— 337	1-Naphthol-3: 8-disulfonic Acid	D
118	Geranine Brilliant Geranine	I '14:— 18,917 M '19:— ? I '20:— 527	1-Naphthol-4: 8-disulfonic Acid *or* 1-Naphthol-3-sulfonic Acid *or* 1: 8-Dihydroxynaphthalene-4-sulfonic Acid	D
119	Diamine Rose	I '14:— 5,269 M '18:— ? M '19:— ? M '20:— ?	1-Chloro-8-naphthol-3: 6-disulfonic Acid	D
	THIOBENZENYL DYES			
614	Chromine G	I '14:— 1,001	[Sulfur, Methylation, Sulfonation]	D
618	Thioflavine T	I '14:— 35,224 I '20:— 5,807	[Methylation]	B

Dehydro-thio-*p*-toluidine-sulfonic Acid

IV-Amino-5-methyl-2-phenyl-thiazol-sulfonic Acid

DTS (*abbreviation for above in compounds, less* NH_2)

1-(4-Amino-?-sulfo-phenyl)-5-methyl-benzothiazole (*C. A. nomen.*)



$C . C_6H_3(SO_3H) . NH_2 = C_{14}H_{12}N_2O_3S_2 = 320$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:—51,961 lbs.

FORMATION.—By sulfonation of the "primuline melt" (from *p*-toluidine and sulfur), and purification from the primuline-sulfonic acid also formed

LITERATURE.—Cain, Intermediate Products (2d Ed.), 78
Lange, Zwischenprodukte, #2237
Ullmann, Enzy. tech. Chemie, **3**, 677

Dyes Derived from Dehydro-thio-*p*-toluidine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	STILBENE DYES			
16	Curcuphenine		Dehydro-thio-*p*-toluidine-sulfonic Acid (2 mols) *p*-Nitro-toluene-*o*-sulfonic Acid (4 mols)	D
17	Chlorophenine		Dehydro-thio-*p*-toluidine-sulfonic Acid (2 mols) *p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) [Reduction]	D
18	Diphenyl Fast Yellow	I '14:— 10,229 I '20:— 1,102	Dehydro-thio-*p*-toluidine-sulfonic Acid (2 mols) Dinitro-dibenzyl-disulfonic Acid *or* Dinitro-stilbene-disulfonic Acid	D
	MONOAZO DYES			
51	Nitrophenine Thiazol Yellow R	I '14:— 423 M '20:— ?	*p*-Nitro-aniline	D
190	Alkali Brown Benzo Brown 5R	M '19:— ? M '20:— 2,987	*m*-Phenylene-diamine	D
193	Clayton Cloth Red Stanley Red	I '14:— 100 M '18:— ? M '19:— ? M '20:— ?	β-Naphthol	**A**

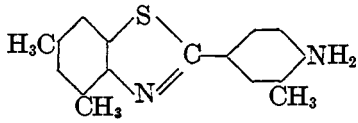
Dyes Derived from Dehydro-thio-*p*-toluidine-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
194	Rosophenine 10B Thiazine Red R	I '14:— 3,077 M '19:— ? M '20:— ?	Nevile-Winther's Acid	D
196	Titan Red	I '14:— 886 M '19:— ? M '20:— ?	Schaeffer's Acid	D
198	Clayton Yellow Thiazol Yellow Mimosa C	I '14:— 29,879 M '18:— ? M '19:— ? I '20:— 11,182 M '20:— ?	Dehydro-thio-*p*-toluidine-sulfonic Acid (2 mols)	D
199	Oriol Yellow Cotton Yellow R	I '14:— 13,416 I '20:— 125 M '20:— ?	Salicylic Acid	D
	DISAZO DYE			
209	Terracotta FC	I '14:— 551	Naphthionic Acid *m*-Phenylene-diamine	D
350	Alkali Yellow R		Benzidine Salicylic Acid	D
	THIOBENZENYL DYE			
617	Chloramine Yellow Diamine Fast Yellow Columbia Yellow	I '14:—180,497 M '17:— ? M '18:—123,816 M '19:— 54,077 I '20:— 4,810 M '20:—100,248	[Oxidation]	D

Dehydro-thio-*m*-xylidine

IV-Amino-2-phenyl-5:7:III-trimethyl-thiazol

1-(4-Amino-*m*-tolyl-)-3:5-dimethyl-benzothiazole (*C. A. nomen.*)



$= C_{13}H_{16}N_2S = 268$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—From *m*-xylidine and sulfur by heating to the boiling point until there is no further evolution of hydrogen sulfide; and by separating by distillation from the excess *m*-xylidine, and by solution in 30% hydrochloric acid from the *iso*-dehydro-thio-*m*-xylidine

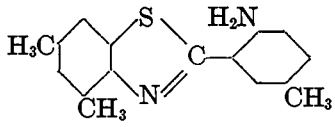
LITERATURE.—Lange, Zwischenprodukte, #2232
Cain, Intermediate Products (2d Ed.), 80
Anschütz and Schultz, Ber., **22**, 582 (1889)
Paul, Zeitsch. angew. Chem., **9**, 679 (1896)

Dyes Derived from Dehydro-thio-*m*-xylidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
120	Salmon Red	M '20:— ?	Amino-R Acid	D
121	Erica B	I '14:— 5,349 I '20:— 2,393 M '19:— ?	1-Naphthol-3: 8-disulfonic Acid	D
122	Erica G	I '14:— 2,370 I '20:— 1,142 M '18:— ?	G Acid	D

***iso*-Dehydro-thio-*m*-xylidine**

1-(6-Amino-*m*-tolyl)-3: 5-dimethyl-benzothiazole (*C. A. nomen.*)



$= C_{16}H_{16}N_2S = 268$

FORMATION.—As a by-product in the manufacture of dehydro-thio-*m* xylidine (see dehydro-thio-*m*-xylidine)

LITERATURE.—See dehydro-thio-*m*-xylidine
Heumann, Anilinefarben, **4**, 752

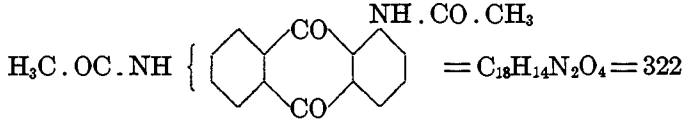
Dyes Derived from *iso*-Dehydro-thio-*m*-xylidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
123	Emine Red		Schaeffer's Acid	A

Delta Acid

See, 1-Naphthylamine-4: 8-disulfonic Acid
and 2-Naphthylamine-7-sulfonic Acid

1: 6-(*or* 1: 7-)Diacetamido-*a*nthraquinone



$= C_{18}H_{14}N_2O_4 = 322$

FORMATION.—The above intermediate is obtained by reduction and acetylation of the easily soluble dinitro-anthraquinone, prepared from the crude dinitration product of anthraquinone.

LITERATURE.—Ger. Pat. 72,685, 198,048
Lange, Zwischenprodukte, #3218

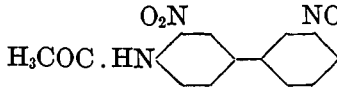
Dyes Derived from 1: 6-(*or* 1: 7-)Diacetamido-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
812	Indanthrene Orange RT	I '14:— 2,103 I '20:— 382	2-Acetamido-anthraquinone	V
813	Indanthrene Copper R	I '14:— 1,268	1-Acetamido-anthraquinone	V

Diacetyl-*o*: *o'*-dinitro-benzidine

Diacetyl-3: 3'-dinitro-benzidine (*numbering from point of attachment*)

2: 2'-Dinitro-*p*: *p'*-biacetanilide (*C. A. nomen. with numbering from "chief function" or the acetamido groups*)



$= C_{16}H_{14}N_4O_6 = 358$

FORMATION.—Benzidine is acetylated by boiling with acetic acid under a reflux, and the resulting diacetyl-compound is nitrated by dissolving in 10 parts of nitric acid (sp. gr. 1.48) with cooling

LITERATURE.—Beil, IV, 964
Brunner and Witt, Ber. 20, 1024 (1887)

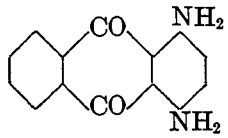
Dye Derived from Diacetyl-*o*: *o'*-dinitro-benzidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
715	Thiocatechine		[Sulfur and Na_2S]	S

***p*-(2: 4-Diamino-anilino)-phenol** (*C. A. nomen.*)

See, 2: 4-Diamino-4'-hydroxy-diphenylamine

1: 4-Diamino-*a*nthraquinone



$= C_{14}H_{10}N_2O_2 = 238$

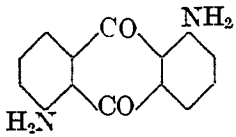
FORMATION.—From 1-nitro-4-amino-anthraquinone (derived from 1-amino-anthraquinone) by reduction with alkaline sodium sulfide

LITERATURE.—Lange, Zwischenprodukte, #3221, 3232, 3233
Ullmann, Enzy. tech. Chemie, **1**, 477

Dyes Derived from 1: 4-Diamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
816	Algol Red 5G	I '14 — 1,338 I '20:— 51	Benzoyl chloride (2 mols)	V
873	Helindone Brown AN	I '14:— 2,831 I '20:— 16,290	1-Bromo-anthraquinone (2 mols)	V

1: 5-Diamino-anthraquinone



$= C_{14}H_{10}N_2O_2 = 238$

FORMATION.—(1) From 1: 5-dinitro-anthraquinone by reduction. (2) From 1: 5-anthraquinone-disulfonic acid by treatment with ammonia

LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 477
Lange, Zwischenprodukte, #3109, 3115, 3222, 3265

Dyes Derived from 1: 5-Diamino-anthraquinone

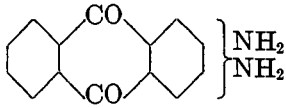
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
817	Algol Yellow R	I '14:— 4,887 I '20:— 2,299 M '20:— ?	Benzoyl chloride (2 mols)	V
819	Algol Red R	I '14:— 2,322 I '20:— 7,335	Benzoyl chloride (2 mols) [Oxidation]	V
828	Indanthrene Bordeaux B	I '20:— 2,741	2-Chloro-anthraquinone (2 mols)	V

Dyes Derived from 1:5-Diamino-anthraquinone (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
845	Indanthrene Maroon R	I '20:— 46	1:5-Diamino-anthraquinone (2 mols)	V
848	Indanthrene Gray B	I '14:— 401 I '20:— 2,639	1:5-Diamino-anthraquinone (2 mols ?)	V

Diamino-anthraquinones

(*Probably a mixture of the 1:4, 1:5 and 1:8*)

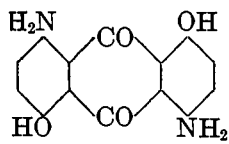


$= C_{14}H_{10}N_2O_2 = 238$

Dyes Derived from Diamino-anthraquinones

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
836	Helindone Brown 3GN	I '20:— 15,238	2-Anthraquinonyl-urea chloride (2 mols)	V

4:8-Diamino-*a*nthrarufin



$= C_{14}H_{10}N_2O_4 = 270$

FORMATION.—1:5-Dinitro-anthraquinone is partly reduced, giving 1:5-dihydroxyamino-anthraquinone, which is then transformed into diamino-anthrarufin

LITERATURE.—Georgievics and Grandmougin, Dye Chemistry, 275

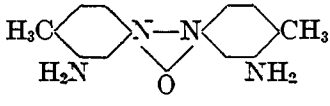
Dyes Derived from 4: 8-Diamino-anthrarufin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
820	Algol Brilliant Violet R	I '14:— 12,784 I '20:— 7,856	Diamino-anthrarufin (2 mols) [Succinic Acid]	V
821	Algol Brilliant Violet 2B	I '14:— 3,893 I '20:— 827	Benzoyl chloride (2 mols)	V

Diamino-azoxy-toluene

p-Azoxy-*o*-toluidine

5: 5′-Azoxy-bis-*o*-toluidine (*C. A. nomen.*)



$= C_{14}H_{16}N_4O = 256$

FORMATION.—From 5-nitro-*o*-toluidine ($NH_2 = 1$) by reduction, using zinc dust and caustic soda

LITERATURE.—Cain, Intermediate Products (2d Ed.), 99
Lange, Zwischenprodukte, #1792

Dyes Derived from Diamino-azoxy-toluene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES			
483	St. Denis Red Rosophenine 4B	I '14:— 1,496 I '20:— 550	Nevile-Winther's Acid (2 mols)	D
484	Milling Scarlet B,S		Nevile-Winther's Acid R Acid	A

4: 6-Diamino-*m*-benzene-disulfonic Acid (*C. A. nomen.*)

See, *m*-Phenylene-diamine-disulfonic Acid

2: 5-Diamino-benzene-sulfonic Acid (*C. A. nomen.*)

See, *p*-Phenylene-diamine-sulfonic Acid

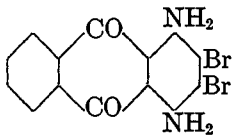
6: 6′-Diamino-*m*: *m*′-bi(benzene-sulfonic) Acid (*C. A. nomen.*)

See, Benzidine-disulfonic Acid

2: 2′-Diamino-5: 5′-bi-*m*-toluene-sulfonic Acid (*C. A. nomen.*)

See, *o*-Tolidine-disulfonic Acid

1: 4-Diamino-2: 3-dibromo-anthraquinone



$= C_{14}H_8Br_2N_2O_2 = 396$

FORMATION.—By brominating 1: 4-diamino-anthraquinone, probably in nitro-benzene solution. (The corresponding chloro-compound is made by action of sulfuryl chloride)

LITERATURE.—*Cf.* Lange, Zwischenprodukte, #3334
Barnett, Anthracene and Anthraquinone, 170–175, 190–231

Dyes Derived from 1: 4-Diamino-2: 3-dibromo-anthraquinone

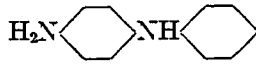
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYE			
847	Algol Green B	I '14:— 2,796 I '20:— 527	1: 4-Diamino-2: 3-dibromo-anthraquinone (2 mols)	V

2:7-Diamino-9-dioxide-?:?-dibenzothiophene-disulfonic Acid
(*C. A. nomen.*)

See, Benzidine-sulfon-disulfonic Acid

p:p'-Diamino-diphenylamine

p:p'-Imino-bisaniline (*C. A. nomen.*)



$= C_{12}H_{13}N_3 = 199$

STATISTICS.—Imported '14:—very small amount

FORMATION.—Equal molecules of aniline and *p*-phenylene-diamine are oxidized at 0° by means of potassium permanganate to a blue indamine, which is then reduced with zinc dust and hydrochloric acid

LITERATURE.—Nietzke, Ber., **16**, 474
Lange, Zwischenprodukte, #1636, 1753

Dye Derived from *p:p'*-Diamino-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANILINE BLACK GROUP			
923	Furreine DB	I '14:— 54,005 M '19:— ? I '20:— 1,600 M '20:—168,459	*p:p'*-Diamino-diphenylamine (x mols) (?) [Oxidation on hair]	Fur

4:4'-Diamino-diphenyl-3:3'-disulfonic Acid

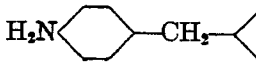
See, Benzidine-disulfonic Acid

p:p'-Diamino-diphenylethylene-o:o'-disulfonic Acid

See, Diamino-stilbene-disulfonic Acid

p:p'-Diamino-diphenyl-methane

p:p'-Methylene-bisaniline (*C. A. nomen.*)



$= C_{13}H_{14}N_2 = 198$

STATISTICS.—Manufactured '20:— ?

FORMATION.—50 parts of anhydro-formaldehyde-aniline (from equal parts of aniline and 40 per cent formaldehyde), 100 parts of aniline and 70 parts of aniline salt are heated together on a water bath, condensing to the *p*: *p'*-diamino-diphenyl-methane

LITERATURE.—Schultz, Farbstofftabellen (1914), #511
Lange, Zwischenprodukte, #1297

Dyes Derived from *p*: *p'*-Diamino-diphenyl-methane

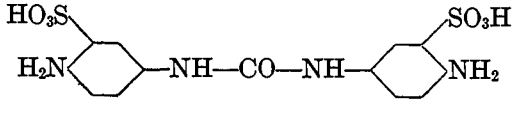
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
298	Milling Red R		R Acid (2 mols)	A
	TRIPHENYL-METHANE DYES			
511	Parafuchsine	I '14 — 65,026	Aniline	B
	Paramagenta	M '18:— ?	Nitro-benzene	
		M '19:— ?		
		M '20:— ?		
540	Pacific Blue		Aniline *o*-Toluidine *p*-Toluidine [Sulfonation] *or* [*p*-Rosaniline+Benzoic acid and sulfonation]	D

4: 4'-Diamino-diphenyl-2: 2'-sulfon-disulfonic Acid

See, Benzidine-sulfon-disulfonic Acid

Diamino-diphenyl-urea-disulfonic Acid

5. 5'-Ureido-bis(2-amino-*b*enzene-sulfonic Acid) (*C. A. nomen.*)



$= C_{13}H_{14}N_4O_7S_2 = 402$

Diamino-diphenyl-sulfide

See, Thioaniline

FORMATION.—24 Parts of 4-nitro-amino-benzene-3-sulfonic acid is dissolved in water containing 5.5 parts of soda ash, and phosgene conducted in until the reaction is completed, as indicated by test not diazotizing. The dinitro-body is now reduced with iron

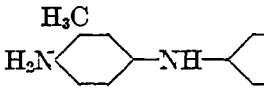
LITERATURE.—Lange, Zwischenprodukte, #1823.

Dye Derived from Diamino-diphenyl-urea-disulfonic acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
297	DISAZO DYE Benzo Fast Pink 2BL	I '14:— 3,252 I '14:— 1,226	Gamma acid (2 mols)	D

p:p'-Diamino-ditolyl-amine

4:4'-Imino-bis-*o*-toluidine (*C A. nomen.* $NH_2 = 1$)



$= C_{14}H_{17}N_2 = 227$

FORMATION.—By semidine rearrangement of amino-azo-*o*-toluene whereby the hydrochloride of amino-azo-*o*-toluene is dissolved in sulfurous acid solution and reduced with zinc dust, the product poured into 50 per cent sulfuric acid, boiled and crystallized

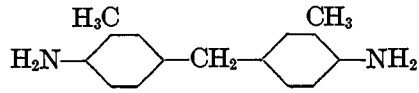
LITERATURE.—Barber and Sisley, Sur un noveau mode de formation de la *p*-diamino-diphenylamine
Bull. Soc. Chim. [3] **33**, 1232–34 (1905)
Chem. Centr. **1906** [1], 232

Dye Derived from *p*:*p'*-Diamino-ditolyl-amine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
295	DISAZO DYE Diphenyl Fast Black	I '14:— 882	Gamma Acid *m*-Tolylene-diamine	D

p:p'-Diamino-ditolyl-methane

4:4'-Methylene-bis-*o*-toluidine (*C. A. nomen.*)



$= C_{15}H_{18}N_2 = 226$

FORMATION.—100 parts of anhydro-formaldehyde-aniline + 250 parts of *o*-toluidine hydrochloride + 500 parts of *o*-toluidine are warmed together on a water bath; and after 12 hours the mass is made alkaline and the aniline is distilled off with the aid of steam. (The anhydro-formaldehyde-aniline is only used as a carrier for the formaldehyde)

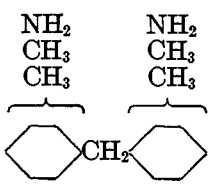
LITERATURE.—Lange, Zwischenprodukte, #1315, 1316

Dye Derived from p:p'-Diamino-ditolyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
513	New Fuchsine O	I '14:— 300 M '18:— ? M '19:— ? M '20:— ?	*o*-Toluidine *o*-Nitro-toluene	B

Diamino-dixylyl-methane

Methylene-bis*x*ylidine (*C. A. nomen*)



$= C_{17}H_{22}N_2 = 254$

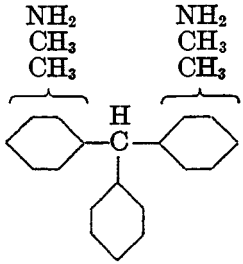
FORMATION.—From formaldehyde and xylidine in the presence of a condensing agent

Dye Derived from Diamino-dixylyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
299	DISAZO DYE Cinnabar Scarlet BF		R Acid (2 mols)	CL

Diamino-dixylyl-phenyl-methane

Benzal-bisxylidine (*C. A. nomen.*)



$= C_{23}H_{26}N_2 = 330$

FORMATION.—From benzaldehyde and xylidine in the presence of a condensing agent

LITERATURE.—Lange, Zwischenprodukte, #1434

Dye Derived from Diamino-dixylyl-phenyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
300	DISAZO DYE Cotton Ponceau Cinnabar Scarlet G		R Acid (2 mols)	CL

Di-*p*-amino-ethoxy-diphenyl

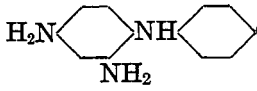
See, Ethoxy-benzidine

1: 3-Diamino-2-hydroxy-benzene-5-sulfonic Acid

See, 2: 6-Diamino-1-phenol-4-sulfonic Acid

2: 4-Diamino-4′-hydroxy-diphenylamine

p-(2: 4-Diamino-anilino)-*p*henol (*C. A. nomen.*)



$= C_{12}H_{13}N_3O = 215$

FORMATION.—Molecular proportions of 4-chloro-1: 3-dinitro-benzene and *p*-amino-phenol are heated to boiling in aqueous suspension with somewhat more than theoretical amount of limestone. The heating is done by direct steam in a vessel provided with a reflux condenser. After all the chloro-nitro-benzene has disappeared, the liquid is cooled and the crystalline 2: 4-dinitro-4′-hydroxy-diphenylamine is separated and washed. This is then reduced to the desired 2: 4-diamino-4′-hydroxy-diphenylamine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 74
Lange, Zwischenprodukte, #1670

Dye Derived from 2: 4-Diamino-4′-hydroxy-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
732	SULFUR DYE Autogene Black	I '14:— 7,495	Phenol [S_2Cl_2, S+Na_2S]	S

α-Diamino-naphthalene

1: 5-Diamino-naphthalene (*not considered herein*)

β-Diamino-naphthalene

1: 8-Diamino-naphthalene (*not considered herein*)

4: 5-Diamino-2: 7-naphthalene-disulfonic Acid (*C. A. nomen.*)
See, 1: 8-Naphthylene-diamine-3: 6-disulfonic Acid

4: 8-Diamino-2: 6-naphthalene-disulfonic Acid (*C. A. nomen.*)
See, 1: 5-Naphthylene-diamine-3: 7-disulfonic Acid

1: 4-Diamino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)
See, 1: 4-Naphthylene-diamine-2-sulfonic Acid

2: 7-Diamino-*naphthalene*-sulfonic Acid (*C. A. nomen.*)

See, 2: 7-Naphthylene-diamine-sulfonic Acid

5: 7-Diamino-2-*naphthalene*-sulfonic Acid (*C. A. nomen.*)

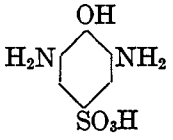
See, 1: 3-Naphthylene-diamine-6-sulfonic Acid

5: 8-Diamino-2-*naphthalene*-sulfonic Acid (*C. A. nomen.*)

See, 1: 4-Naphthylene-diamine-6-sulfonic Acid

2: 6-Diamino-1-*phenol*-4-sulfonic Acid (*C. A. nomen. OH=1*)

1: 3-Diamino-2-hydroxy-benzene-5-sulfonic Acid



$= C_6H_8N_2O_4S = 204$

FORMATION.—Phenol is sulfonated by dissolving in hot sulfuric acid, cooled, diluted, and then dinitrated, using nitric acid and heating to boiling. The dinitro-phenol-sulfonate is then isolated, dissolved in water, and reduced with ammonium sulfide, and the diamine precipitated by acidification

LITERATURE.—Lange, Zwischenprodukte, #1137
Cain, Intermediate Products (2d Ed.), 129, 130

Dyes Derived from 2: 6-Diamino-1-phenol-4-sulfonic Acid

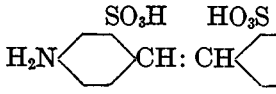
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
288	Acid Alizarin Black SE Palatine Chrome Black F	I '14:— 19,185 I '20:— 34,302	β-Naphthol (2 mols)	ACr
289	Acid Alizarin Black SN Palatine Chrome Black S	M '17:— ? M '18:— ? M 19:— ?	β-Naphthol Schaeffer's Acid	ACr

Diamino-stilbene-disulfonic Acid

p: *p'*-Diamino-diphenylethylene-*o*: *o'*-disulfonic Acid

DS (*abbreviation for above in compounds, less 2-NH_2*)

4: 4'-Diamino-2: 2'-stilbene-disulfonic Acid (*C. A. nomen.*)



$= C_{14}H_{14}N_2O_6S_2 = 370$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—5,021 lbs.
Manufactured '20:—142,227 lbs.

FORMATION.—From sodium salt of *p*-nitro-toluene-*o*-sulfonate by dissolving in water and boiling with caustic soda until the color becomes deep red. Then reduction is effected by adding zinc dust until the liquid is decolorized

LITERATURE.—Cain, Intermediate Products (2d Ed.), 98
Lange, Zwischenprodukte, #1454

Dyes Derived from Diamino-stilbene-disulfonic Acid

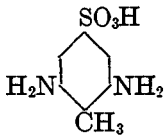
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
301	Hessian Purple N	I '14:— 465	β-Naphthylamine (2 mols)	D
302	Brilliant Hessian Purple		Broenner's Acid (2 mols)	D
303	Brilliant Yellow	I '14:—278,000	Phenol (2 mols)	D
	Paper Yellow	M '17:— ?		A
		M '18:— 1,664		
		M '19:— 48,723		
		I '20:— 126		
		M '20:— 91,218		
304	Chrysophenine G	I '14:—157,799	Phenol (2 mols)	D
		M '17.— ?	[Ethylation]	
		M '18:— 41,663		
		M '19:— 86,795		
		I '20:— 3,661		
		M '20:—247,202		
305	Hessian Yellow		Salicylic Acid (2 mols)	D

3: 5-Diamino-*p*-toluene-sulfonic Acid (*C. A. nomen. $SO_3H=1$*)

1-Tolylene-2: 6-diamine-4-sulfonic Acid

Toluylene-diamine-sulfonic Acid

1-Methyl-2: 6-diamino-benzene-4-sulfonic Acid



$= C_7H_{10}N_2O_3S = 202$

FORMATION.—From *o*-nitro-toluene by sulfonation, nitration and reduction

LITERATURE.—Lange, Zwischenprodukte, #1096

Dyes Derived from 3: 5-Diamino-*p*-toluene-sulfonic Acid

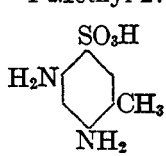
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
285	Toluylene Brown G		*m*-Phenylene-diamine	D
286	Toluylene Yellow	I '14:— 5,485	Nitro-*m*-phenylene-diamine (2 mols)	D
287	Toluylene Orange RR	I '14:— 500	β-Naphthylamine (2 mols)	D
	TETRAKISAZO DYE			
488	Toluylene Brown R	I '14:— 201	Naphthionic Acid (2 mols) *m*-Phenylene-diamine (2 mols)	D

4: 6-Diamino-*m*-toluene-sulfonic Acid (*C. A. nomen. $SO_3H=1$*)

m-Tolylene-diamine-sulfonic Acid

m-Toluylene-diamine-sulfonic Acid

1-Methyl-2: 4-diamino-benzene-5-sulfonic Acid



$= C_7H_{10}N_2O_3S = 202$

STATISTICS.—Manufactured in 1918, 1919, 1920, but in undisclosed quantities

FORMATION.—By addition of *m*-tolylene-diamine sulfate to oleum, and heating the mixture for three hours on a water bath.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 87
Lange, Zwischenprodukte, #1096

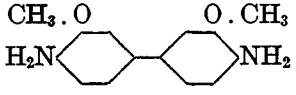
Dyes Derived from 4: 6-Diamino-*m*-toluene-sulfonic Acid (*$SO_3H = 1$*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
362	Toluylene Orange R Oxydiamine Orange R	I '14:— 25,908 M '19:— ? I '20:— 1,653	Tolidine 4: 6-Diamino-*m*-toluene-sulfonic Acid (2 mols)	D
392	Toluylene Orange G	I '14:— 67,022 M '18:— ? M '19:— ? M '20:— ? I '20:— 273	Tolidine *o*-Cresotic Acid	D

Dianisidine

o-Dianisidine

D (*abbreviation for Dianisidine in compounds, without the 2-NH_2 groups*)



$= C_{14}H_{16}N_2O_2 = 244$

STATISTICS.—Imported '14:—10,656 lbs.
Manufactured '17:—11,702 lbs.
Manufactured '18:— ?
Manufactured '19:—107,441 lbs.
Manufactured '20:— ?

FORMATION.—*o*-Nitro-anisole is reduced by zinc dust in presence of caustic soda and alcohol to hydrazo-anisole, which is rearranged to dianisidine by being warmed with dilute sulfuric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 96
Lange, Zwischenprodukte, #1204

Dyes Derived from Dianisidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
405	Benzopurpurin 10B	I '14:— 47,768 M '18:— ? M '19:— ? M '20:— 41,265 I '20:— 2,205	Naphthionic Acid (2 mols)	D
406	Diazurine B		1-Naphthylamine-6-sulfonic Acid (2 mols) β-Naphthol (2 mols)	D
407	Azo Violet		Naphthionic Acid Nevile-Winther's Acid	D
408	Dianisidine Blue		β-Naphthol (2 mols)	D
408(1)	Azophor Blue D		[Stable tetrazo-dianisole used with *p*-nitro-aniline]	MF
408(2)	Azophor Black S	I '14:— 140	[Stable tetrazo-dianisole mixed with diazo *m*-nitro-aniline, etc.]	MF
409	Trisulfon Blue B	I '14:— 813	1-Naphthol-3:6:8-trisulfonic Acid β-Naphthol	D
410	Benzoazurine G	I '14:— 78,699 M '18:— ? M '19:—150,589 I '20:— 287 M '20:—237,328	Nevile-Winther's Acid (2 mols)	D
411	Benzoazurine 3G	I '20:— 201	1-Naphthol-5-sulfonic (2 mols)	D
412	Congo Blue 2B		R Acid Nevile-Winther's Acid	D
413	Direct Violet BB	I '14:— 4,396	1:7-Dihydroxy-naphthalene-4-sulfonic Acid *m*-Tolylene-diamine	D

Dyes Derived from Dianisidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
414	Indazurine B		1:7-Dihydroxy-naphthalene-4-sulfonic Acid R Acid	D
415	Dianil Blue G	M '19:— ? M '20:— ?	Chromotropic Acid (2 mols)	D
416	Brilliant Azurine 5G	I '14:— 22,324 I '20:— 1,563	1:8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
417	Chlorazol Blue 3G *or* R	I '14:— 10,151	1-Chloro-8-naphthol-5-sulfonic Acid (2 mols) *or* 1-Chloro-8-naphthol-4-sulfonic Acid (2 mols)	D
418	Diamine Brilliant Blue G	I '14:— 11,592 I '20:— 51	1-Chloro-8-naphthol-3:6-disulfonic Acid (2 mols)	D
419	Chicago Blue RW	I '14:— 15,176 M '19:— ? I '20:— 351 M '20:— ?	1-Amino-8-naphthol-2:4-disulfonic Acid β-Naphthol	D
420	Azidine Wool Blue B		Croceine Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
421	Oxamine Blue B	I '14:— 35,891 I '20:— 13	1-Amino-5-naphthol-7-sulfonic Acid Nevile-Winther's Acid	D
422	Chicago Blue 4B	I '14:— 8,269	1-Amino-8-naphthol-2:4-disulfonic Acid 1-Amino-8-naphthol-4-sulfonic Acid	D

Dyes Derived from Dianisidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
423	Chicago Blue B	M '18:— ?	1-Amino-8-naphthol-4-sulfonic Acid (2 mols)	D
424	Chicago Blue 6B	I '14:—118,542 M '19:— ? I '20:— 7,480 M '20:— ?	1-Amino-8-naphthol-2:4-disulfonic Acid (2 mols)	D
425	Benzo Cyanine 3B	I '14:— 1,001	H Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
426	Diamine Pure Blue Benzamine Pure Blue	I '14:— 12,881 M '17:— ? M '18:— ? M '19:—192,350 '20:— 652 M '20:—223,100	H Acid (2 mols)	D
427	Indazurine GM		1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid Nevile-Winther's Acid	D
428	Direct Blue B	I '14:— 21,421 M '17:— 14,823 M '18:— ? I '20:— 7,055	1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid Nevile-Winther's Acid	D
429	Indazurine BB		1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid R Acid	D
430	Indazurine 5GM		1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid H Acid	D
	TRISAZO DYES			
455	Columbia Black B	I '14:—165,727	2 R Acid *m*-Tolylene-diamine (2 mols)	D

Dyes Derived from Dianisidine (*continued*)

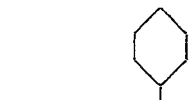
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
456	Congo Fast Blue B Benzo Fast Blue B	I '14:—100,495 I '20:— 1,821	α-Naphthylamine 1-Naphthol-3: 8-disulfonic Acid	D
457	Trisulfon Brown GG	I '14:— 7,562 I '20:— 38,411	2 R Acid Salicylic Acid *m*-Phenylene-diamine	D

Dibenzo-pyrrole

See, Carbazole

Dibenzyl-aniline-sulfonic (disulfonic) Acid

[(*N*-Benzyl-anilino)-methyl]-benzene-sulfonic Acid (*C. A. nomen.*)



$$= C_{20}H_{19}NO_3S = 353$$

$$C_6H_5 . CH_2—N—CH_2 . C_6H_4 . SO_3H$$

FORMATION.—Aniline, benzyl chloride and sodamide are mixed together and then heated up on water bath until ammonia is all off, resulting in the formation of dibenzyl-aniline. This latter is then sulfonated

LITERATURE.—Lange, Zwischenprodukte, #1561

Dye Derived from Dibenzyl-aniline-sulfonic (disulfonic) Acid

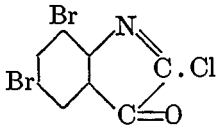
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
531	Eriocyanine A	I '14:— 25,091 I '20:— 8,223	Tetramethyl-*p: p'*-diamino-benzohydrol-sulfonic Acid [Oxidation]	A

5: 7-Dibromo-2-chloro-3-pseudoindolone (*C. A. nomen.*)

See, 5: 7-Dibromo-isatin Chloride

5: 7-Dibromo-isatin Chloride

5: 7-Dibromo-2-chloro-3-*p*seudoindolone (*C. A. nomen.*)



$= C_8H_2Br_2ClNO = 323.5$

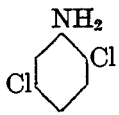
FORMATION.—Isatin is gently warmed with bromine in concentrated sulfuric acid, giving 5: 7-dibromo-isatin, which is then warmed with phosphorus pentachloride and benzene

LITERATURE.—Ullmann, Enzy. tech. Chemie, **6**, 526
Lange, Zwischenprodukte, #2122

Dyes Derived from 5: 7-Dibromo-isatin Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
893	Alizarin Indigo G	I '20:— 1,596	1-Anthrol	V
895	Alizarin Indigo 3R	I '20:— 3,514	α-Naphthol	V

2: 5-Dichloro-aniline



$= C_6H_5Cl_2N = 162$

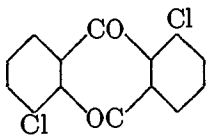
FORMATION.—From 2: 5-dichloro-nitro-benzene by reduction with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 50

Dyes Derived from 2: 5-Dichloro-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
218	Nigrophor BASF		1-Amino-8-naphthol-5-sulfonic Acid *p*-Nitro-aniline	MF
	TRISAZO DYES			
469	Chloramine Black N	I '14:— 39,600 M '19:— ? I '20:— 1,763 M '20:— ?	Benzidine *m*-Phenylene-diamine H Acid	D
470	Chloramine Green B	I '14:— 1,675 M '19:— ? M '20:— ?	Benzidine Phenol H Acid	D
471	Chloramine Blue 3G	I '14:— 286 M '19:— ? I '20:— 882	Benzidine H Acid (2 mols)	D
472	Chloramine Blue HW		Benzidine Gamma Acid H Acid	D

1: 5-Dichloro-anthraquinone



$= C_{14}H_6Cl_2O_2 = 277$

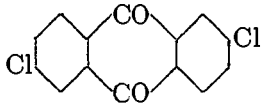
FORMATION.—Sodium 1: 5-anthraquinone-disulfonate in dilute hydrochloric acid is heated to boiling and treated with a solution of sodium chlorate

LITERATURE.—Cain, Intermediate Products (2d Ed.), 250
Lange, Zwischenprodukte, #3083, 3086
Ullmann, Enzy. tech. Chemie, **1**, 472

Dye Derived from 1: 5-Dichloro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
832	Indanthrene Violet RN	I '14:— 11,667 I '20:— 49	Anthranilic Acid (2 mols)	V

2: 6-Dichloro-anthraquinone



$= C_{14}H_6Cl_2O_2 = 277$

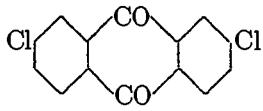
FORMATION.—2: 6-Anthraquinone-disulfonic acid is treated with chlorine

LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 472
Cf. Ber., **37**, 4706
Lange, Zwischenprodukte, #3164, 3165

Dyes Derived from 2: 6-Dichloro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
826	Indanthrene Red G		1-Amino-anthraquinone (2 mols)	V
829	Algol Bordeaux 3B	I '20:— 61	1-Amino-4-methoxy-anthraquinone (2 mols)	V

2: 7-Dichloro-anthraquinone



$= C_{14}H_6Cl_2O_2 = 277$

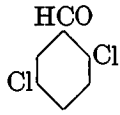
FORMATION.—From anthraquinone-2: 7-disulfonic acid by treatment with hydrochloric acid and sodium chlorate; or better from 9: 10-dichloro-anthracene-2: 7-disulfonic acid by treatment with the same reagents

LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 472
Lange, Zwischenprodukte, #3165

Dyes Derived from 2: 7-Dichloro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
827	Indanthrene Bordeaux B extra	I '14:— 28,728 I '20:— 4,056	1-Amino-6-chloro-anthraquinone (2 mols)	V
830	Indanthrene Red R	I '14:— 2,099 I '20:— 6,595	1-Amino-anthraquinone (2 mols)	V

2: 5-Dichloro-*b*enzaldehyde



$= C_7H_4Cl_2O = 175$

FORMATION.—From 2-chlor-5-nitro-benzaldehyde by the substitution of the nitro group by chlorine

LITERATURE.—Lange, Zwischenprodukte, #669
Beil, III, 13

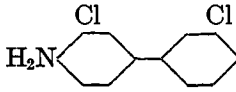
Dyes Derived from 2:5-Dichloro-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
497	New Fast Green 2B Victoria Green 3B	I '14:— 44,595	Dimethyl-aniline (2 mols) [Oxidation]	B
501	Glacier Blue Brilliant Glacier Blue	I '14:— 2,495	Methyl-*o*-toluidine (2 mols) [Oxidation]	B

o: o'-Dichloro-benzidine

2: 2'-Dichloro-benzidine (*C. A. nomen. $NH_2 = 1$*)

3: 3'-Dichloro-benzidine (*Usual numbering, point of attachment = 1*)



$= C_{12}H_{10}Cl_2N_2 = 253$

FORMATION.—(1) By chlorinating of diacetyl-benzidine, and hydrolyzing product. (2) By reducing *o*-chloro-nitro-benzene in alkaline solution with zinc, and rearranging with acid the *o: o'*-dichloro-hydrazo-benzene formed (similar to benzidine formation from nitro-benzene)

LITERATURE.—Cain, Intermediates (2d Ed.), 94
Lange, Zwischenprodukte, #1229, 1230

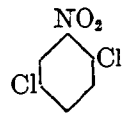
Dyes Derived from *o: o'* Dichloro-benzidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
356	Dianol Red 2B	I '14:— 4,422 I '20:— 17,632	Naphthionic Acid (2 mols)	D
357	Dianol Red B		Broenner's Acid (2 mols)	D
358	Brilliant Dianol Red R extra Diphenyl Red	I '14:— 14,305 I '20:— 3,704	Amino-R Acid (2 mols)	D

2: 5-Dichloro-4-(4: 5-dihydro-5-keto-3-methyl-1-pyrazolyl)-benzene-sulfonic Acid (*C. A. nomen.*)

See, 1-(2': 5'-Dichloro-4'-sulfo-phenyl)-3-methyl-5-pyrazolone

2: 5-Dichloro-nitro-benzene



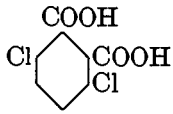
$= C_6H_3Cl_2NO_2 = 192$

FORMATION.—By nitration of *p*-dichloro-benzene with mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 14
Lange, Zwischenprodukte, #674

USES.—For preparing 2: 5-dichloro-aniline

3: 6-Dichloro-*phthalic* Acid



$= C_8H_4Cl_2O_4 = 235$

STATISTICS.—Imported '14:—very small
Manufactured '18:— ?

FORMATION.—(1) From dichloro-naphthalene tetrachloride, by oxidation with nitric acid. (2) From phthalic anhydride dissolved in oleum by chlorination in presence of iodine, and by separation from the isomers formed at the same time

LITERATURE.—Lange, Zwischenprodukte, #992
Cain, Intermediate Products (2d Ed.), 165

Dyes Derived from 3: 6-Dichloro-phthalic Acid

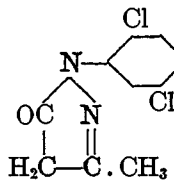
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
584	Fast Acid Blue R	I '14:— 3,022 I '20:— 130	Resorcinol (2 mols) *p*-Phenetidine (2 mols) [PCl_5; Sulfonation] *or* [Tetrachloro-fluoresceine and *p*-phenetidine; Sulfonation]	A
593	Phloxine P	I '14:— 2,244 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Resorcinol (2 mols) [Bromination] *or* [Dichloro-fluoresceine brominated]	A

Dyes Derived from 3:6-Dichloro-phthalic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES (*continued*)			
594	Cyanosine, Spirit Soluble		Resorcinol (2 mols) [Bromination, methylation] *or* [Phloxine P methyl ester]	A
595	Rose Bengal	I '14:— 2,277 M '20:— ?	Resorcinol (2 mols) [Iodation] *or* [Dichloro-fluoresceine iodated]	A

1-(2: 5-Dichloro-4-sulfo-phenyl)-3-methyl-5-pyrazolone

2: 5-Dichloro-4-(4:5-dihydro-5-keto-3-methyl-1-pyrazolyl)-benzene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_8Cl_2N_2O_4S = 323$

FORMATION.—2: 5-Dichloro-aniline-4-sulfonic acid is diazotized and reduced to 2: 5-dichloro-phenyl-hydrazine-4-sulfonic acid, which latter body by condensation with ethyl acetoacetate forms the above pyrazolone derivative

LITERATURE.—Cain, Intermediate Products (2d Ed.), 170
Cf. Lange, Zwischenprodukte, #138

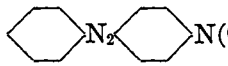
Dye Derived from 1-(2: 5-Dichloro-4-sulfo-phenyl)-3-methyl-5-pyrazolone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYE			
22	Xylene Yellow 3G	I '14:— 23,074 I '20:— 77,782	Sulfanilic Acid	A

p-Diethylamino-azo-benzene

Benzene-azo-diethylaniline

N: *N*-Diethyl-*p*-phenylazo-aniline (*C. A. nomen.*)



$= C_{16}H_{19}N_3 = 253$

FORMATION.—By coupling diazo-benzene chloride (diazotized aniline) with diethyl-aniline

LITERATURE.—Ullmann, Enzy. tech. Chemie, **2**, 80

Dyes Derived from *p*-Diethylamino-azo-benzene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES			
641	Coreine RR Cœlestine Blue B	I '14:— 1,320 I '20:— 44	Gallamide	M
646	Coreine AR		Gallamide Aniline [Sulfonation] *or* [Coreine RR, Aniline, Sulfonation]	M

p-Diethylamino-benzoyl Chloride

$= C_{11}H_{14}ClNO = 211.5$

FORMATION.—(1) *p*-Amino-benzoic acid is ethylated, and then treated with phosphorus pentachloride to form the desired acid chloride. (2) Diethyl-aniline is subjected to the action of phosgene first at ordinary temperatures until no more gas is absorbed, and then after melting the crystalline mass first obtained. The product is mixed with water and the excess of diethyl-aniline removed by acetic acid. The acid chloride is formed by treatment with phosphorus pentachloride

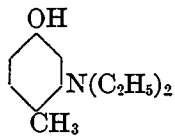
LITERATURE.—Cain, Intermediate Products (2d Ed.), 148

Dye Derived from *p*-Diethylamino-benzoyl Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
534	Acid Violet 7B	I '14:— 21,665 I '20:— 51	*N*-Methyl-diphenyl-amine (2 mols)	A

3-Diethylamino-*p*-cresol (*C. A. nomen. OH=1*)

Diethyl-*m*-amino-*p*-cresol (*OH=1*)



$= C_{11}H_{17}NO = 179$

FORMATION.—From diethyl-*o*-toluidine by sulfonation in the cold with oleum and caustic soda fusion of the sulfonic acid

LITERATURE.—Möhlau, Klimmer and Kahl, Zeit. Farb. Chem., 1902 316

Lange, Zwischenprodukte, #815

Dye Derived from 3-Diethylamino-*p*-cresol (OH=1)

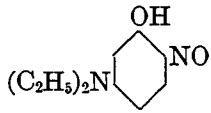
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYE			
620	Capri Blue GON	I' 14:— 128	Nitroso-dimethyl-aniline	B

Diethyl-*m*-amino-*p*-cresol (OH=1)

See, 3-Diethylamino-*p*-cresol (*C. A. nomen. OH=1*)

5-Diethylamino-2-nitroso-*phenol* (*C. A. nomen.*)

Nitroso-diethyl-*m*-amino-phenol



$= C_{10}H_{14}N_2O_2 = 194$

FORMATION.—Diethyl-*m*-amino-phenol (which can be prepared by sulfonating diethyl-aniline and then fusing the sulfonic acid to produce the diethyl-*m*-amino-phenol) is dissolved in hydrochloric acid, cooled with ice to 0° C., and sodium nitrite solution introduced

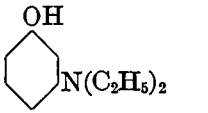
LITERATURE.—Lange, Zwischenprodukte, #906

Dyes Derived from 5-Diethylamino-2-nitroso-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES			
653	Nile Blue A	I '14:— 1,518 I '20:— 1,241	α-Naphthylamine	B
654	Nile Blue 2B		Benzyl-α-naphthyl-amine	B

m*-Diethylamino-*phenol (*C. A. nomen.*)

Diethyl-*m*-amino-phenol



$= C_{10}H_{15}NO = 165$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—Diethyl-aniline is sulfonated with oleum, and the resulting diethyl-aniline-*m*-sulfonic acid fused with caustic soda

LITERATURE.—Cain, Intermediate Products (2d Ed.), 122
Lange, Zwischenprodukte, #603–606, 2263

Dyes Derived from *m*-Diethylamino-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
570	Rhodamine S	I '14:— 600 I '20:— 273	Diethyl-*m*-amino-phenol (2 mols) [Succinic Anhydride]	A
572	Rhodamine G	I '14:— 2,648 I '20:— 517	Phthalic Anhydride Diethyl-*m*-amino-phenol (2 mols) Aniline [Removes one C_2H_5 group] *or* [Rhodamine B heated with Aniline Salt]	B
573	Rhodamine B	I '14:— 59,354 M '17:— ? M '18:— ? M '19:— ? M '20:— ? I '20:— 24,709	Phthalic Anhydride Diethyl-*m*-amino-phenol (2 mols)	B
574	Rhodamine 3B		Phthalic Anhydride Diethyl-*m*-amino-phenol (2 mols) [Ethyl esterification] *or* [Rhodamine B ethylated]	B
579	Sulfo Rhodamine B Xylene Red B	I '14:— 1,698	Benzaldehyde-di-sulfonic Acid Diethyl-*m*-amino-phenol (2 mols) [Oxidation]	A
581	Fast Acid Eosine G Fast Acid Phloxine A	I '14:— 650 I '20:— 5,234	Phthalic Anhydride Diethyl-*m*-amino-phenol (2 mols) *or* [Rhodamine B, sulfonated]	A

Diethyl-aniline

N: *N*-Diethyl-aniline (*C. A. nomen.*)

$= C_{10}H_{15}N = 149$

STATISTICS.—Imported '14:—very small quantity
Manufactured '17:— 3,955 lbs.
Manufactured '18:—48,048 lbs.
Manufactured '19:—30,000 lbs.
Manufactured '20:—180,542 lbs.

FORMATION.—Aniline is heated in an autoclave with ethyl alcohol in the presence of a catalyst, for example, hydrochloric acid, hydrobromic acid, or iodine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 68
Lange, Zwischenprodukte, #128

Dyes Derived from Diethyl-aniline

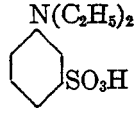
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
499	Brilliant Green	I '14:— 73,904 M'18:— ? M'19:— ? I '20:— 25 M'20:— ?	Diethyl-aniline (2 mols) Benzaldehyde [Oxidation]	B
507	Xylene Blue VS	I '14:— 2,130 I '20:— 27,254	Diethyl-aniline (2 mols) 3-Methyl-benzaldehyde-4:6-disulfonic Acid [Oxidation]	A
518	Ethyl Violet Ethyl Purple	I '14:— 51,933	Tetraethyl-diamino-benzophenone *or* Diethyl-aniline (3 mols) Phosgene *or* Tetraethyl-diamino-diphenyl-methane	B

Dyes Derived from Diethyl-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
530	Acid Violet 6B Formyl Violet Guinea Violet	I '14:—161,624 M '17:— ? M '18:— ? M '19:— ? I '20:— 3,925 M '20:—144,207	Ethyl-sulfobenzyl-aniline (2 mols) [Formaldehyde, Oxidation]	A
543	Patent Blue V	I '14:—196,228 M '17:— ? M '18:— ? I '20:— 36,420	Diethyl-aniline (2 mols) *m*-Nitro-benzaldehyde *or* *m*-Hydroxy-benzaldehyde [Sulfonation, Oxidation]	A
544	Cyanine B	I '14:— 8,398 I '20:— 24	Diethyl-aniline (2 mols) *m*-Nitro-benzaldehyde *or* *m*-Hydroxy-benzaldehyde [Sulfonation, Oxidation] *or* [Patent Blue Oxidized]	A
	AZINE DYE			
686	Amethyst Violet		Diethyl-*p*-phenylene-diamine Aniline *or* *p*-Toluidine [Oxidation]	A

Diethyl-aniline-*m*-sulfonic Acid

N: *N*-Diethyl-*m*etanilic Acid (*C. A. nomen.*)



$= C_{10}H_{15}NO_3S = 229$

FORMATION.—From diethyl-aniline by sulfonation with oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 122
Lange, Zwischenprodukte, #631

Dyes Derived from Diethyl-aniline-*m*-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
59	MONOAZO DYE Wool Violet S	I '14:— 308 M '18:— ? M '19:— ?	2:4-Dinitro-aniline	A

N: N-Diethyl-metanilic Acid (*C. A. nomen.*)

See, Diethyl-aniline-*m*-sulfonic Acid

N: N-Diethyl-*p*-nitroso-aniline (*C. A. nomen.*)

See, *p*-Nitroso-diethyl-aniline

N: N-Diethyl-*p*-phenylazo-aniline (*C. A. nomen.*)

See, *p*-Diethylamino-azo-benzene

N: N'-Diethyl-*m*-phenylene-diamine (*C. A. nomen.*)

s-Diethyl-*m*-phenylene-diamine

$= C_{10}H_{16}N_2 = 164$

FORMATION.—Probably by heating resorcinol with ethylamine in the presence of a dehydrating agent

LITERATURE.—*Cf.* Green, Organic Coloring Matters (1908), 37.
Cf. Calm, Ber., **16**, 2792 (1883)

Dye Derived from N: N'-Diethyl-*m*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
678	AZINE DYE Fast Neutral Violet B	M '17:— ?	Nitroso-dimethyl-aniline	B

N: N-Diethyl-*p*-phenylene-diamine (*C. A. nomen.*)

p-Amino-diethyl-aniline

$= C_{10}H_{16}N_2 = 164$

FORMATION.—Diethyl-aniline is converted into *p*-nitroso-diethyl-aniline by nitrous acid, which by reduction with zinc dust and hydrochloric acid yields the *p*-amino-diethyl-aniline

LITERATURE.—*Cf.* Lange, Zwischenprodukte, #561–563

Dye Derived from N: N-Diethyl-*p*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYE			
686	Amethyst Violet		Diethyl-aniline Aniline *or* *p*-Toluidine [Oxidation]	A

s-Diethyl-*m*-phenylene-diamine

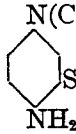
See, N: N'-Diethyl-*m*-phenylene-diamine

Diethyl-*p*-phenylene-diamine-thiosulfonic Acid

p-Amino-diethyl-aniline-thiosulfonic Acid

4-Amino-1-diethylamino-benzene-3-thiosulfonic Acid

2-Amino-5-diethylamino-benzene-thiosulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{16}N_2O_3S_2 = 276$

FORMATION.—12 parts of the zinc chloride double salt of diethyl-*p*-phenylene-diamine are dissolved in 90 parts of water, treated with a solution of 25 parts of aluminum sulfate and 20 parts of sodium thiosulfate in 70 parts of water, and finally oxidized with 3 parts of potassium bichromate dissolved in 30 parts of water

LITERATURE.—Lange, Zwischenprodukte, #931, 932

Dye Derived from Diethyl-*p*-phenylene-diamine-thiosulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
666	THIAZINE DYE Indochromogen S		1:2-Naphthoquinone-4:6-disulfonic Acid	M

3:4-Dihydro-3:4-diketo-1:7-naphthalene-disulfonic Acid (*C. A. nomen.*)

See, 1:2-Naphthoquinone-4:6-disulfonic Acid

3:4-Dihydro-3:4-diketo-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

See, 1:2-Naphthoquinone-4-sulfonic Acid

***p*-(4:5-Dihydro-5-keto-3-methyl-1-pyrozolyl)-benzene-sulfonic Acid** (*C. A. nomen.*)

See, 3-Methyl-1-(*p*-sulfo-phenyl)-5-pyrazolone

1:2-Dihydroxy-anthraquinone

See, Alizarin

1:5-Dihydroxy-anthraquinone

See, Anthrarufin

2:4-Dihydroxy-benzoic Acid

See, β-Resorcylic Acid (*C. A. nomen.*)

3:5-Dihydroxy-benzoic Acid

See, *a*-Resorcylic Acid (*C. A. nomen*)

***m*-Dihydroxy-benzoic Acid**

See, *a*-Resorcylic Acid (*C. A. nomen.*)

1:7-Dihydroxy-2-carboxy-naphthalene-4-sulfonic Acid

See, 1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid

1: 7-Dihydroxy-6-carboxy-naphthalene-3-sulfonic Acid

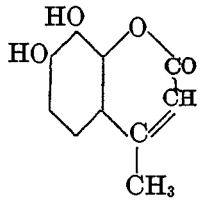
See, 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid

Dihydroxy-β-methyl-coumarin

See, 7: 8-Dihydroxy-4-methyl-coumarin (*C. A. nomen.*)

7: 8-Dihydroxy-4-methyl-coumarin (*C. A. nomen.*)

Dihydroxy-β-methyl-coumarin



$= C_{10}H_8O_4 = 192$

FORMATION.—From pyrogallol and acetoacetic ethyl ester

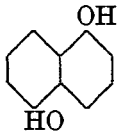
LITERATURE.—J. pr. Ch. (2) **26**, 68
Ber., **16**, 2127 (1883)

Dye Derived from 7: 8-Dihydroxy-4-methyl-coumarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYE			
773	Anthracene Yellow	I '14:— 4,046	[Bromination]	M

1: 5-Dihydroxy-naphthalene

1: 5-Naphthalenediol (*C. A. nomen.*)



$= C_{10}H_8O_2 = 160$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By caustic soda fusion of sodium naphthalene-1: 5-disulfonate or of sodium 1-naphthol-5-sulfonate

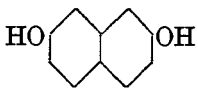
LITERATURE.—Cain, Intermediate Products (2d Ed.), 230
Lange, Zwischenprodukte, #2392
Thorpe, Dic. Chemistry, **3**, 646

Dye Derived from 1: 5-Dihydroxy-naphthalene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
157	MONOAZO DYE Diamond Black PV	I '14:—285,074	*o*-Amino-phenol-*p*-sulfonic Acid	M

2: 7-Dihydroxy-naphthalene

2: 7-Naphthalenediol (*C. A. nomen.*)



$= C_{10}H_8O_2 = 160$

FORMATION.—By caustic soda fusion of F acid (2-naphthol-7-sulfonic acid)

LITERATURE.—Lange, Zwischenprodukte, #2401
Green, Organic Coloring Matters (1908), 54
Thorpe, Dic. Chemistry, **3**, 647

Dyes Derived from 2: 7-Dihydroxy-naphthalene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
3	NITROSO DYE Dioxine		[Nitrous Acid]	M
655	OXAZINE DYE Muscarine		Nitroso-dimethyl-aniline	B

1:7-Dihydroxy-naphthalene-2-carboxylic-4-sulfonic Acid

See, 1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid

1:7-Dihydroxy-naphthalene-6-carboxylic-3-sulfonic Acid

See, 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid

1:8-Dihydroxy-naphthalene-3:6-disulfonic Acid

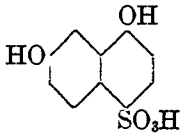
See, Chromotropic Acid

4:5-Dihydroxy-2:7-naphthalene-disulfonic Acid (*C. A. nomen.*)

See, Chromotropic Acid

1:7-Dihydroxy-naphthalene-4-sulfonic Acid

4:6-Dihydroxy-1-naphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_8O_5S = 240$

FORMATION.—From 1 hydroxy-naphthalene-2-carboxylic-4:7-disulfonic acid by fusion with alkalis, whereby first a sulfonic group is replaced by hydroxyl and then at a higher temperature carbon dioxide is split out

LITERATURE.—Lange, Zwischenprodukte, #2617, 2618
Thorpe, Dic. Chemistry, **3**, 650

Dyes Derived from 1:7-Dihydroxy-naphthalene-4-sulfonic Acid

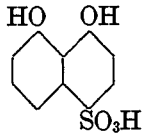
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
413	Direct Violet BB	I '14:— 4,396	Dianisidine *m*-Tolylene-diamine	D
414	Indazurine B		Dianisidine R Acid	D

1: 8-Dihydroxy-naphthalene-4-sulfonic Acid

Dihydroxy-naphthalene-sulfonic Acid S

S Acid

4: 5-Dihydroxy-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)



$=C_{10}H_8O_5S=240$

STATISTICS.—Imports '14:—2,178 lbs.

FORMATION.—(1) From 1-naphthol-4: 8-disulfonic acid by fusion with caustic soda, preferably in an autoclave. (2) From 1-naphthylamine-4: 8-disulfonic acid by fusion with caustic soda, in an autoclave. (3) From 1-amino-8-naphthol-4-sulfonic acid by heating with sodium sulfite

LITERATURE.—Cain, Intermediate Products (2d Ed.), 230
Lange, Zwischenprodukte, #2621, 2622

Dyes Derived from 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
63	Azo Acid Blue	I '14:— 45,098 I '20:— 9,222	Dimethyl-*p*-phenylene-diamine *or* *p*-Nitro-aniline [Reduction and alkylation]	A
71	Azo Fuchsine B		Toluidine	A
118	Brilliant Geranine	I '14:— 18,917 M '19:— ? I '20:— 527	Dehydro-thio-*p*-toluidine	D
146	Azo Fuchsine G	I '14:— 17,819 I' 20:— 3,694	Sulfanilic Acid	A
147	Azo Fuchsine 6B	I '14:— 13,206 M '17:— ? M '18:— ?	Sulfanilic Acid (?)	A

Dyes Derived from 1:8-Dihydroxy-naphthalene-4-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
229	Azo Acid Violet	I '14:— 150 I '20:— 11 M '20:— ?	Amino-azo-benzene	A
242	Sulfon Black G		Aniline 1-Naphthylamine-6-*and* 7-sulfonic Acids [Cleve's Acids]	A
262	Victoria Black B	I '14:— 557	Sulfanilic Acid α-Naphthylamine	A
276	Diamond Green B	I '14:— 8,622 M '18:— ? I '20:— 4,061	Amino-salicylic α-Naphthylamine	ACr
416	Brilliant Azurine 5G	I '14:— 22,324 I '20:— 1,563	Dianisidine 1:8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
	TRISAZO DYES			
452	Benzo Indigo Blue		Tolidine α-Naphthylamine 1:8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
460	Benzo Black Blue 5G	I '14:— 602	Benzidine-disulfonic-Acid α-Naphthylamine 1:8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D

4:5-Dihydroxy-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

See, 1:8-Dihydroxy-naphthalene-4-sulfonic Acid

4:6-Dihydroxy-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

See, 1:7-Dihydroxy-naphthalene-4-sulfonic Acid

Dihydroxy-naphthalene-sulfonic Acid S

See, 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid

Dihydroxy-naphthoic Acid L

2: 6-Dihydroxy-3-naphthoic Acid (*not considered herein*)

Dihydroxy-naphthoic Acid S

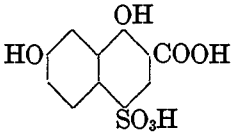
1: 7-Dihydroxy-6-naphthoic Acid (*not considered herein*)

1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid

1: 7-Dihydroxy-naphthalene-2-carboxylic-4-sulfonic Acid

1: 7-Dihydroxy-2-carboxy-naphthalene-4-sulfonic Acid

1: 7-Dihydroxy-4-sulfo-2-naphthoic Acid (*C. A. nomen.*)



$= C_{11}H_8O_7S = 284$

FORMATION.—1-Hydroxy-2-naphthoic acid is disulfonated with 4 parts of 20 per cent oleum, the product isolated and fused with caustic soda at 190–200°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 242
Lange, Zwischenprodukte, 2677

Dyes Derived from 1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
396	Indazurine RM		Tolidine Nevile-Winther's Acid	D
399	Indazurine TS		Tolidine Gamma Acid	D
427	Indazurine GM		Dianisidine Nevile-Winther's Acid	D
429	Indazurine BB		Dianisidine R Acid	D
430	Indazurine 5GM		Dianisidine H Acid	D

1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid

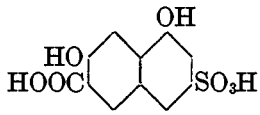
1: 7-Dihydroxy-naphthalene-6-carboxylic-3-sulfonic Acid

1: 7-Dihydroxy-6-carboxy-naphthalene-3-sulfonic Acid

Nigrotic Acid

Nigrotinic Acid

3: 5-Dihydroxy-7-sulfo-2-*n*aphthoic Acid (*C. A. nomen.*)



$= C_{11}H_8O_7S = 284$

FORMATION.—2-Hydroxy-3-naphthoic acid is disulfonated with 4 parts of 24 per cent oleum at 125–150° for from two to three hours, the product isolated, and fused with 2 parts of caustic soda at about 210–220° and then at 230–240°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 241
Lange, Zwischenprodukte, #2678

Dyes Derived from 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
352	Direct Violet R	I '14:— 661 M '19:— ?	Benzidine *m*-Tolylene-diamine	D
353	Direct Indigo Blue BN	I '14:— 6,000	Benzidine H Acid	D
354	Direct Gray R	I '20:— 4,927	Benzidine 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid (2 mols)	D
397	Direct Blue R	M '17:— ?	Tolidine Nevile-Winther's Acid	D

Dyes Derived from 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid
(*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
398	Direct Gray B		Tolidine 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid (2 mols)	D
428	Direct Blue B	I '14:— 21,421 M '17:— 14,823 M '18:— ? I '20:— 7,055	Dianisidine Nevile-Winther's Acid	D

1:2-Dihydroxy-naphthoquinone

See, Naphthazarin

5:6-Dihydroxy-1:4-naphthoquinone

See, Naphthazarin

5:6-Dihydroxy-α-naphthoquinone

See, Naphthazarin

1:7-Dihydroxy-4-sulfo-2-naphthoic Acid (*C. A. nomen.*)

See, 1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid

3:5-Dihydroxy-7-sulfo-2-naphthoic Acid (*C. A. nomen.*)

See, 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid

Dihydroxy-tartaric Acid

Dioxy-tartaric Acid

$$\begin{matrix} C:(OH)_2 \cdot COOH \\ | \\ C:(OH)_2 \cdot COOH \end{matrix} = C_4H_6O_8 = 182$$

FORMATION.—By oxidation of tartaric acid with strong nitric acid in presence of oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 168

Dyes Derived from Dihydroxy-tartaric Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYE			
23	Tartrazine	I '14:—272,477 M '17:— ? M '18:— ? M '19:— ? I '20:— 47,877 M '20:—701,722	Phenyl-hydrazine-*p*-sulfonic Acid (2 mols)	A

3:6-Dihydroxy-9-xanthene-proprionic Acid, γ-Lactone (*C. A. nomen.*)

See, Resorcinol-succinein

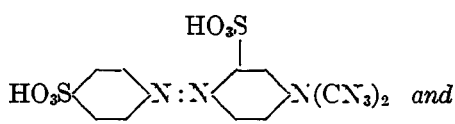
***p*-(*p*-Dimethylamino-anilino)-*p*henol** (*C. A. nomen.*)

See, 4-Dimethylamino-4′-hydroxy-diphenylamine

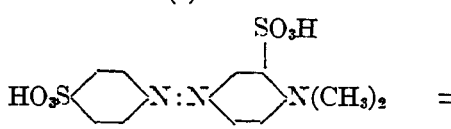
Dimethylamino-azo-benzene-disulfonic Acids

5-Dimethylamino-*o*: *p*′-azo-bis(benzene-sulfonic Acid) (*C. A. nomen. for I*)

6-Dimethylamino-*m*: *p*′-azo-bis(benzene-sulfonic Acid) (*C. A. nomen. for II*)



(I)



(II)

$= C_{14}H_{15}N_3O_6S_2 = 385$

FORMATION.—The compound represented by "Formula I" is prepared by coupling diazotized sulfanilic acid with dimethyl-aniline-*m*-sulfonic acid (prepared by sulfonating dimethyl-aniline). The isomeric compound represented in all probability by "Formula II," is made by direct sulfonation of dimethylamino-azo-benzene by means of oleum

LITERATURE.—Ger. Pat. 80434, Methods (b) and (a). Frdl. **4**, 490
Cf. Ullmann, Enzy. tech. Chemie, **2**, 81

Dye Derived from Dimethylamino-azo-benzene-disulfonic Acids

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYE			
628	Gallocyanine MS	I '20:— 22	Gallic Acid	M

***p*-Dimethylamino-*b*enzaldehyde**

$= C_9H_{11}NO = 149$

FORMATION.—Dimethyl-aniline is changed into dimethylamino-benzyl alcohol by treatment with hydrochloric acid and formaldehyde. This is then oxidized by adding nitroso-dimethyl-aniline directly to the crude alcohol, resulting in the formation of dimethylamino-benzylidene-amino-dimethyl-aniline, $(CH_3)_2N.C_6H_4.CH:N.C_6H_4.N(CH_3)_2$. This latter by treatment with nitrous acid or formaldehyde forms pure *p*-dimethylamino-benzaldehyde

LITERATURE.—Ullmann, Enzy. tech. Chemie, **2**, 307
Lange, Zwischenprodukte, #333–335

Dyes Derived from *p*-Dimethylamino-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
529	Acid Violet 6B		Ethyl-sulfobenzyl-aniline (2 mols) [Oxidation]	A
564	Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	Dimethyl-aniline *m*-Xylene	A

***p*-Dimethylamino-benzoyl Chloride**

$= C_9H_{10}ClNO = 183.5$

FORMATION.—From dimethyl-aniline by action of phosgene

LITERATURE.—Beil., **2**, 1271

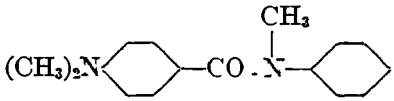
Dye Derived from *p*-Dimethylamino-benzoyl Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
533	Acid Violet 7BN		Methyl-diphenylamine-sulfonic Acid (2 mols)	A

Dimethylamino-benzoyl-methyl-aniline

Dimethylamino-benzo-methyl-aniline (*Schultz nomen.*)

p-Dimethylamino-*N*-methyl-benzanilide (*C. A. nomen.*)



$= C_{16}H_{18}N_2O = 254$

FORMATION.—Dimethyl-aniline reacting with phosgene forms *p*-dimethylamino-benzoyl chloride, which latter unites with methyl-aniline to form the *p*-dimethylamino-benzoyl-methyl-aniline

LITERATURE.—*Cf.* Ger. Pat. 41751, 44077
Cf. Georgievics and Grandinougin, Dye Chemistry, 174

Dye Derived from Dimethylamino-benzoyl-methyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-METHANE DYE			
493	Auramine	I '14:—449,276 M '17:— ? M '18:— 45,634 M '19:—127,567 M '20:— ? I '20:— 74,414	Dimethyl-aniline	B

6-(*p*-Dimethylamino-benzyl)-*N*: *N*-dimethyl-*m*etanilic Acid (*C. A. nomen.*)

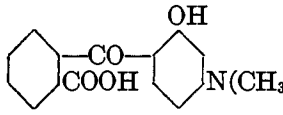
See, *p*: *p'*-Tetramethyl-diamino-diphenylmethane-sulfonic Acid

5-Dimethylamino-α-(*p*-dimethylamino-phenyl)-α-hydroxy-*o*-toluene-sulfonic Acid (*C. A. nomen.*)

See, *p*: *p'*-Tetramethyl-diamino-benzohydrol-sulfonic Acid

(Dimethylamino-hydroxy-benzoyl)-benzoic Acid

o-(4-Dimethylamino-2-hydroxy-benzoyl)-benzoic Acid (*C. A. nomen.*)



$= C_{16}H_{15}NO_4 = 285$

FORMATION.—By condensing phthalic anhydride and *m*-dimethylamino-phenol

LITERATURE.—Georgievics and Grandmougin, Dye Chemistry, 232

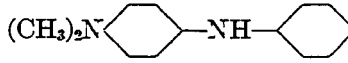
Lange, Zwischenprodukte, #1394, 1395 (*Note Lange's formula is at variance with structure given above, which, however, corresponds to the generally accepted formula*)

Dyes Derived from (Dimethylamino-hydroxy-benzoyl)benzoic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
575	Rhodine 12GM		Resorcinol Methyl Ether [Ethyl esterification]	B
576	Rhodamine 3G	I '14:— 19,568 I '20:— 855	3-Amino-*p*-cresol [Ethyl esterification]	B
577	Rhodine 2G		Ethyl-*m*-amino-phenol [Ethyl esterification]	B
578	Rhodamine 12GF		Resorcinol [Formaldehyde; esterification]	B

4-Dimethylamino-4'-hydroxy-diphenylamine

p-(*p*-Dimethylamino-anilino)-*p*henol (*C. A. nomen.*)



$= C_{14}H_{16}N_2O = 228$

FORMATION.—(1) Dimethyl-*p*-phenylene-diamine is heated with the hydrochloride of *p*-amino-phenol. (2) Dimethyl-*p*-phenylene-diamine and phenol are simultaneously oxidized and the product carefully reduced

LITERATURE.—Lange, Zwischenprodukte, #1644

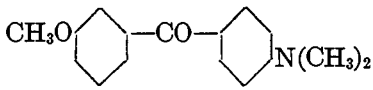
Lange, Swefelfarbstoffe, 145, 157

Dye Derived from 4-Dimethylamino-4'-hydroxy-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
728	SULFUR DYE Immedial Sky Blue	M'17:— ?	[S+Na_2S]	S

4-Dimethylamino-3'-methoxy-benzophenone (*C. A. nomen.*)

Methoxy-dimethylamino-benzophenone



$= C_{16}H_{17}NO_2 = 255$

FORMATION.—10 parts of *m*-methoxy-benzanilide, 14 parts of dimethyl-aniline and 7 parts of phosphorus oxychloride are heated together carefully on the water bath at 90°. The melt is treated with 50 parts of water and 5 parts of hydrochloric acid, and the yellow brown solution warmed to 70–80° until the color has disappeared, which indicates the completion of the splitting off of the aniline. More water is now added, the precipitate filtered, washed, dried, and crystallized from two parts of alcohol. From the filtrate aniline and dimethyl-aniline can be recovered

LITERATURE.—Lange, Zwischenprodukte, #1383

Dye Derived from 4-Dimethylamino-3'-methoxy-benzophenone

Schultz Number for Dye	*Ordinary Nome and Class oj Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
547	TRIPHENYL-METHANE DYE Ketone Blue 4BN		Methyl-diphenylamine [Sulfonation]	A

***p*-Dimethylamino-*N*-methyl-benzanilide** (*C. A. nomen.*)

See, Dimethylamino-benzoyl-methyl-aniline

2-Dimethylamino-8-naphthol-6-sulfonic Acid

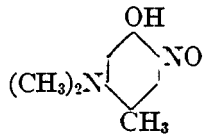
See, Dimethyl-gamma Acid

7-Dimethylamino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)

See, Dimethyl-gamma Acid

5-Dimethylamino-2-nitroso-*p*-cresol (*OH = 1*, *C. A. nomen.*)

Nitroso-dimethyl-*m*-amino-*p*-cresol (*OH = 1*)



$= C_9H_{12}N_2O_2 = 180$

FORMATION.—3-Dimethylamino-*p*-cresol (*OH = 1*) [which can be obtained by decomposing diazo-dimethyl-*o*-toluidine in an acid solution] is dissolved in hydrochloric acid, cooled to 0° C., and nitrosified with aqueous solution of sodium nitrite

LITERATURE.—Lange, Zwischenprodukte, #1089

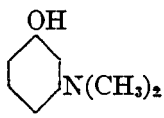
Dye Derived from 5-Dimethylamino-2-nitroso-*p*-cresol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYE			
621	Cresyl Blue 2BS		*p*-Phenylene-diamine	B

***m*-Dimethylamino-*p*henol** (*C. A. nomen.*)

m-Hydroxy-dimethyl-aniline

Dimethyl-*m*-amino-phenol



$= C_6H_{11}NO = 137$

FORMATION.—By caustic soda fusion of dimethyl-aniline-*m*-sulfonic acid, prepared by sulfonating dimethyl-aniline with oleum

LITERATURE.—Lange, Zwischenprodukte, #603–606, 2263

Dyes Derived from *m*-Dimethylamino-phenol

Schult Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
568	Pyronine G		*m*-Dimethylamino-phenol (2 mols) [Oxidation]	B
569	Acridine Red B		*m*-Dimethylamino-phenol (2 mols) [Oxidation] *or* [Oxidation of Pyronine G with $KMnO_4$]	B
570	Rhodamine S	I '14:— 600 I '20:— 273	*m*-Dimethylamino-phenol (2 mols) [Succinic Anhydride]	A

Dimethyl-aniline

N:*N*-Dimethyl-*a*niline (*C. A. nomen.*)

$= C_8H_{11}N = 121$

STATISTICS.—Imported '14:— 48,642 lbs.
Manufactured '17:—2,847,093 lbs.
Manufactured '18:—4,263,458 lbs.
Manufactured '19:—3,559,654 lbs.
Manufactured '20:—5,447,107 lbs.

FORMATION.—By heating aniline and methanol (methyl alcohol) in an autoclave in the presence of sulfuric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 62
Lange, Zwischenprodukte, #129

Dyes Derived from Dimethyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
32	Butter Yellow Oil Yellow	I '14:— 4,062 M '17:— 33,180 M '18:— 27,669 M '19:— 31,156 M '20:— 74,182	Aniline	ss
124	Diazine Green S	I '14:— 1,340	*p*-Tolylene-diamine *o*-Toluidine Aniline *or* *o*-Toluidine *or* Safranine	B
138	Helianthine Methyl Orange	I '14:— 500 M '18:— ? M '19:— ? M '20:— ?	Sulfanilic Acid	A
	AURAMINES			
493	Auramine	I '14:—449,276 M '17:— ? M '18:— 45,634 M '19:—127,567 I '20:— 74,414 M '20:— ?	Dimethylamino-benzo-methylaniline	B
	TRIPHENYL-METHANE DYES			
495	Malachite Green	I '14:—183,852 M '17:—130,229 M '18:—290,416 M '19:—560,301 I '20:— 100 M '20:—654,237	Dimethyl-aniline (2 mols) Benzaldehyde [Oxidation]	B
496	Setoglaucine O	I '20:— 1,102	Dimethyl-aniline (2 mols) *o*-Chloro-benzaldehyde [Oxidation]	B
497	New Fast Green 2B Victoria Green 3B	I '14:— 44,595	Dimethyl-aniline (2 mols) 2:5-Dichloro-benzaldehyde [Oxidation]	B

Dyes Derived from Dimethyl-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
510	Azo Green		Dimethyl-aniline (2 mols) *m*-Nitro-benzaldehyde Salicylic Acid [Oxidation]	M
515	Methyl Violet	I '14:—255,063 M '17:—375,107 M '18:—632,196 M '19:—574,436 I '20:— 3,312 M '20:—600,873	Dimethyl-aniline (3 mols) [Phenol] [Oxidation]	B
516	Crystal Violet	I '14:— 51,872 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,919 M '20:— ?	Ketone *or* Dimethyl-aniline (3 mols) Phosgene *or* Hydrol [Oxidation]	B
517	Methyl Violet 5B Benzyl Violet	I '14:— 22,387 I '20:— 3,313 M '17:— ?	[Benzylation of Methyl Violet] *or* Benzyl-chloride Dimethyl-aniline (3 mols) [Phenol]	B
519	Methyl Green		[Methyl Chloride of Methyl Violet] *or* Dimethyl-aniline (3 mols) [Phenol and Methyl Chloride]	B

Dyes Derived from Dimethyl-aniline (*continued*)

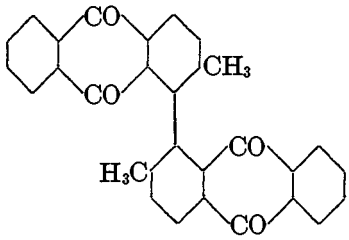
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
523	Fast Green	I '14:— 14,347 I '20:— 10,461	*m*-Nitro-benzaldehyde Dimethyl-aniline (2 mols) Benzyl-chloride (2 mols) [Sulfonation, Oxidation]	A
564	Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	*p*-Dimethylamino-benzaldehyde *m*-Xylene	A
	THIAZINE DYES			
659	Methylene Blue	I '14:—185,958 M '17:—268,435 M '18:—312,572 M '19:—465,992 I '20:— 2,053 M '20:—577,264	Dimethyl-aniline (2 mols) [$Na_2S_2O_3$, etc.] *or* Nitroso-dimethyl-aniline [$Na_2S_2O_3$, etc.] *or* Dimethyl-*p*-phenylene diamine [$Na_2S_2O_3$, etc.]	B
660	Methylene Green O	I' 14:— 30,812 M '18:— ? M '19:— 2,435 I '20:— 1,049	Dimethyl-aniline (2 mols) [$Na_2S_2O_3$, Nitration] *or* Nitroso-dimethyl-aniline [$Na_2S_2O_3$, etc.; Nitration] *or* Dimethyl-*p*-phenylene-diamine [$Na_2S_2O_3$, etc.; Nitration] *or* [Methylene Blue nitrated]	B
661	Thionine Blue G O	I '14:— 18,618 I '20:— 330	Ethyl-methyl-aniline [$Na_2S_2O_3$, etc.]	B

***N*:*N*-Dimethyl-*p*:*p*′-azo-bisaniline** (*C. A. nomen.*)

See, Dimethyl-*p*:*p*′-diamino-azo-benzene

2:2′-Dimethyl-1:1′-bianthraquinone (*C. A. nomen.*)

2:2′-Dimethyl-1:1′-dianthraquinonyl



$= C_{30}H_{18}O_4 = 442$

FORMATION.—1-Amino-2-methyl-anthraquinone is dissolved in sulfuric acid and sodium nitrite added. The isolated and dried diazonium sulfate is stirred into acetic anhydride, and copper powder added. Nitrogen is evolved and the combination takes place, forming the bianthraquinone derivative

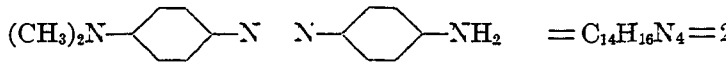
LITERATURE.—Lange, Zwischenprodukte, #3491–3493
Cain, Intermediate Products (2d Ed.), 261

Dyes Derived from 2:2′-Dimethyl-1:1′-bianthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
760	Indanthrene Gold Orange G Pyranthrone	I '14:— 20,092 I '20:— 7,617	[2 mols H_2O removed]	V
761	Indanthrene Gold Orange R	I '14:— 50,496 I '20:— 35,338	[2 mols H_2O removed, Chlorination] [*or* Pyranthrone 760, chlorinated]	V
762	Indanthrene Scarlet G	I '14:— 99 I '20:— 399	[2 mols H_2O removed, Bromination] [*or* Pyranthrone 760, brominated]	V

Dimethyl-*p*: *p*'-diamino-azo-benzene

N: *N*-Dimethyl-*p*: *p*'-azo-bisaniline (*C. A. nomen.*)



$= C_{14}H_{16}N_4 = 240$

FORMATION.—(1) By coupling of diazotized *p*-nitro-aniline with dimethyl-aniline and subsequent reduction with sodium sulfide. (2) By coupling of diazotized *p*-amino-acetanilide with dimethyl-aniline and splitting off of acetyl group

LITERATURE.—Heumann, Anilinfarben, **3**, 1467; **4**, 1026
Cf. Lange, Zwischenprodukte, #1760

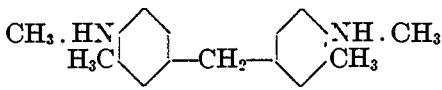
Dye Derived from Dimethyl-*p*: *p*'-diamino-azo-benzene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
239	Azotol C		β-Naphthol	MF

4: 4'-Dimethyl-diamino-3: 3'-ditolyl-methane

Dimethyl-diamino-di-*o*-tolyl-methane

4: 4'-Methylene-bis(*N*-methyl-*o*-toluidine) (*C. A. nomen.*)



$= C_{17}H_{22}N_2 = 254$

FORMATION.—By condensing formaldehyde and two molecules of methyl-*o*-toluidine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 104
Lange, Zwischenprodukte, #1318

Dye Derived from 4: 4'-Dimethyl-diamino-3: 3'-ditolyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AURAMINES			
494	Auramine G	I '14:— 1,902	[Sulfur, Ammonium chloride, etc.]	B

Dimethyl-diamino-di-*o*-tolyl-methane

See, 4:4′-Dimethyl-diamino-3:3′-ditolyl-methane

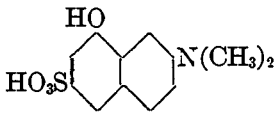
2:2-Dimethyl-1:1′-dianthraquinonyl

See, 2:2′-Dimethyl-1:1′-*b*ianthraquinone (*C. A. nomen.*)

Dimethyl-gamma Acid

2-Dimethylamino-8-naphthol-6-sulfonic Acid

7-Dimethylamino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)



$= C_{12}H_{13}NO_4S = 267$

FORMATION.—G acid is heated with dimethylamine in an autoclave around 200°, the dimethylamino-G acid thus obtained is fused with caustic soda at 210–220°, and the dimethyl-gamma acid isolated

LITERATURE.—Lange, Zwischenprodukte, #2550

Dyes Derived from Dimethyl-gamma Acid

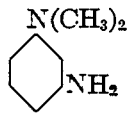
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
206	Diphenyl Catechine G	I '14:— 8,642	*p*-Nitro-toluene-*o*-sulfonic Acid *p*-Phenylene-diamine [Diphenyl Orange RR]	D
	DISAZO DYES			
348	Diphenyl Brown BN	I '14:— 13,471	Salicylic Acid Benzidine	D
393	Diphenyl Brown 3GN	M '20:— ?	Salicylic Acid Tolidine	D

N: ***N*-Dimethyl-*p*-nitroso-aniline** (*C. A. nomen.*)

See, *p*-Nitroso-dimethyl-aniline

N: N-Dimethyl-m-phenylene-diamine (*C. A. nomen.*)

m-Amino-dimethyl-aniline



$= C_8H_{12}N_2 = 136$

FORMATION.—Dimethyl-aniline is nitrated with mixed acid, and the *m*-nitro-dimethyl-aniline separated from the para isomer. The *m*-derivative is now reduced to dimethyl-*m*-phenylene-diamine

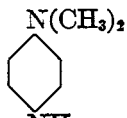
LITERATURE.—Green, Organic Coloring Matter (1908), 32

Dyes Derived from *N*: *N*-Dimethyl-*m*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ACRIDINE DYES			
603	Acridine Orange NO	I '14:— 2,336 I '20:— 1,925	Dimethyl-*m*-phenylene-diamine (2 mols) [Formaldehyde, Oxidation, etc.]	B
604	Acridine Orange R		Dimethyl-*m*-phenylene-diamine (2 mols) Benzaldehyde [Ammonia removal; Oxidation]	B

N: N-Dimethyl-p-phenylene-diamine (*C. A. nomen.*)

p-Amino-dimethyl-aniline



$= C_8H_{12}N_2 = 136$

STATISTICS.—Imported '14:—very small
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '20:—314,931

FORMATION.—Dimethyl-aniline by action of nitrous acid forms nitroso-dimethyl-aniline, which by reduction with zinc dust and hydrochloric acid furnishes dimethyl-*p*-phenylene-diamine

LITERATURE.—Lange, Zwischenprodukte, #561–563

Dyes Derived from *N*:*N*-Dimethyl-*p*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Calss of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
62	Azogalleine		Pyrogallol	M
63	Azo Acid Blue	I '14:— 45,098 I '20:— 4,485	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	M
	INDOPHENOL			
619	Indophenol	M '17:— ? M '18:— ? M '19:—126,611 M '20:— ?	α-Naphthol [Oxidation]	V
	OXAZINE AND THIAZINE DYES			
627	Modern Cyanine		Nitroso-dimethyl-aniline Gallamide	M
659	Methylene Blue	I '14:—185,958 M '17:—268,435 M '18:—312,572 M '19:—465,992 I '20:— 2,053 M '20:—577,264	Dimethyl-aniline [$Na_2S_2O_3$, etc.]	B
660	Methylene Green O	I '14:— 30,812 M '18:— ? M '19:— 2,435 I '20:— 1,047	Dimethyl-aniline [$Na_2S_2O_3$, etc.] [Nitration] *or* [Methylene Blue nitrated]	B
661	Thionine Blue G O	I '14:— 18,618 I '20:— 2,030	Ethyl-methyl-aniline [$Na_2S_2O_3$, etc.]	B

Dyes Derived from *N*: *N*-Dimethyl-*p*-phenylene-diamine (*continued*)

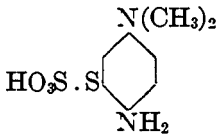
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
669	Neutral Violet		Dimethyl-*p*-phenylene-diamine (2 mols) *m*-Phenylene-diamine	B
670	Neutral Red	M '18:— ?	*m*-Tolylene-diamine	B
680	Methylene Violet BN	I '14:— 1,521 M '17:— ? I '20:— 33	Aniline (2 mols) [Oxidation]	B
681	Methylene Gray O New Fast Gray	I '14:— 29,507 M '17:— ? M '18:— 16,746 M '19:— 28,458 I '20:— 509 M '20:— 31,620	Dimethyl-*p*-phenylene-diamine (2+mols) [Oxidation]	B
683	Safranine MN	I '14:— 198 M '18:— ? M '19:— ? M '20:— ?	Aniline *o*- *or* *p*-Toluidine [Oxidation]	B
690	Diphene Blue R Metaphenylene Blue R	I '20:— 3,124	*sym*-Di-*p*-tolyl-*m*-phenylene-diamine [Oxidation]	B
	SULFUR DYES			
729	Kryogene Pure Blue R		Aniline (2 mols) [S+Na_2S] *or* [Methylene Violet; S+Na_2S]	S
731	Thiophor Indigo CJ		α-Naphthol [S+Na_2S]	S

***N*: *N*-Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid**

p-Amino-dimethyl-aniline-thiosulfonic Acid

1-Amino-4-dimethylamino-benzene-2-thiosulfonic Acid

2-Amino-5-dimethylamino-benzene-thiosulfonic Acid (*C. A. nomen.*)



$= C_8H_{12}N_2O_3S_2 = 248$

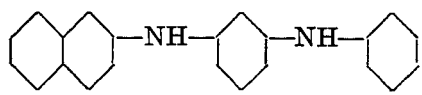
FORMATION.—10 parts of dimethyl-*p*-phenylene-diamine sulfate are dissolved in 100 parts of water and cooled to 0°, and a cold solution of 5.5 parts of potassium bichromate in 60 parts of water and 18 parts by volume of 50 per cent acetic acid, is introduced quickly during agitation. To the crystal mass is now added at once a solution of 22 parts of sodium thiosulfate and 27 parts of aluminum sulfate in 70 parts of water, and the mixture agitated at 10–20°. Upon cooling to 0° the desired product separates out

LITERATURE.—Lange, Zwischenprodukte, #931

Dyes Derived from *N*: *N*-Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	THIAZINE DYES			
661	Thionine Blue G O	I '14:— 18,618 I '20:— 2,030	Ethyl-methyl-aniline	B
664	Lenco-gallo Thionine DH		Gallic Acid	M
665	Urania Blue	I '14:— 132	*N*: *N'*-Di-2-naphthyl-*m*-phenylene-diamine	A
667	Brilliant Alizarin Blue G Indochromine T	I '14:— 19,481 M '19:— ? I '20:— 3,214 M '20:— ?	1: 2-Naphthoquinone-4: 6-disulfonic Acid	M

N: N'-Di-2-naphthyl-*m*-phenylene-diamine



$= C_{26}H_{20}N_2 = 360$

FORMATION.—108 parts of *m*-phenylene-diamine, 432 parts of β-naphthol and 2–3 parts of iodine are heated together at 200° and finally at 260°. The melt is powdered, and washed successively with dilute caustic soda, hydrochloric acid, water, alcohol, and ether. The residue is crystallized from aniline. Yield good

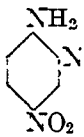
LITERATURE.—Lange, Zwischenprodukte, #2875, 2876

Dyes Derived from *N*:*N*′-Di-2-naphthyl-*m*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates sed and Notes*	*Dye Application Class*
	THIAZINE DYE			
665	Urania Blue	I '14:— 132	Dimethyl-*p*-phenylene-diamine- thiosulfonic Acid	A
	AZINE DYE			
692	Naphthazine Blue	I '14:— 6,261 I '20:— 2,249	Nitroso-dimethyl-aniline	A

2:4-Dinitro-aniline (*C. A. nomen.*)

m-Dinitro-aniline



$=C_6H_5N_3O_4=183$

FORMATION.—Aniline is condensed with phthalic acid, and the phthal-anil dinitrated. Upon heating the latter product with aniline under pressure the 2:4-dinitro-aniline is split off

LITERATURE.—Lange, Zwischenprodukte, #539

Dyes Derived from 2:4-Dinitro-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
59	Wool Violet S	I '14:— 308 M '18:— ? M '19:— ?	Diethyl-aniline-*m*-sulfonic Acid	A

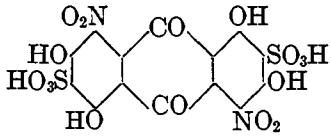
m-Dinitro-aniline

See, 2:4-Dinitro-aniline (*C. A. nomen.*)

p-(2:4-Dinitro-anilino)-phenol (*C. A. nomen.*)

See, 2:4-Dinitro-4′-hydroxy-diphenylamine

4:8-Dinitro-anthrachrysone-2:6-disulfonic Acid



$= C_{14}H_6N_2O_{16}S_2 = 522$

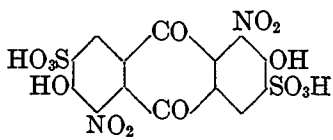
FORMATION.—Anthrachrysone is sulfonated and nitrated

LITERATURE.—Green, Organic Coloring Matters (1908), #554 and #557

Dye Derived from 4:8-Dinitro-anthrachrysone-2:6-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYE			
796	Acid Alizarin Green G	I '20:— 1,334	[Sodium sulfide reduction]	ACr

1:5-Dinitro-anthraflavic-3:7-disulfonic Acid



$= C_{14}H_6N_2O_{14}S_2 = 490$

FORMATION.—By the sulfonation and nitration of anthraflavic acid (which is prepared by heating *m*-hydroxy-benzoic acid with sulfuric acid at 190° C.)

LITERATURE.—Thorpe, Dic. Chemistry, **1**, 84

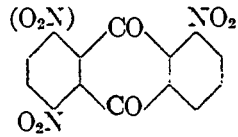
Cf. Bucherer, Lehrbuch des Farbenchemie, 339 (1914)

Dye Derived from 1: 5-Dinitro-anthraflavic-3: 7-disulfonic Acid

Schultz Numbe. for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	ANTHRAQUINONE AND ALLIED DYES			
857	Erweco Alizarin Acid Blue R		Aniline (2 mols) [Sulfonation]	ACr

Dinitro-anthraquinone

(1: 5-*and* 1: 8-Dinitro-anthraquinones)



$= C_{14}H_6N_2O_6 = 238$

STATISTICS.—Manufactured '19:— ?

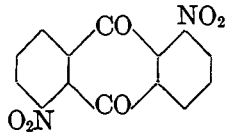
FORMATION.—The mixed compounds are obtained from anthraquinone, by nitration in sulfuric acid solution, and by pouring the nitration product into water

LITERATURE.—Cain, Intermediate Products (2d Ed.), 253

Dyes Derived from Dinitro-anthraquinone

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	SULFUR DYE			
749	Anthraquinone Black		[S+Na_2S]	S
	ANTHRAQUINONE AND ALLIED DYES			
790	Anthracene Blue	I '14:— 26,642 I '20:— 3,539	[Sulfonation, Oxidation]	ACr
801	Anthracene Blue WGG	I '20:— 1,500	[Oxidation]	M
802	Anthracene Blue WG new		[Oxidation]	M

1: 5-Dinitro-*anthraquinone*



$= C_{14}H_6N_2O_6 = 238$

STATISTICS.—Manufactured '20:— ?

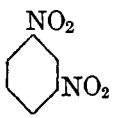
FORMATION.—From anthraquinone in sulfuric acid solution by nitration with HNO_3 or $NaNO_3$. The mixed 1: 5 and 1: 8 dinitroanthraquinones are recovered by pouring the nitration mixture into water. By extraction of the mixed dinitro-compounds with acetone or alcohol, the 1: 5-dinitro-anthraquinone is left behind

LITERATURE.—Cain, Intermediate Products (2d Ed.), 253
Lange, Zwischenprodukte, #3218

Dyes Derived from 1: 5-Dinitro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
749	Anthraquinone Black		[S+Na_2S]	S
	ANTHRAQUINONE AND ALLIED DYES			
800	Anthracene Blue WG	I '14:— 54,812 I '20:— 2,049	[Oxidation]	M
853	Anthraquinone Violet	I '14:— 1,202 I '20:— 1,649	*p*-Toluidine (2 mols) [Sulfonation]	ACr

m*-Dinitro-*benzene



$= C_6H_4N_2O_4 = 168$

STATISTICS.—Imported '14:— 164,650 lbs.
Manufactured '17:—2,333,192 lbs.
Manufactured '18:—4,115,269 lbs.
Manufactured '19:—2,280,282 lbs.
Manufactured '20:—3,380,112 lbs.

FORMATION.—By nitration of nitro-benzene or of benzene, using mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 32
Cf. Lange, Zwischenprodukte, #543

USES.—For the manufacture of *m*-nitro-aniline and *m*-phenylene-diamine

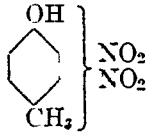
2:2'-Dinitro-*p*:*p*'-biacetanilide

See. Diacetyl-*o*: *o*'-dinitro-benzidine

2:4-Dinitro-chloro-benzene

See, 1-Chloro-2: 4-dinitro-benzene (*C. A. nomen.*)

Dinitro-*p*-cresol



$= C_7H_6N_2O_5 = 198$

FORMATION.—Probably by the dinitration of *p*-cresol

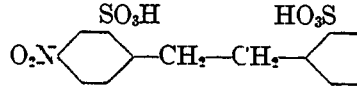
LITERATURE.—*Cf.* Thorpe. 2, 165
Cf. Lange, Schwefelfarbstoffe, 132, 381

Dye Derived from Dinitro-*p*-cresol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
725	SULFUR DYE Immedial Dark Brown A Immedial Brown B	I '14:— 23,887 M '18:— ?	[S+Na_2S]	S

Dinitro-dibenzyl-disulfonic Acid

2:2'-Ethylene-bis(5-nitro-benzene-sulfonic Acid) (*C. A. nomen.*)



$= C_{14}H_{12}N_2O_{10}S_2 = 432$

FORMATION.—12 parts of sodium *p*-nitro-toluene-sulfonate are dissolved in 50 parts of hot water, and treated with 100 parts of sodium hypochlorite solution (2 per cent HOCl) and 50 parts of caustic soda solution (40°) at 70°. At end of reaction, cooled with ice to 40° and after crystallizing several hours, the product is filtered off.

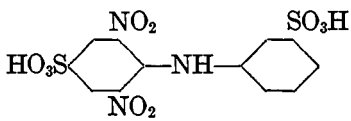
LITERATURE.—Lange, Zwischenprodukte, #1460

Dyes Derived from Dinitro-dibenzyl-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	STILBENE DYES			
10	Mikado Yellow Stilbene Yellow	I '14:— 85,795 M '18:— ? M '20:— ?	Dinitro-dibenzyl-disulfonic Acid (2 mols)	D
12	Diphenyl Citronine G		Aniline	D
18	Diphenyl Fast Yellow	I '14:— 10,229 I '20:— 1,102	Dehydrothio-toluidine-sulfonic Acid (2 mols) *or* Primuline-sulfonic Acid (2 mols)	D

2: 5-Dinitro-diphenylamine-3′: 4-disulfonic Acid

3: 5-Dinitro-3′: 4-imino-bis(benzene-sulfonic Acid) (*C. A. nomen.*)



$=C_{12}H_9N_3O_{10}S_2=419$

FORMATION.—By reaction of 1-chloro-2: 6-dinitro-benzene-4-sulfonic acid and metanilic acid in presence of sodium acetate

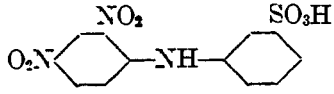
LITERATURE.—Lange, Zwischenprodukte, #1712
Cf. Schultz, Farbstofftabellen, #542

Dye Derived from 2:5-Dinitro-diphenylamine-3′:4-disulfonic Acid

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	TRIPHENYL-METHANE DYE			
542	Agalma Green B	I '14:— 2,294	Hydrol	A

2:4-Dinitro-diphenylamine-3′-sulfonic Acid

N-(2:4-Dinitro-phenyl)-*m*etanilic Acid (*C. A. nomen.*)



$= C_{12}H_9N_3O_7S = 339$

FORMATION.—From chloro-dinitro-benzene and metanilic acid

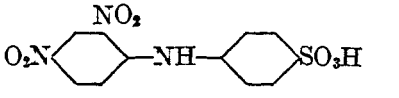
LITERATURE.—Lange, Zwischenprodukte, #1673
Cf. Schultz, Farbstofftabellen (1914), #738

Dye Derived from 2:4-Dinitro-diphenylamine-3′-sulfonic Acid

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	SULFUR DYE			
738	Cotton Black		[S+Na_2S]	S

2:4-Dinitro-diphenylamine-4′-sulfonic Acid

N-(2:4-Dinitro-phenyl)-sulfanilic Acid (*C. A. nomen.*)



$= C_{12}H_9N_3O_7S = 339$

FORMATION.—From chloro-dinitro-benzene and sulfanilic Acid

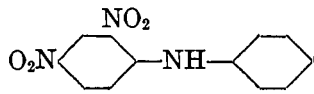
LITERATURE.—Lange, Zwischenprodukte, #1673
Cf. Schultz, Farbstofftabellen, #738

Dye Derived from 2: 4-Dinitro-diphenylamine-4′-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
738	Cotton Black		[S+Na_2S]	S

2: 4-Dinitro-4′-hydroxy-diphenylamine

p-(2: 4-Dinitro-anilino)-phenol (*C. A. nomen.*)



$= C_{12}H_9N_3O_5 = 275$

STATISTICS.—Manufactured 1919 but amount not disclosed

FORMATION.—From chloro-dinitro-benzene and *p*-amino-phenol by boiling molecular proportions in an aqueous suspension with slightly more than the theoretical amount of limestone

LITERATURE.—Cain, Intermediate Products (2d Ed.), 73
Lange, Zwischenprodukte, #1670

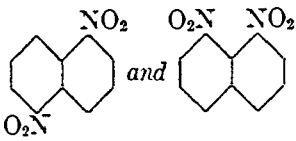
Dyes Derived from 2: 4-Dinitro-4′-hydroxy-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermedictes Used and Notes*	*Dye Application Class*
	SULFUR DYES			
724	Immedial Black	I '14:— 54,696 M '18:— ?	[S+Na_2S]	S
725	Immedial Dark Brown A Immedial Brown B	I '14:— 23,887 M'18:— ?	[NaOH; S+Na_2S]	S
726	Pyrogene Direct Blue Pyrogene Blue	I '14:— 10,934 I '20:— 2,498	[Alcohol; S+Na_2S]	S

3: 5-Dinitro-3′: 4-imino-bis(benzene-sulfonic Acid) (*C. A. nomen.*)

See, 2: 5-Dinitro-diphenylamine-3′: 4-disulfonic Acid

1:5-*and* 1:8-Dinitro-*naphthalenes*



$= C_{10}H_6N_2O_4 = 218$

STATISTICS.—Imported '14:—very small amount
Manufactured '18:— ?
Manufactured '19:— ?

FORMATION.—From α-nitro-naphthalene by nitration

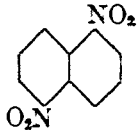
LITERATURE.—Cain, Intermediate Products (2d Ed.), 170

Dyes Derived from 1:5- *and* 1:8-Dinitro-naphthalenes

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
774	Alizarin Black	I '14:—205,439 I '20:— 17,421	[Oxidation]	M
775	Alizarin Dark Green W		Phenol [Oxidation]	M
776	Printing Black for Wool		[Reduction]	A

1:5-Dinitro-*naphthalene*

α-Dinitro-naphthalene



$= C_{10}H_6N_2O_4 = 218$

FORMATION.—α-Nitro-naphthalene is nitrated, resulting in formation of 1:5 and 1:8-dinitro-naphthalenes in the proportion of about

1: 2. This crude product is washed with water and dried, and then extracted first with carbon disulfide to remove nitro-naphthalene, and second with acetone to remove the 1: 8 isomer,—leaving behind the 1: 5 isomer. (See 1: 8-dinitro-naphthalene)

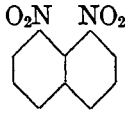
LITERATURE.—Cain, Intermediate Products (2d Ed.), 170
Lange, Zwischenprodukte, #2315

Dyes Derived from 1: 5-Dinitro-naphthalene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
745	Melanogene Blue		[S+Na_2S]	S
	ANTHRAQUINONE AND ALLIED DYES			
789	Anthracene Blue WR	I '14:—107,778 I '20:—103,913 M '20:— ?	[Oxidation]	M

1: 8-Dinitro-*naphthalene*

β-Dinitro-naphthalene



$=C_{10}H_6N_2O_4=218$

FORMATION.—α-Nitro-naphthalene is nitrated, resulting in the formation 1: 5 and 1: 8-dinitro-naphthalenes in the proportion of about 1: 2. The nitration mass upon cooling deposits most of the 1: 5-isomer, and upon pouring this filtrate into water the 1: 8-isomer is precipitated, which can be purified by crystallization from benzene. (See 1: 5-dinitro-benzene)

LITERATURE.—Cain, Intermediate Products (2d Ed.), 170
Lange, Zwischenprodukte, #2315

Dyes Derived from 1: 8-Dinitro-naphthalene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
740	Fast Black B		[Na_2S]	S
741	Fast Black BS		[Na_2S; Alkalies] *or* [Fast Black B; Alkalies]	S
742	Printing Blue for Wool		[Na_2S, $NaHSO_3$, NaOH]	S
743	Kryogene Brown A		[Na_2S, $NaHSO_3$, NaOH; S+Na_2S]	S
750	Kryogene Brown A, G	I '14:— 10,313	[$NaHSO_3$; S+Na_2S]	S

α-Dinitro-naphthalene

See, 1: 5-Dinitro-naphthalene

β-Dinitro-naphthalene

See, 1: 8-Dinitro-naphthalene

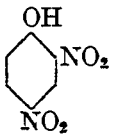
γ-Dinitro-naphthalene

1: 3-Dinitro-naphthalene (*not considered herein*)

δ-Dinitro-naphthalene

1: 6-Dinitro-naphthalene (*not considered herein*)

2: 4-Dinitro-phenol



$= C_3H_4N_2O_5 = 184$

STATISTICS.—Manufactured '20:— ?

FORMATION.—From chloro-dinitro-benzene by boiling with sodium carbonate solution

LITERATURE.—Cain, Intermediate Products (2d Ed.), 113
Lange, Zwischenprodukte, #577, 1121

Dyes Derived from 2: 4-Dinitro-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
720	Sulfur Black	I '14:— 4,923,981(?) M '17:— 9,298,631 M '18:— 12,385,130 M '19:— 14,504,770 I '20:— 662 M '20:— 16,305,037	[S+Na_2S]	S
721	Sulfur Black Thio Cotton Black		[*p*-Amino-phenol-sulfonic Acid] [S+Na_2S]	S
722	Auronal Black	I '14:— 50,879	[S+Na_2S]	S
723	Autogene Black EEB		[S+Na_2S]	S

***N*-(2: 4-Dinitro-phenyl)-*m*etanilic Acid** (*C. A. nomen.*)

See, 2: 4-Dinitro-diphenylamine-3′-sulfonic Acid

***N*-(2: 4-Dinitro-phenyl)-*p*-phenylene-diamine** (*C. A. nomen.*)

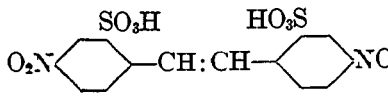
See 4′-Amino-2: 4-dinitro-diphenylamine

***N*-(2: 4-Dinitro-phenyl)-sulfanilic Acid** (*C. A. nomen.*)

See 2: 4-Dinitro-diphenylamine-4′-sulfonic Acid

Dinitro-stilbene-disulfonic Acid

4: 4′-Dinitro-stilbene-2: 2′-disulfonic Acid (*C. A. nomen.*)



$= C_{14}H_{10}N_2O_{10}S_2 = 430$

STATISTICS.—Manufactured '19:— ?

FORMATION.—*p*-Nitro-toluene-sulfonic acid is dissolved in weak caustic soda solution and oxidized with sodium hypochlorite solution. If the product contains dinitro-dibenzyl-disulfonic acid, it is again oxidized with sodium hypochlorite in caustic soda solution.

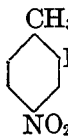
LITERATURE.—Cain, Intermediate Products (2d Ed.), 39
Lange, Zwischenprodukte, #1453

Dyes Derived from Dinitro-stilbene-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	STILBENE DYES			
10	Mikado Yellow Stilbene Yellow	I '14:— 85,795 M '18:— ? M '20:— ?	Dinitro-stilbene-disulfonic Acid (2 mols)	D
11	Mikado Orange Chloramine Orange G	I '14:— 26,010 M '17:— ? M '18:— ? M '19:— ? M '20:— 38,287	Dinitro-stilbene-disulfonic Acid (2 mols) [Reduction]	D
12	Diphenyl Citronine G		Aniline (2 mols)	D
13	Polychromine B Diphenyl Orange RR	I '14:— 16,113 M '18:— ?	*p*-Phenylene-diamine (2 mols)	D
18	Diphenyl Fast Yellow	I '14:— 10,229 I '20:— 1,102	Dehydrothio-toluidine-sulfonic Acid (2 mols) *or* Primuline-sulfonic Acid (2 mols)	D

2:4-Dinitro-toluene (*C. A. nomen.*)

m-Dinitro-toluene



$= C_7H_6N_2O_4 = 182$

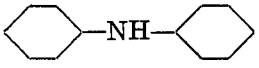
STATISTICS.—Imported '14:—547,701
Manufactured '18:— ?
Manufactured '19:—746,266
Manufactured '20:—1,847,191

FORMATION.—From toluene by nitration with mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 34
Lange, Zwischenprodukte, #789

USES.—For manufacture of *m*-tolylene-diamine

Diphenylamine



$= C_{12}H_{11}N = 169$

STATISTICS.—Imported '14:—81,137
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By heating aniline and aniline hydrochloride togeth
in an autoclave, provided with a replaceable acid-proof enamell
lining

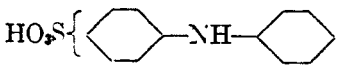
LITERATURE.—Cain, Intermediate Products (2d Ed.), 72
Lange, Zwischenprodukte, #1598–1600

Dyes Derived from Diphenylamine

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediated Used and Notes	Dye Application Class
	MONOAZO DYES			
134	Metanil Yellow	I '14.—284,606 M '17:— ? M '18:— ? M '19:—477,143 I '20:— 8,456 M '20:—629,437	Metanilic Acid	A
135	Metanil Yellow, Brominated		Metanilic Acid [Bromination]	A
136	Acid Yellow MGS, GG		Metanilic Acid [Sulfonation]	A
139	Orange IV	I '14:— 19,020 M '19:— ? I '20:— 608	Sulfanilic Acid	A
140	Azoflavine RS Curcuneine	I '14:— 39,869 I '20:— 5,225	Sulfanilic Acid [Nitration]	A
141	Azo Yellow 3G	I '14:—114,689 M '17:— ? M '18:— ? M '19:— ? I '20:— 4,818 M '20:— ?	Sulfanilic Acid [Nitration]	A
142	Brilliant Yellow S Curcumine	I '14:— 9,934	Sulfanilic Acid [Sulfonation]	A
150	Fast Yellow N		*p*-Toluidine-*o*-sulfonic Acid	A
203	Yellow Fast To Soap		*m*-Amino-benzoic Acid	M

Diphenylamine-sulfonic Acid

Anilino-benzene-sulfonic Acid (*C. A. nomen.*)



$= C_{12}H_{11}NO_3S = 249$

FORMATION.—By sulfonation of diphenylamine, and purification from the disulfonate formed simultaneously

LITERATURE.—Schultz, Die Chemie des Steinkohlentheers (3 aufl.), **1**, 181
Lange, Zwischenprodukte, #1615–1617

Dyes Derived from Diphenylamine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
538	Methyl Blue Cotton Blue	I '14:— 50,255	Diphenylamine-sulfonic Acid (3 mols)	B

Diphenylene-imide

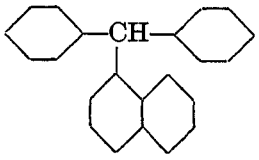
See, Carbazole

Diphenyl-methyl-amine

See, *N*-Methyl-*d*iphenylamine (*C. A. nomen.*)

Diphenyl-naphthyl-methane

1-Naphthyl-diphenyl-*m*ethane (*C. A. nomen.*)



$=C_{23}H_{18}=294$

FORMATION.—From benzo-hydrol by heating with naphthalene and P_2O_5 at 140°–145° for some hours

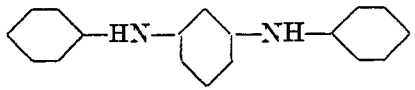
LITERATURE.—A. Lehne, Ueber die Condensation von Benzhydrol und Naphthalin, Ber, **13**, 358 (1880)
Richter, Lex. d. Kohlenstoff Verbindungen, 4193

Dye Derived from Diphenyl-naphthyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYE			
565	Acid Blue B Wool Blue G	I '14:—180,423 I '20:— 1,852 M '20:— ?	[Sulfonation]	A

N: N'-Diphenyl-*m*-phenylene-diamine (*C. A. nomen.*)

s-Diphenyl-*m*-phenylene-diamine



$= C_{18}H_{16}N_2 = 260$

FORMATION.—From resorcinol and aniline by heating together in presence of calcium chloride and a little zinc chloride at 210°

LITERATURE.—Green, Organic Coloring Matters (1908), 37
Cf. Schultz, Farbstofftabellen, #689

Dyes Derived from N: N'-Diphenyl-*m*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
267	Phenylene Black		1-Naphthylamine-4: 7-disulfonic Acid α-Naphthylamine	A
267	Anthracite Black	I '14:— 99 M '17:— ? I '20:— 220	Freund's Acid α-Naphthylamine	A
	AZINE DYE			
689	Indazine M		Nitroso-dimethylaniline (1 and 2 mols)	B

Diphenyl-thiourea

See, Thio-carbanilide (*C. A. nomen.*)

Disulfo Acid C

2-Naphthylamine-4: 8-disulfonic Acid (*not considered herein*)

Disulfo Acid E

See, 1-Naphthol-3: 8-disulfonic Acid

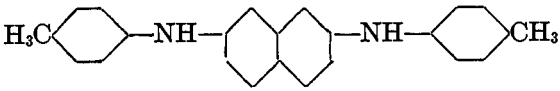
Disulfo Acid F

2-Naphthylamine-3: 7-disulfonic Acid (*not considered herein*)

Disulfo Acid S

See, 1-Naphthylamine-4: 8-disulfonic Acid

***N*: *N'*-(*p*: *p'*-Ditolyl)-2: 7-naphthylene-diamine**



$= C_{24}H_{22}N_2 = 338$

FORMATION.—By heating 2: 7-dihydroxy-naphthalene with *p*-toluidine and *p*-toluidine hydrochloride

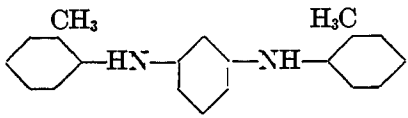
LITERATURE.—Green, Organic Coloring Matters (1908), 38
Lange, Zwischenprodukte, #2886

Dye Derived from *N*: *N'*-(*p*: *p'*-Ditolyl)-2: 7-naphthylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
677	AZINE DYE Basle Blue R		Nitroso-dimethyl-aniline	B

N:N'-(o:o'-Ditolyl)-m-phenylene-diamine (*C. A. nomen.*)

Di-o-tolyl-m-phenylene-diamine



$= C_{20}H_{20}N_2 = 288$

FORMATION.—Presumably by heating resorcinol with o-toluidine in presence of condensing agent. *Cf.* Di-p-tolyl-m-phenylene-diamine

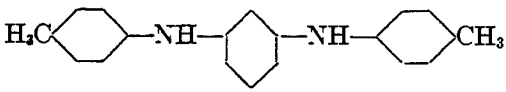
LITERATURE.—Ullmann, Enzy. tech. Chemie, **9**, 63

Dye Derived from N:N'-(o:o'-Ditolyl)-m-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
691	AZINE DYE Metaphenylene Blue B	I '14:— 50	Nitroso-dimethyl-aniline	B

N:N'-(p:p'-Ditolyl)-m-phenylene-diamine (*C. A. nomen.*)

Di-p-tolyl-m-phenylene-diamine



$= C_{20}H_{20}N_2 = 288$

FORMATION.—From resorcinol, p-toluidine, and p-toluidine hydrochloride by heating together in presence of calcium chloride and a little zinc chloride

LITERATURE.—Ullmann, Enzy. tech. Chemie, **9**, 63
Green, Organic Coloring Matters (1908), 37

Dye Derived from *N*: *N'*-(*p*: *p'*-Ditolyl)-*m*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
690	AZINE DYE Diphene Blue R Metaphenylene Blue R	I '20:— 3,124	Dimethyl-*p*-phenylene-diamine	B

D S

See, Diamino-stilbene-disulfonic Acid

D T

See, Dehydro-thio-*p*-toluidine-sulfonic Acid

Ebert and Merz α Acid

See, Naphthalene-2: 7-disulfonic Acid

Ebert and Merz β Acid

Naphthalene-2: 6-disulfonic Acid (*not considered here*)

Epsilon Acid

See, 1-Naphthol-3: 8-disulfonic Acid

See, 1-Naphthylamine-3: 8-disulfonic Acid

and 1: 8-Dihydroxy-naphthalene-3-sulfonic Acid (*not considered herein*)

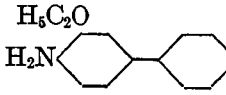
Erdmann's μ Acid

See, 1-Naphthylamine-6-sulfonic Acid

Ethoxy-benzidine

Di-*p*-amino-ethoxy-diphenyl

2-Ethoxy-benzidine (*C. A. nomen. $NH_2=1$*)



$= C_{14}H_{16}N_2O = 228$

FORMATION.—Aniline is diazotized and coupled with phenol-*p*-sulfonic acid and the product ethylated with ethyl bromide, thus forming,—benzene-azo-phenetole-sulfonic acid. This is then reduced in an aqueous solution with zinc dust and caustic soda followed by acidification with hydrochloric acid, resulting in preparation of ethoxy-benzidine-sulfonic acid which is heated in an autoclave with water (at 170°) to split out the sulfonic acid group

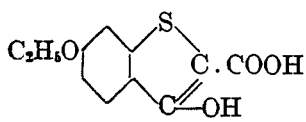
LITERATURE.—Weinberg, Ber. 20, 3171
Lange, Zwischenprodukte, #1224, 1249
Heumann, Anilinfarben 4, 380

Dyes Derived from Ethoxy-benzidine

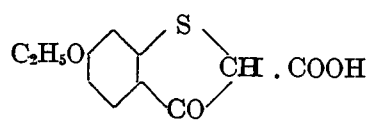
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
401	Diamine Blue 3R		Nevile-Winther's Acid (2 mols)	D
402	Diamine Blue Black E		2-Naphthol-3 : 7-disulfonic Acid Gamma Acid	D
403	Diamine Black BO		Gamma Acid (2 mols)	D
404	Diamine Yellow N	M '17:— ? I '20:— 313	Salicylic Acid Phenol [Ethylation]	D

5-Ethoxy-2-hydroxy-thionaphthene-1-carboxylic Acid (*C. A. nomen.*)

6-Ethoxy-3-hydroxy-1-thionaphthene-2-carboxylic Acid (*German numbering*)

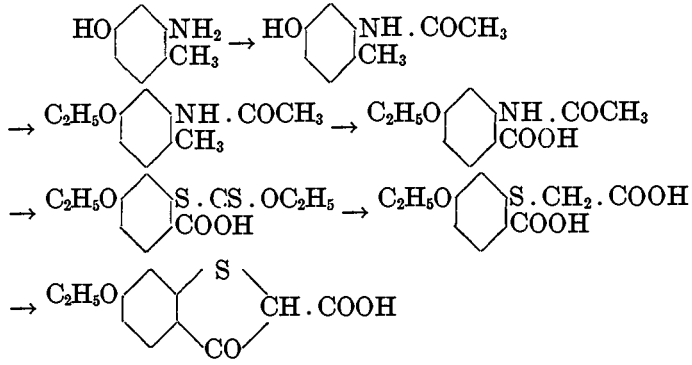


or



$= C_{11}H_{10}O_4S = 238$

FORMATION.—5-Hydroxy-*o*-toluidine (amino-*p*-cresol) is acetylated to protect the amino group, and then ethylated with diethyl-sulfate for example. The resulting 2-acetamido-4-ethoxy-toluene is oxidized with potassium permanganate to 2-acetamido-4-ethoxy-benzoic acid. The acetyl group is split off by boiling with caustic soda, acid added, and the amino group diazotized with sodium nitrite, and reacted with potassium xanthate. This xanthate compound, upon being treated with sodium chloro-acetate and caustic soda, yields 5-ethoxy-phenyl-thioglycol-*o*-carboxylic acid. This latter heated with caustic soda condenses to 5-ethoxy-2-hydroxy-thionaphthene-1-carboxylic acid. The successive reaction steps are as follows:—



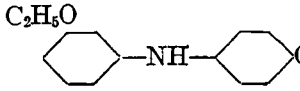
LITERATURE.—Lange, Zwischenprodukte, #2167, 2168
Georgievics and Grandmougin, Dye Chemistry, 437

Dyes Derived from 5-Ethoxy-2-hydroxy-thionaphthene-1-carboxylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
913	Helindone Orange R	I '14:— 14,511 I '20:— 3,155	5-Ethoxy-2-hydroxy-thionaphthene-1-carboxylic Acid (2 mols)	V
915	Helindone Fast Scarlet R	I '14:— 4,302 I '20:— 3,748	5-Ethoxy-2-hydroxy-thionaphthene-1-carboxylic Acid (2 mols) [Bromination]	V

3-Ethoxy-4′-methyl-*di*phenylamine (*C. A. nomen.*)

3-Ethoxy-phenyl-4′-tolyl-amine



$= C_{15}H_{17}NO = 227$

FORMATION.—100 parts of *m*-hydroxy-phenyl-*p*-tolyl-amine, 20.5 parts of caustic soda solution (40° ?), 200 parts of alcohol, and 75 parts of ethyl chloride are heated together in an autoclave at 110–120° for 7-8 hours

LITERATURE.—Lange, Zwischenprodukte, #1624, 1625

Dye Derived from 3-Ethoxy-4′-methyl-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
548	Acid Violet 6BN	I '14:— 6,861 I '20:— 5,582	Ketone [Sulfonation]	A

2-Ethoxy-1-*naphthylamine* (*C. A. nomen.*)

See, 1-Amino-2-naphthol Ethyl Ether

3-Ethylamino-4-methyl-diphenylamine

See, N^3-Ethyl-N^1-phenyl-4-*m*-tolylene-diamine

7-Ethylamino-2-*naphthalene*-sulfonic Acid (*C. A. nomen.*)

See, Ethyl-2-naphthylamine-7-sulfonic Acid

2-Ethylamino-8-naphthol-6-sulfonic Acid

See, Ethyl-gamma Acid

7-Ethylamino-1-*naphthol*-3-sulfonic Acid (*C. A. nomen.*)

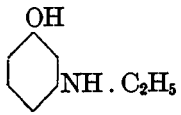
See, Ethyl-gamma Acid

Ethyl-amino-naphthol-sulfonic Acid γ

See, Ethyl-gamma Acid

***m*-Ethylamino-*p*henol** (*C. A. nomen.*)

Ethyl-*m*-amino-phenol



$= C_8H_{11}NO = 137$

FORMATION.—Ethyl-aniline is sulfonated with 23 per cent oleum, the sodium ethyl-aniline-*m*-sulfonate isolated and fused with caustic potash for ten hours at 200–220°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 120
Lange, Zwischenprodukte, #593–595

Dyes Derived from *m*-Ethylamino-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
571	Rhodamine 6G	I '14:— 37,515 I '20:— 8,574	*m*-Ethylamino-phenol (2 mols) Phthalic anhydride [Ethyl esterification]	B
577	Rhodine 2G		Dimethylamino - hydroxy - benzoyl - benzoic Acid [Ethyl esterification]	B

***N*-Ethyl-aniline** (*C. A. nomen.*)

Ethyl-aniline

$= C_8H_{11}N = 121$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—195,161
Manufactured '20:— ?

FORMATION.—By heating aniline hydrochloride and ethyl alcohol together in an autoclave

LITERATURE.—Cain, Intermediate Products (2d Ed.), 67
Lange, Zwischenprodukte, #93

USES.—For preparation of ethyl-methyl-aniline and benzyl-ethyl-aniline

α-(*N*-ethyl-anilino)-*p*-toluene-sulfonic Acid (*C. A. nomen.*)

See, Ethyl-sulfobenzyl-aniline

Ethyl-benzyl-aniline

See, Benzyl-ethyl-aniline

Ethyl-benzyl-aniline-sulfonic Acid

See, Ethyl-sulfobenzyl-aniline

2:2′-Ethylene-bis (5-nitro-benzene-sulfonic Acid) (*C. A. nomen.*)

See, Dinitro-dibenzyl-disulfonic Acid

Ethyl-F Acid

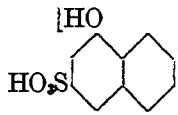
See, Ethyl-2-naphthylamine-7-sulfonic Acid

Ethyl-gamma Acid

2-Ethylamino-8-naphthol-6-sulfonic Acid

Ethylamino-naphthol-sulfonic Acid γ

7-Ethylamino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)



$= C_{12}H_{13}NO_4S = 267$

FORMATION.—G acid (2-naphthol-6: 8-disulfonic acid) is heated with ethylamine in an autoclave at about 200°. The ethylamino-G acid thus obtained is fused with caustic soda at 210-220°, and the ethyl-gamma acid isolated

LITERATURE.—Lange, Zwischenprodukte, #2550

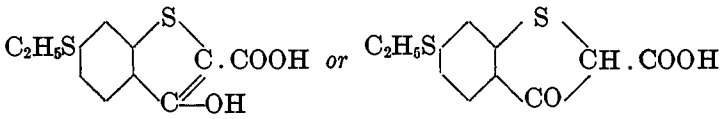
Dye Derived from Ethyl-gamma Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
334	DISAZO DYE Diphenyl Blue Black	I '14:— 26,240	H Acid Benzidine	D

5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid (*C A. nomen.*)

5-Ethylthio-2-hydroxy-thionaphthene-1-carboxylic Acid

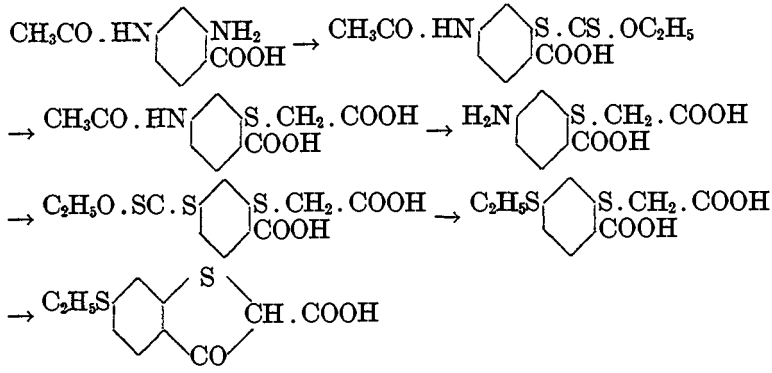
6-Ethylthio-3-hydroxy-1-thionaphthene-2-carboxylic Acid (*German numbering*)



$= C_{11}H_{10}O_3S_2 = 254$

FORMATION.—4-Acetamido-anthranilic acid is diazotized and treated with potassium xanthate. This xanthate compound is reacted with chloro-acetic acid and then hydrolyzed to split the acetyl group from the 4-amino radical. This amino group is now diazotized and reacted with potassium xanthate. This second xanthate compound is treated with ethyl-sulfate, resulting in the formation of 5-ethylmercapto-phenyl-thioglycol-*o*-carboxylic acid. This latter, upon being heated with caustic soda, condenses to 5-ethylmercapto-

2-hydroxy-thionaphthene-1-carboxylic acid. The successive reaction steps are as follows:—



LITERATURE.—Georgievics and Grandmougin, Dye Chemistry, 436–437
Lange, Zwischenprodukte, #2175

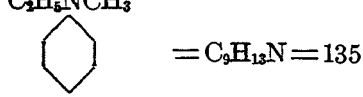
Dye Derived from 5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates sed and Notes*	*Dye Application Class*
916	INDIGO GROUP DYES Helindone Scarlet S	I '14:— 5,515 I '20:— 56	5-Ethylmercapto-2-hydroxy-thionaphthene 1-carboxylic Acid (2 mols)	

***N*-Ethyl-*N*-methyl-aniline** (*C. A. nomen.*)

Ethyl-methyl-aniline

Methyl-ethyl-aniline



FORMATION.—From ethyl-aniline by methylation, or from methyl-aniline by ethylation

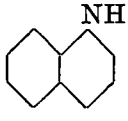
LITERATURE.—Beil. II, 334

Dye Derived from Ethyl-methyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	THIAZINE DYE			
661	Thionine Blue GO	I '14:— 18,618 I '20:— 2,030	Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid [Oxidation, etc.] *or* Nitroso-dimethyl-aniline [Reduction, Oxidation, $Na_2S_2O_3$, etc.] *or* Dimethyl-*p*-phenylene-diamine [$Na_2S_2O_3$, Oxidation, etc.] *or* Dimethyl-aniline [$Na_2S_2O_3$, etc.]	B

Ethyl-α-naphthylamine

N-Ethyl-1-naphthylamine (*C. A. nomen.*)



$= C_{12}H_{13}N = 171$

STATISTICS.—Imported '14:—1,102 lbs.

FORMATION.—By treating α-naphthylamine with ethyl bromide

LITERATURE.—Limpricht, Ann. **99**, 117 (1856)
Friedlaender and Welmans, Ber. **21**, 3124 (1888)
Bamberger and Helwig, Ber. **22**, 1315 (1889)
Thorpe, Dic. Chemistry, **3**, 587

Dyes Derived from Ethyl-α-naphthyl-amine

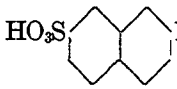
Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates sed and Notes	Dye Application Class
	MONOAZO DYE			
186	Lanacyl Violet B	I '14:— 3,628 M '17:— ? M'18:— ?	H Acid	A
	DIPHENYL-NAPHTHYL-METHANE-DYE			
558	Victoria Blue R	I '14:— 4171 I '20:— 97	Hydrol *or* Ketone	B

Ethyl-2-naphthylamine-7-sulfonic Acid

Ethyl-F Acid

Ethyl-β-naphthylamine-δ-sulfonic Acid

7-Ethylamino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{12}H_{13}NO_3S = 251$

FORMATION.—By ethylation of 2-naphthylamine-7-sulfonic acid by means of an ethyl halide or sodium ethyl sulfate, in an autoclave at 100–110° C. for several hours

LITERATURE.—Lange, Zwischenprodukte, #2385

Dyes Derived from Ethyl-2-naphthylamine-7-sulfonic Acid

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	DISAZO DYES			
231	Cloth Red 3B Extra	I '14:— 15 I '20:— 84	*o*-Amino-azo-toluene	M
371	Roseazurine G		Tolidine 2-Naphthylamine-7-sulfonic Acid	D
372	Rosazurine B		Tolidine Ethyl-2-naphthyl-amine-7-sulfonic Acid (2 mols)	D

Ethyl-β-naphthylamine-δ-sulfonic Acid

See, Ethyl-2-naphthylamine-7-sulfonic Acid

***N*-Ethyl-*p*-nitroso-aniline** (*C. A. nomen.*)

See, *p*-Nitroso-ethyl-aniline

***N*-Ethyl-4-nitroso-*o*-toluidine** (*C. A. nomen. NHR = 1*)

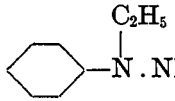
See, Nitroso-ethyl-*o*-toluidine

***N*-Ethyl-*N*-phenyl-benzylamine** (*C. A. nomen.*)

See, Benzyl-ethyl-aniline

Ethyl-phenyl-hydrazine

α-Ethyl-α-phenyl-hydrazine (*C. A. nomen.*)



$= C_8H_{12}N_2 = 136$

FORMATION.—Phenyl-hydrazine is treated with metallic sodium to form the sodium compound, from which by means of ethyl iodide the ethyl-phenyl-hydrazine is prepared

LITERATURE.—Thorpe, Dic. Chemistry, **3**, 53

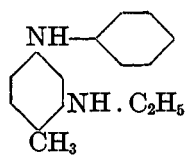
Dye Derived from Ethyl-phenyl-hydrazine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
130	MONOAZO DYE Chromazone Blue R		*p*-Amino-benzaldehyde Chromotropic Acid	M

N^3-Ethyl-N^1-phenyl-4-*m*-tolylene-diamine (*$NH_2 = 1$, C. A. nomen.*)

Phenyl-*p*-amino-ethyl-*o*-toluidine (*$CH_3 = 1$*)

3-Ethylamino-4-methyl-diphenylamine



$= C_{15}H_{18}N_2 = 226$

FORMATION.—N^1-Phenyl-4-*m*-tolylene-diamine (*q.v.*) is heated for ten hours with ethyl bromide at 150–175°

LITERATURE.—Ger. Pat. 87,667, Frdl. IV, 85
Beilstein, Organische Chemie (3 auf.), IV spl. 400
Lange, Zwischenprodukte, #1750, 1755, referring to the same patent, gives a different formula

Dye Derived from N^3-Ethyl-N^1-phenyl-4-*m*-tolylene-diamine

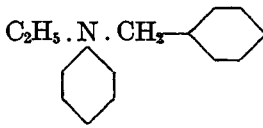
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates sed and Notes*	*Dye Application Class*
684	AZINE DYE Brilliant Rhoduline Red		Nitroso-ethyl-*o*-toluidine	B

Ethyl-sulfobenzyl-aniline

Benzyl-ethyl-aniline-sulfonic Acid

Ethyl-benzyl-aniline-sulfonic Acid

α-(*N*-Ethyl-anilino)-*p*-toluene-sulfonic Acid (*C. A. nomen.*)



$= C_{15}H_{17}NO_3S = 291$

STATISTICS.—Manufactured 1919 and 1920, but in undisclosed quantities

FORMATION.—By sulfonation of benzyl-ethyl-aniline with 20 per cent oleum at 40–50°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 69
Cf. Lange, Zwischenprodukte, #1500

Dyes Derived from Ethyl-sulfobenzyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
50	Azo Cardinal G	M '14:— ?	*p*-Nitro-aniline	A
	TRIPHENYL-METHANE DYES			
502	Guinea Green Acid Green 2BG	I '14:— 49,971 M '17:— ? M '18:— ? M '19:— ? I '20:— 278 M '20:— ?	Ethyl-sulfobenzyl-aniline (2 mols) Benzaldehyde [Oxidation]	A
503	Night Green A Neptune Green Brilliant Milling Green B	I '14:— 40,868 M '19:— ? I '20:— 10,940 M '20:— ?	Ethyl-sulfobenzyl-aniline (2 mols) *o*-Chloro-benzaldehyde [Oxidation]	A
506	Erioglaucine	I '14:— 66,526 M '19:— ? I '20:— 6,160 M '20:— ?	Ethyl-sulfobenzyl-aniline (2 mols) Benzaldehyde-*o*-sulfonic Acid [Oxidation]	A
529	Acid Violet 6B		Ethyl-sulfobenzyl-aniline (2 mols) Dimethyl-*p*-amino-benzaldehyde [Oxidation]	A
530	Acid Violet 6B Formyl Violet Guinea Violet	I '14:—161,624 M '17:— ? M '18:— ? M '19:— ? I '20:— 3,925 M '20:—144,207	Diethyl-aniline Ethyl-sulfobenzyl-aniline (2 mols) [Oxidation]	A
	THIAZINE DYE			
662	Thiocarmine R	I '14:— 1,399	Ethyl-sulfobenzyl-*p*-phenylene-diamine [$Na_2S_2O_3$, etc.]	A

N-Ethyl-N-(p-sulfo-benzyl)-metanilic Acid (*C. A. nomen.*)

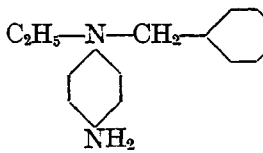
See, Benzyl-ethyl-aniline-disulfonic Acid

Ethyl-sulfobenzyl-p-phenylene-diamine

Benzyl-ethyl-*p*-phenylene-diamine-sulfonic Acid

p-Amino-benzyl-ethyl-aniline-sulfonic Acid

α-(*p*-Amino-*N*-ethyl-anilino)-*p*-toluene-sulfonic Acid (*C. A. nomen.*)



$= C_{15}H_{18}N_2O_3S = 306$

FORMATION.—Benzyl-ethyl-aniline-sulfonic acid is changed into the nitroso-derivative with nitrous acid, and this latter is reduced with sulfite

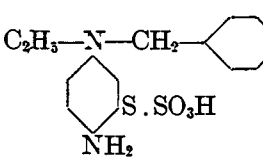
LITERATURE.—Lange, Zwischenprodukte, #1499, 929
Cf. Cain, Intermediate Products (2d Ed.), 69

Dye Derived from Ethyl-sulfobenzyl-p-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
662	THIAZINE DYE Thocarmine R	I '14:— 1,399	Ethyl-sulfobenzyl-aniline [$Na_2S_2O_3$, etc.]	A

Ethyl-sulfobenzyl-p-phenylene-diamine-thiosulfonic Acid

α-(4-Amino-*N*-ethyl-3-sulfomercapto-anilino)-*p*-toluene-sulfonic Acid (*C. A. nomen.*)



$= C_{15}H_{18}N_2O_6S_3 = 418$

FORMATION.—Ethyl-sulfobenzyl-*p*-phenylene-diamine is dissolved in dilute hydrochloric acid, zinc chloride solution and sodium thiosulfate solution added; and then oxidized quickly with solution of sodium bichromate

LITERATURE.—Lange, Zwischenprodukte, #1501

Dye Derived from Ethyl-sulfobenzyl-*p*-phenylene-diamine-thiosulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	THIAZINE DYE			
667	Brilliant Alizarin Blue Indochromine T	I '14:— 19,481 M '19:— ? I '20:— 3,214 M '20:— ?	1: 2-Naphthoquinone	M

5-Ethylthio-2-hydroxy-thionaphthene-1-carboxylic Acid

See, 5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid (*C. A. nomen.*)

6-Ethylthio-3-hydroxy-1-thionaphthene-2-carboxylic Acid (*German numbering*)

See, 5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid (*C. A. nomen.*)

***N*-Ethyl-*o*-toluidine** (*C. A. nomen.*)

Ethyl-*o*-toluidine

$= C_9H_{13}N = 135$

FORMATION.—From *o*-toluidine hydrochloride and ethyl alcohol by heating together in an autoclave at about 200°. The crude product contains considerable *o*-toluidine, which can be removed as sulfate by adding just sufficient sulfuric acid to combine with it, allowing to cool, and centrifugating

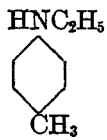
LITERATURE.—Cain, Intermediate Products (2d Ed.), 71
Lange, Zwischenprodukte, #128

Dyes Derived from *N*-Ethyl-*o*-toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermedicles Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
500	Setocyanine O	I '14:— 923 I '20:— 1,102	Ethyl-*o*-toluidine (2 mols) *o*-Chloro-benzaldehyde [Oxidation]	B
546	Cyanol	I '14:— 40,015 I '20:— 7,954	Ethyl-*o*-toluidine (2 mols) *m*-Hydroxy-benzaldehyde [Sulfonation, Oxidation]	A
	THIAZINE DYE			
663	New Methylene Blue N	I '14:— 30,392 I '20:— 513	Ethyl-*o*-toluidine (2 mols) [Nitroso-derivative, $Na_2S_2O_3$, etc.] *or* *p*-Amino-ethyl-*o*-toluidine [$Na_2S_2O_3$, etc.]	B

***N*-Ethyl-*p*-toluidine** (*C. A. nomen.*)

Ethyl-*p*-toluidine



$= C_9H_{13}N = 135$

FORMATION.—From *p*-toluidine hydrochloride and ethyl alcohol by heating together in an autoclave and purification of resulting product

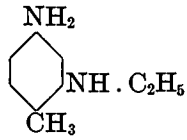
LITERATURE.—*Cf.* Cain, Intermediate Products (2d Ed.), 71
Lange, Zwischenprodukte, #128
Ger. Pat. 21,241, Frdl. **1**, 21

Dye Derived from *N*-Ethyl-*p*-toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
671	AZINE DYE Induline Scarlet	I '14:— 198 I '20:— 154	α-Naphthylamine	

N^3-Ethyl-4-*m*-tolylene-diamine (*C. A. nomen.* $NH_2=1$)

p-Amino-ethyl-*o*-toluidine ($CH_3=1$)



$=C_9H_{14}N_2=150$

FORMATION.—From 5-nitro-ethyl-*o*-toluidine ($NH_2=1$) [4-nitro-ethyl-*o*-toluidine ($CH_3=1$)] by reduction with zinc dust and hydrochloric acid

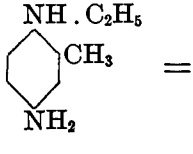
LITERATURE.—Beilstein, Organische Chemie (3 auf.), IV, 601
J. Chem. Soc., **67**, 247

Dye Derived from N^3-Ethyl-4-*m*-tolylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
684	AZINE DYE Brilliant Rhoduline Red		Methyl-*o*-toluidine Aniline	B

N^1-Ethyl-*p*-tolylene-diamine (*C. A. nomen.*)

p-Amino-ethyl-*o*-toluidine



$=C_9H_{14}N_2=150$

FORMATION.—From 4-nitroso-ethyl-*o*-toluidine (NHR=1) by reduction with $SnCl_2+HCl$

LITERATURE.—Beil. II, 609

Dye Derived from *N*¹-Ethyl-*p*-tolylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
663	THIAZINE DYE New Methylene Blue N	I '14:— 30,392 I '20:— 513	Ethyl-*o*-toluidine [$Na_2S_2O_3$]	B

Ewer and Pick's Acid

See, Naphthalene-1:6-disulfonic Acid

F Acid

See, 2-Naphthol-7-sulfonic Acid

See, 2-Naphthylamine-7-sulfonic Acid

2-Naphthylamine-3:7-disulfonic Acid (*not considered herein*)

2-Amino-7-naphthol-3-sulfonic Acid (*not considered herein*)

2:7-Dihydroxy-naphthalene-3-sulfonic Acid (*not considered herein*)

Formaniline

See, Anhydro-formaldehyde-aniline

4-Formyl-*m*-benzene-disulfonic Acid (*C. A. nomen.*)

See, Benzaldehyde-disulfonic Acid

***o*-Formyl-benzene-sulfonic Acid** (*C. A. nomen.*)

See, Benzaldehyde-*o*-sulfonic Acid

4-Formyl-6-methyl-*m*-benzene-disulfonic Acid

See, 3-methyl-benzaldehyde-4:6-disulfonic Acid

Forsling's Acid I

See, 2-Naphthylamine-8-sulfonic Acid

Forsling's Acid II

See, 2-Naphthylamine-5-sulfonic Acid

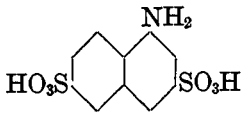
Freund's Acid

1-Naphthylamine-3: 6-disulfonic Acid

4-Amino-2: 7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)

α-Naphthylamine-α-disulfonic Acid

Alén's α Acid



$= C_{10}H_9NO_6S_2 = 303$

STATISTICS.—Imported '14:—5,246 lbs.
Manufactured '18:— ?
Manufactured '19:— ?

FORMATION.—Naphthalene is heated with five parts of concentrated sulfuric acid for about 8 hours at 160–200°, the mixture is cooled and two parts of 50 per cent nitric acid are added. After reacting for some time the nitration mass is diluted and reduced with iron

LITERATURE.—Cain, Intermediate Products (2d Ed.), 195
Thorpe, Dic: Chemistry, **3**, 592
Lange, Zwischenprodukte, #2591

Dyes Derived from Freund's Acid

Schultz Number Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
266	Naphthylamine Black D	I '14:—152,141 M '17:— ? M '18:— 29,724 M '19:— ? I '20:— 1,687 M '20:— ?	α-Naphthylamine (2 mols)	A
267	Anthracite Black	I '14:— 99 M '17:— ? I '20:— 220	α-Naphthylamine Diphenyl-*m*-phenylene-diamine	A

G Acid[1]

2-Naphthol-6: 8-disulfonic Acid (*C. A. nomen.*)

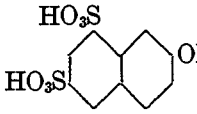
β-Naphthol-β-disulfonic Acid

β-Naphthol-γ-disulfonic Acid

β-Naphthol-disulfonic Acid G

β-Naphthol-disulfonic Acid γ

Y Acid



$= C_{10}H_8O_7S_2 = 304$

STATISTICS.—Imported 14':—11,624 lbs.
Manufactured '18:— ?
Manufactured '19:—732,192 lbs.
Manufactured '20:—1,446,605 lbs.

FORMATION.—Sulfonation of β-naphthol and separation from the R acid simultaneously formed

LITERATURE.—Cain, Intermediate Products (2d Ed.), 227
Thorpe, Dic. Chemistry, 3, 627
Lange, Zwischenprodukte, ₱2659–2661

Dyes Derived from G Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
38	Orange G	I '14:— 48,456 M '17:— ? M '18:— ? M '19:— ? I '20:— 100 M '20:—120,874	Aniline	A

[1] Occasionally in the old literature G acid is used to mean Gamma acid (or 2-Amino-8-naphthol-6-sulfonic acid), or 2-Naphthylamine-6: 8-disulfonic acid, or 1: 7-Dihydroxy-naphthalene-3-sulfonic acid.

Dyes Derived from G Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
113	Crystal Ponceau	I '14:— 628	α-Naphthylamine	A
122	Erica G	I '14:— 2,370 M'18:— ? I '20:— 1,142	Dehydro-thio-*m*-xylidine	D
169	Cochineal Red A	I '14:— 32,645 M'17:— ? M'18:— ? M'19:—231,519 M'20:—288,945	Naphthionic Acid	A
	DISAZO DYES			
227	Brilliant Croceine M	I '14:—125,137 M'17:— ? M'18:— 84,643 M'19:—157,509 I '20:— 49 M'20:—129,124	Amino-azo-benzene	A
270	Brilliant Croceine 9B		Amino-G Acid Aniline R Acid	A
319	Diamine Scarlet B	I '14:— 41,175 I '20:— 10,565	Benzidine Phenol [Ethylation]	D
	DIPHENYL-NAPHTHYL-METHANE DYE			
566	Wool Green S	I '14:— 60,073 M'17:— ? M'19:— ? I '20:—127,764 M'20:—212,362	Hydrol	A

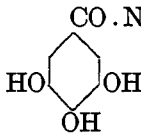
Gallamic Acid

See, Gallamide (*C. A. nomen.*)

Gallamide (*C. A. nomen.*)

Gallamic Acid

Gallic Acid Amide



$= C_7H_7NO_4 = 169$

FORMATION.—From tannin by boiling with strong solution of ammonium sulfite and aqueous ammonia until the excess of ammonia has been driven off. The amide crystallizes out upon cooling

LITERATURE.—Green, Organic Coloring Matters (1908), 46
Lange, Zwischenprodukte, #1546

Dyes Derived from Gallamide

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES			
627	Modern Cyanine		Nitroso-dimethyl-aniline Dimethyl-*p*-phenylene-diamine [Reduction]	M
630	Cyanazurine		Nitroso-dimethyl-aniline Aniline [Reduction]	M
637	Gallamine Blue	I '14:— 2,756 I '20:— 16,446	Nitroso-dimethyl-aniline	M
638	Amido Gallamine Blue		Nitroso-dimethyl-aniline [Ammonia, Reduction]	M
641	Coreine RR Coelestine Blue B	I '14:— 1,320 I '20:— 44	Nitroso-diethyl-aniline *or* Diethylamino-azo-benzene	M
646	Coreine AR		Nitroso-diethyl-aniline *or* Diethylamino-azo-benzene Aniline [Sulfonation] *or* [Coreine RR; Aniline; Sulfonation]	M

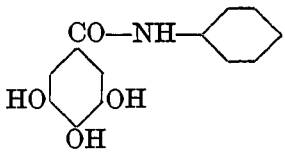
Gallanilic Acid

See, Gallanilide (*C. A. nomen.*)

Gallanilide (*C. A. nomen.*)

Gallanilic Acid

Gallic Acid Anilide



$= C_{13}H_{11}NO_4 = 245$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—From tannin by heating with aniline

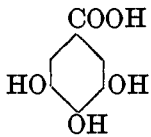
LITERATURE.—Green, Organic Coloring Matters (1908), 46
Cf. Lange, Zwischenprodukte, #1546

Dye Derived from Gallanilide

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
639	OXAZINE DYE Gallanilic Violet R, B		Nitroso-dimethyl-(*or* dicthyl-) aniline	M

Gallic Acid

3: 4: 5-Trihydroxy-benzoic Acid



$= C_7H_6O_5 = 170$

STATISTICS.—Imported '14:—61,644 lbs.
Manufactured regularly, but in amounts that are not yearly disclosed

FORMATION.—From nut galls (Chinese or Aleppo) by action of ferments or acids, and subsequent extraction and crystallization

LITERATURE.—Green, Organic Coloring Matters (1908), 46
Lange, Zwischenprodukte, #1112

Dyes Derived from Gallic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
599	Galleine	I '14:— 15,404 M '19:— ? I '20:— 5,075 M '20:— ?	Phthalic Anhydride Gallic Acid (2 mols)	M
601	Coeruleine S	I '14:— 3,404 M '19:— ? I '20:— 9,392	Phthalic Anhydride Gallic Acid (2 mols) [Dehydration] *or* [Galleine dehydrated]	M
	OXAZINE DYES			
622	Delphine Blue B	M '17:— ? M '18:— ? M '19:— 43,827 I '20:— 29,643 M '20:— 76,719	Nitroso-dimethylaniline Aniline [Sulfonation] *or* [Gallocyanine, Aniline, Sulfonation]	M
624	Modern Violet N	I '20:— 5,688	Nitroso-dimethylaniline [CO_2 split off] *or* [Gallocyanine heated]	M
625	Chrome Heliotrope		Nitroso-methyl-aniline [Reduction]	M
626	Gallocyanine	I '14:— 78,253 M '17:— ? M '18:—435,460 M '19:—365,243 I '20:— 12,414 M '20:— 70,169	Nitroso-dimethylaniline	M

Dyes Derived from Gallic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES (*continued*)			
628	Gallocyanine MS	I '20:— 22	Dimethylamino-azo-benzene-disulfonic Acid *or* Nitroso-dimethyl-aniline [Sulfonation; Oxidation]	M
629	Gallogreen DH Modern Blue		Nitroso-dimethyl-aniline [Formaldehyde, Reduction] *or* [Gallocyanine, Formaldehyde, Reduction]	M
631	Chromocyanine V	M '18:— ? M '19:— ? I '20:— 1,287 M '20:— ?	Nitroso-dimethyl-aniline [Sulfonation] *or* [Gallocyanine, Sulfites]	M
632	Ultra Violet LGP	I '14:— 4,368	Nitroso-dimethyl-aniline (2 mols) Gallic Acid (2 mols)	M
633	Indalizarine R	I '20:— 551	Nitroso-dimethyl-aniline [Sulfonation]	M
634	Indalizarine Green		Nitroso-dimethyl-aniline [Sulfonation; Nitration] *or* [Indalizarine nitrated]	M
635	Blue 1900 TC Modern Violet	I '20:— 1,933	Nitroso-dimethyl-aniline [Reduction]	M

Dyes Derived from Gallic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES (*continued*)			
642	Phenocyanine TC	I '20:— 4,740	Nitroso-dimethyl-aniline Resorcinol *or* [Gallocyanine, Resorcinol]	M
643	Phenocyanine TV	M '17:— ? I '20:— 1,543	Nitroso-dimethyl-aniline Resorcinol [Sulfonation] *or* [Phenocyanine sulfonated]	M
644	Ultracyanine B		Nitroso-dimethyl-aniline Resorcinol [Alkaline Condensation] *or* [Gallocyanine; Resorcinol; Alkaline Condensation]	M
645	Gallazine A		Nitroso-dimethyl-aniline Schaeffer's Acid [Oxidation] *or* [Gallocyanine, Schaeffer's Acid Oxidation]	M
	THIAZINE DYE			
664	Leuco-gallo Thionine DH		Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid	M

Dyes Derived from Gallic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
772	Galloflavine W	I '14:— [838 I '20:— 24	Gallic Acid (2 mols)	M
782	Anthracene Brown Alizarin Brown	I '14:—115,586 M '17:— ? M '18:— ? M '19:— 40,426 I '20:— 2,728 M '20:— 42,840	Benzoic Acid *or* Phthalic Anhydride	M

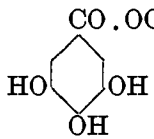
Gallic Acid Amide

See, Gallamide (*C. A. nomen.*)

Gallic Acid Anilide

See, Gallanilide (*C. A. nomen.*)

Gallic Acid Methyl Ester



$= C_8H_8O_5 = 184$

FORMATION.—From gallic acid by heating with methanol (methyl alcohol) and hydrochloric acid

LITERATURE.—Green, Organic Coloring Matters (1908), 46

Dyes Derived from Gallic Acid Methyl Ester

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES			
636	Prune	I '14:— 3,197 I '20:— 4,418	Nitroso-dimethyl-aniline	M
640	Modern Azurine DH		Nitroso-dimethyl-aniline Aniline	M

Gamma Acid

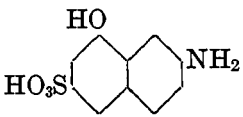
2-Amino-8-naphthol-6-sulfonic Acid

Amino-naphthol-sulfonic Acid γ

Amino-naphthol-sulfonic Acid G

G Acid (*occasionally in old literature*)

7-Amino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_4S = 239$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:—155,025 lbs.
Manufactured '20:—418,456 lbs.

FORMATION.—β-Naphthol is sulfonated to R and G acids, and these two β-naphthol-disulfonic acids are separated. The sodium salt of G acid is heated in an autoclave with ammonia and sodium bisulfite solution to form amino-G acid (2-naphthylamine-6:8-disulfonic acid). This latter is fused in an autoclave with caustic soda, thus forming gamma acid.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 236
Lange, Zwischenprodukte, #2546

Dyes Derived from Gamma Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
241	Neutral Gray G	I '14:— 2,546 M '19:— ? I '20:— 3,472 M '20:— ?	Aniline α-Naphthylamin	D
245	Nyanza Black B		*p*-Nitro-aniline α-Naphthylamine [*p*-Nitro-aniline reduced after coupling]	D
274	Diaminogene BB	I '14:—313,629 I '20:— 18,120	Acetyl-1 : 4-naphthylene-diamine-6-sulfonic Acid α-Naphthylamin	D
295	Diphenyl Fast Black	I '14:— 882	*p* : *p'*-Diamino-ditolylamine *m*-Tolylene-diamine	D
297	Benzo Fast Pink 2BL	I '14:— 3,252 I '20:— 1,226	Diamino-diphenyl-urea-disulfonic Acid Gamma Acid (2 mols)	D
327	Diamine Violet N	I '14:— 18,263 M '19:— ? M '20:— 92,503	Benzidine Gamma Acid (2 mols)	D
328	Diamine Black RO Dianol Black RW	I '14:— 8,253	Benzidine Gamma Acid (2 mols)	D
329	Diamine Brown V	M '19:— ?	Benzidine *m*-Phenylene-diamine	D
330	Zambesi Brown G	I '14:— 4,028 I '20:— 1,104	Benzidine 2 : 7-Naphthylene-diamine-sulfonic Acid	D
331	Alkali Dark Brown GV		Benzidine Nitroso-β-naphthol	D
332	Dianil Garnet B Benzo Fast Red	I '14:— 5,985 I '20:— 3,799	Benzidine Amino-R Acid	D

Dyes Derived from Gamma Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
333	Diamine Black BH Oxamine Black BHN	I '14:—619,430 M '17:— ? M '18:— ? M '19:—485,046 I '20:— 5,512 M '20:—803,501	Benzidine H Acid	D
335	Naphthamine Black RE	I '14:— 49,016	Benzidine K Acid	D
343	Diamine Fast Red F	I '14:— 50,479 M '19:— 56,864 I '20:— 4,040 M '20:—115,865	Benzidine Salicylic Acid	D
344	Diamine Brown M	I '14:— 65,396 M '18:— ? M '19:— 15,959 M '20:—257,872	Benzidine Salicylic Acid	D
399	Indazurine TS		Tolidin 1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid	D
402	Diamine Blue Black E		Ethoxy-benzidine 2-Naphthol-3: 7-disulfonic Acid	D
403	Diamine Black BO		Ethoxy-benzidine Gamma Acid (2 mols)	D
	TRISAZO DYES			
436	Columbia Black FF	I '14:—402,997 M '18:— ? M '19:— ? I '20:— 23,350 M '20:— ?	1-Naphthylamine-6- *and* 7-sulfonic Acids *m*-Phenylene-diamine *p*-Phenylene-diamine	D
437	Iso-Diphenyl Black R		Resorcinol *p*-Phenylene-diamine *m*-Phenylene-diamine	D

Dyes Derived from Gamma Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
440	Direct Indigo Blue BK		Benzidine *m*-Amino-*p*-cresol Methyl Ether Gamma Acid (2 mols)	D
442	Direct Black V	I '14:—145,738	Benzidine 2R Acid α-Naphthylamine	D
444	Crompsall Direct Fast Brown B		Benzidine Salicylic Acid Aniline	D
461	Coomassie Union Blacks		1: 4-Naphthylene-diamine-2-sulfonic Acid *m*-Phenylene-(*or* Tolylene-) diamine *or* Resorcinol (2 mols)	D
472	Chloramine Blue HW		Benzidine 2: 5-Dichloro-aniline H Acid	D
473	Diamine Black HW	I '20:— 342	Benzidine *p*-Nitro-aniline H Acid	D
	TETRAKISAZO DYE			
491	Dianil Black PR		Benzidine sulfonic Acid Gamma Acid (2 mols) *m*-Phenylene-diamine (2 mols)	D

G R Acid

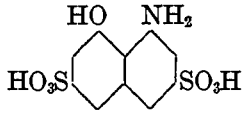
See, 1-Naphthol-3: 6-disulfonic Acid

H Acid

1-Amino-8-naphthol-3: 6-disulfonic Acid

Amino-naphthol-disulfonic Acid H

8-Amino-1-*n*aphthol-3: 6-disulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_7S_2 = 319$

STATISTICS.—Imported '14:— 96,296 lbs.
Manufactured '17:—3,089,273 lbs.
Manufactured '18:—3,837,534 lbs.
Manufactured '19:—2,883,228 lbs.
Manufactured '20:—5,180,993 lbs.

FORMATION.—Naphthalene is trisulfonated with oleum, and then nitrated and reduced with iron, resulting in the formation of Koch acid or 1-naphthylamine-3: 6: 8-trisulfonic acid. This latter is now fused in an autoclave with caustic soda, forming H acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 237
Lange, Zwischenprodukte, #2720–2724
Thorpe, Dic. Chemistry, **3**, 641

Dyes Derived from H Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
41	Fast Acid Fuchsine B	M '18:— ? M '19:— 26,699 M '20:— 30,678	Aniline	A
182	Fast Sulfon Violet 5BS Brilliant Sulfon Red B	I '14:— 4,871 I '20:— 4,740	Aniline Benzene-(*or* Toluene-) sulfo chloride	A
186	Lanacyl Violet B	I '14:— 3,628 M '17:— ? M '18:— ?	Ethyl-α-naphthylamine	A

Dyes Derived from H Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
187	Lanacyl Blue BB	I '14:— 4,200	5-Amino-1-naphthol	A
188	Tolyl Blue SR Sulfon Acid Blue R	I '14:— 45,038 M '17:— ? M '18:— ? M '19:— ? M '20:—454,185	Phenyl-1-naphthyl-amine-8-sulfonic Acid	A
189	Sulfon Acid Blue B	I '14:— 35,560 M '17:— ? M '19:— ? M '20:— ?	Tolyl-1-naphthylamine-8-sulfonic Acid	A
	DISAZO DYES			
217	Naphthol Blue Black Agalma Black 10B	I '14:—431,027 M '17:—620,218 M '18:— 1,158,309 M '19:— 1,877,860 I '20:— 840 M '20:— 2,608,864	*p*-Nitro-aniline Aniline	A
261	Buffalo Black 10B	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Sulfanilic Acid α-Naphthylamine	A
264	Fast Sulfon Black F	M '19:— ? I '20:— 2,204 M '20:— ?	Naphthionic Acid β-Naphthol	A
333	Diamine Black BH Oxamine Black BHN	I '14:—619,430 M '17:— ? M '18:— ? M '19:—485,046 I '20:— 5,512 M '20:—803,501	Benzidine Gamma Acid	D

Dyes Derived from H Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
334	Diphenyl Blue Black	I '14:— 26,240	Benzidine Ethyl-gamma Acid	D
336	Benzo Cyanine R	I '14:— 201	Benzidine 1-Amino-8-naphthol-4-sulfonic Acid	D
337	Diamine Blue 2B Benzo Blue 2B	I '14:— 19,035 M '17:— 1,445,059 M '18:— 1,523,985 M '19:— 1,380,335 M '20:— 1,789,774	Benzidine H Acid (2 mols)	D
353	Direct Indigo Blue BN	I '14:— 6,000	Benzidine 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid	D
381	Azo Black Blue B, R		Tolidine *m*-Hydroxy-diphenylamine	D
382	Azo Mauve B	M '17:— ? M '20:— ?	α-Naphthylamine Tolidine	D
383	Naphthazurine B	I '14:— 4,782	Tolidine β-Naphthylamine	D
386	Diamine Blue BX Benzo Blue BX	I '14:— 1,740 M '17:— ? M '18:— ? M '19:— 92,214 I '20:— 4,520 M '20:— 90,147	Tolidine Nevile-Winther's Acid	D
390	Benzo Cyanine B	I '14:— 201	Tolidine 1-Amino-8-naphthol-4-sulfonic Acid	D

Dyes Derived from H Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
391	Diamine Blue 3B Benzo Blue 3B	I '14:— 1,365 M '17:— 14,533 M '18:— 99,645 M '19:—182,946 I '20:— 1,124 M '20:—136,891	Tolidine H Acid (2 mols)	D
425	Benzo Cyanine 3B	I '14:— 1,001	Dianisidine 1-Amino-8-naphthol-4-sulfonic Acid	D
426	Diamine Pure Blue Benzamine Pure Blue	I '14:— 12,881 M '17:— ? M '18:— ? M '19:—192,350 I '20:— 662 M '20:—223,100	Dianisidine H Acid (2 mols)	D
430	Indazurine 5 GM		Dianisidine 1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid	D
	TRISAZO DYES			
438	Melogene Blue BH	M '17:— ? M '18:— ?	Benzidine *p*-Xylidine H Acid (2 mols)	D
439	Direct Indigo Blue A	M '18:— ?	H Acid (2 mols) Benzidine *m*-Amino-*p*-cresol Methyl Ether	D
441	Diazo Blue Black RS	M '19:— ? M '20:— ?	Benzidine α-Naphthylamine H Acid (2 mols)	D
443	Direct Indone Blue R		Benzidine α-Naphthylamine 2 R Acid	D
446	Benzo Olive	I '14:— 1,149	Benzidine Salicylic Acid α-Naphthylamine	D

Dyes Derived from H Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
448	Diamine Bronze G	I '14:— 4,495	Benzidine Salicylic Acid *m*-Phenylene-diamine	D
462	Erie Direct Black GX Direct Deep Black EW	I '14:— 1,246,536 M '17:— ? M '18:— ? M '19:— 7,250,007 M '20:— 7,736,994	Benzidine Aniline *m*-Phenylene-diamine	D
463	Erie Direct Black RX Cotton Black E	I '14:—248,567 M '19:— ? M '20:— 2,050,741	Benzidine Aniline *m*-Tolylene-diamine	D
464	Erie Direct Green ET	M '17:— ? M '18:— ? M '19:— 69,700 M '20:— ?	Benzidine Aniline Phenol	D
467	Diphenyl Green G	I '20:— 2,205	Benzidine *o*-Chloro-*p*-nitro-aniline Phenol	D
468	Diphenyl Green 3G		Benzidine *o*-Chloro-*p*-nitro-aniline Salicylic Acid	D
469	Chloramine Black N	I '14:— 39,600 M '19:— ? I '20:— 1,763	Benzidine 2: 5-Dichloro-aniline *m*-Phenylene-diamine	D
470	Chloramine Green B	I '14:— 1,675 M '19:— ? M '20:— ?	Benzidine 2: 5-Dichloro-aniline Phenol	D

Dyes Derived from H Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
471	Chloramine Blue 3G	I '14:— 286 M '19:— ? I '20:— 882	Benzidine 2: 5-Dichloro-aniline H Acid (2 mols)	D
472	Chloramine Blue HW		Benzidine 2: 5-Dichloro-aniline Gamma Acid	D
473	Diamine Black HW	I '20:— 342	Benzidine *p*-Nitro-aniline Gamma Acid	D
474	Diamine Green B Oxamine Green B	I '14:— 77,100 M '17:— ? M '18:—295,147 M '19:—305,854 I '20:— 2,460 M '20:—420,138	Benzidine *p*-Nitro-aniline Phenol	D
475	Diamine Green G Oxamine Green G	I '14:— 7,329 M '17:— ? M '18:— 29,118 M '19:—136,638 I '20:— 1,332 M '20:— 53,292	Benzidine *p*-Nitro-aniline Salicylic Acid	D

Histazarin

2: 3-Dihydroxy-anthraquinone (*not considered herein*)

***o*-Homo-salicylic Acid**

See, *o*-Cresotic Acid

***p*-Hydrazine-benzene-sulfonic Acid** (*C. A. nomen.*)

See, Phenyl-hydrazine-*p*-sulfonic Acid

α-Hydro-juglone

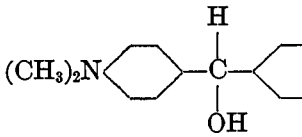
1: 4: 5-Trihydroxy-naphthalene (*not considered herein*)

Hydrol

Tetramethyl-diamino-benzohydrol

p: *p'*-Bis(dimethylamino)-*b*enzohydrol (*C. A. nomen.*)

Michler's Hydrol



$= C_{17}H_{22}N_2O = 270$

STATISTICS.—Manufactured '20:—88,583 lbs.

FORMATION.—Dimethyl-aniline is condensed with formaldehyde in presence of hydrochloric acid, and the resulting product is oxidized with lead peroxide; or the corresponding ketone (tetramethyl-diamino-benzophenone) is reduced with zinc

LITERATURE.—Cain, Intermediate Products (2d Ed.), 102–3
Lange, Zwischenprodukte, #1358

Dyes Derived from Hydrol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
498	Turquoise Blue	I '14:— 1,541 I '20:— 1,407	*p*-Nitro-toluene [Oxidation]	B
509	Chrome Green		Benzoic Acid [Oxidation]	M
516	Crystal Violet	I '14:— 51,872 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,919 M '20:— ?	Dimethyl-aniline [Oxidation]	B
528	Fast Acid Violet 10B	I '14:— 12,919 M '17:— ? M '18:— ? M '19:— ? I '20:— 10,086 M '20:— ?	Benzyl-ethyl(methyl)-aniline-disulfonic Acid [Oxidation]	A

Dyes Derived from Hydrol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
542	Agalma Green B	I '14:— 2,294	4-Chloro-3: 5-dinitro-benzene-sulfonic Acid Metanilic Acid *or* Dinitro-diphenylamine-disulfonic Acid	A
549	Chrome Violet	I '14:— 51	Salicylic Acid [Oxidation]	M
550	Chrome Bordeaux		Amino-salicylic Acid [Oxidation]	M
	DIPHENYL-NAPHTHYL-METHANE DYES			
558	Victoria Blue R	I '14:— 4,171 I '20:— 97	Ethyl-α-naphthylamine [Oxidation]	B
559	Victoria Blue B	I '14:—127,769 M '17:— ? M '18:— ? M '19:— ? I '20:— 4,171 M '20:— ?	Phenyl-α-naphthyl-amine [Oxidation]	B
562	Fast Acid Blue B	I '14:— 33,251 I '20:— 6,478	1-Naphthylamine-2-sulfonic Acid [Oxidation]	A
563	New Patent Blue B	I '14:— 595 I '20:— 1,814	Naphthionic Acid *or* Laurent's Acid [Substitution of $-NH_2$ by $-SO_3Na$ and Oxidation]	A
564	Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	Naphthalene *or* Naphthalene-2: 7-disulfonic Acid	A

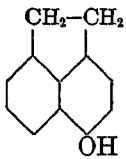
Dyes Derived from Hydrol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYES (*continued*)			
566	Wool Green S	I '14:— 60,073 M '17:— ? M '19:— ? I '20:—127,764 M '20:—212,362	G Acid	A
567	Chrome Blue		1-Hydroxy-2-naphthoic Acid [Oxidation]	M
	OXAZINE DYE			
652	New Fast Blue F	I '14:— 2,502	Nitroso-dimethyl-aniline β-Naphthol *or* [Meldola's Blue]	B

3-Hydroxy-acenaphthene

4-Hydroxy-acenaphthene (*German numbering*)

3-Acenaphthenol (*C. A. nomen.*)



$= C_{12}H_{10}O = 170$

FORMATION.—From **3**-amino-acenaphthene by diazotizing and then boiling to hydrolyze the diazo group

LITERATURE.—Lange, Zwischenprodukte, #2957
Frdl. **10**, 544

Dye Derived from 3-Hydroxy-acenaphthene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
894	Alizarin Indigo B	I '14:— 402 I '20:— 291	2-Isatin Anilide	V

4-Hydroxy-acenaphthene (*German numbering*)

See, 3-Hydroxy-acenaphthene

1-Hydroxy-anthracene

See, 1-Anthrol (*C. A. nomen.*)

9-Hydroxy-anthracene

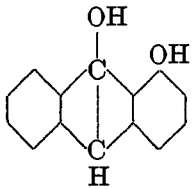
See, 9-Anthrol (*C. A. nomen.*)

1-Hydroxy-anthranol

1-Hydroxy-9-anthrol

α-Hydroxy-anthranol

1: 9-Anthradiol (*C. A. nomen.*)



$= C_{14}H_{10}O_2 = 210$

FORMATION.—1-Hydroxy-anthraquinone is reduced with hydrosulfite and alkali or with stannous chloride and hydrochloric acid

LITERATURE.—Ger. Pat. 242,053; Frdl. **10**, 532
Barnett, Anthracene and Anthraquinone

Dye Derived from 1-Hydroxy-anthranol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
896	Helindone Blue 3GN	I '14:— 622 I '20:— 2,527	2-Isatin Anilide	V

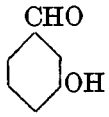
α-Hydroxy-anthranol

See, 1-Hydroxy-anthranol

1-Hydroxy-9-anthrol

See, 1-Hydroxy-anthranol

m-Hydroxy-benzaldehyde



$= C_7H_6O_2 = 122$

FORMATION.—From *m*-amino-benzaldehyde by diazotizing the amino-group and then boiling until the nitrogen evolution ceases

LITERATURE.—Cain, Intermediate Products (2d Ed.), 145
Lange, Zwischenprodukte, #461

Dyes Derived from *m*-Hydroxy-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
543	Patent Blue V	I '14:—196,228 M '17:— ? M '18:— ? I '20:— 36,420	Diethyl-aniline (2 mols) [Sulfonation, Oxidation]	A
544	Cyanine B	I '14:— 8,398 I '20:— 24	Diethyl-aniline (2 mols) [Sulfonation, Oxidation] *or* [Oxidation of Patent Blue]	A
545	Patent Blue A	I '14:— 63,744 M '18:— ? I '20:— 44,801	Benzyl-ethyl-aniline (2 mols) [Sulfonation, Oxidation]	A
546	Cyanol	I '14:— 40,015 I '20:— 7,954	Ethyl-*o*-toluidine (2 mols) [Sulfonation, Oxidation]	A

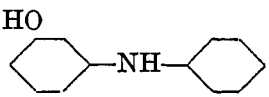
m-Hydroxy-dimethyl-aniline

See, *m*-Dimethylamino-*p*henol (*C. A. nomen.*)

m-Hydroxy-diphenylamine

Phenyl-*m*-amino-phenol

m-Anilino-phenol (*C. A. nomen.*)



$= C_{12}H_{11}NO = 185$

FORMATION.—(1) From resorcinol by heating with aniline and zinc chloride at 280–290°. (2) From *m*-amino-phenol by heating with aniline hydrochloride in an autoclave at 210–215°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 55
Lange, Zwischenprodukte, #1613

Dyes Derived from *m*-Hydroxy-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
381	Azo Black Blue B, R		Tolidine H Acid	D
	OXAZINE DYE			
658	Fast Black	I '14:— 1,960 I '20:— 2,883	Nitroso-dimethyl-aniline	B

***N*-(3-Hydroxy-4-keto-1(4)-naphthylidene)-sulfanilic Acid** (*C. A. nomen.*)

See, β-Hydroxy-naphthoquinonyl-aniline-*p*-sulfonic Acid

1-Hydroxy-naphthalene-2-carboxylic Acid

See, 1-Hydroxy-2-naphthoic Acid (*C. A. nomen.*)

2-Hydroxy-naphthalene-3-carboxylic Acid

See, 3-Hydroxy-2-naphthoic Acid (*C. A. nomen.*)

Hydroxy-naphthalene-sulfonic Acids

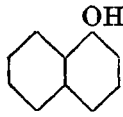
See, Naphthol-sulfonic Acids

1-Hydroxy-2-naphthoic Acid (*C. A. nomen.*)

1-Hydroxy-naphthalene-2-carboxylic Acid

α-Oxy-naphthoic Acid

α-Naphthol-carboxylic Acid



$= C_{11}H_8O_3 = 188$

FORMATION.—α-Naphthol is converted into sodium α-naphtholate, and treated with the theoretical amount of carbon dioxide under pressure and at 120–145°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 240
Lange, Zwischenprodukte, #775, 2308

Dye Derived from 1-Hydroxy-2-naphthoic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYES			
567	Chrome Blue		Hydrol [Oxidation]	M

2-Hydroxy-3-naphthoic Acid

See, 3-Hydroxy-2-naphthoic Acid (*C. A. nomen.*)

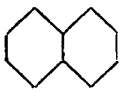
3-Hydroxy-2-naphthoic Acid (*C. A. nomen.*)

2-Hydroxy-3-naphthoic Acid

2-Hydroxy-naphthalene-3-carboxylic Acid

β-Oxy-naphthoic Acid

β-Naphthol-carboxylic Acid



$= C_{11}H_8O_3 = 188$

STATISTICS.—Imports '14:—2,359 lbs.
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—β-Naphthol is converted into the sodium β-naphtholate, and treated with the theoretical amount of carbon dioxide under pressure and at 200–250°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 241
Lange, Zwischenprodukte, #775, 2308

Dyes Derived from 3-Hydroxy-2-naphthoic Acid

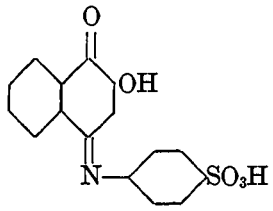
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
45	Brilliant Lake Red R	I '14:— 31,674 I '20:— 1,071	Aniline	CL
152	Lithol Rubine B Permanent Red 4B	I '14:—101,395 M '19:— ? I '20:— 2,983 M '20:— ?	*p*-Toluidine-*o*-sulfonic Acid	CL
179	Lake Bordeaux B		2-Naphthylamine-1-sulfonic Acid	CL

β-Hydroxy-naphthoquinone

1 : 2-Dihydroxy-naphthalene (*not considered herein*)

β-Hydroxy-naphthoquinonyl-aniline-*p*-sulfonic Acid

N-(3-Hydroxy-4-keto-1(4)-naphthylidene)-sulfanilic Acid (*C. A. nomen.*)



$= C_{16}H_{11}NO_5S = 329$

FORMATION.—The potassium salt of 1:2-naphthoquinone-4-sulfonic acid is condensed with the sodium salt of sulfanilic acid, splitting off a sulfonic group and furnishing the β-hydroxy-naphthoquinonyl-aniline-*p*-sulfonic acid

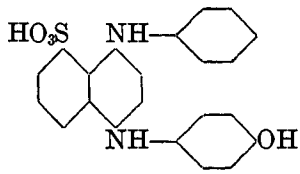
LITERATURE.—Lange, Schwefelfarbstoffe, 393,139
Lange, Zwischenprodukte, #2870, 2871
Schultz, Farbstofftabellen, #747

Dye Derived from β-Hydroxy-naphthoquinonyl-aniline-*p*-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
747	SULFUR DYE Thional Brown G	I '14:— 110 I '20:— 43,219	[S+Na_2S]	S

4-(*p*-Hydroxy-phenyl-amino)-1-phenylamino-naphthalene-8-sulfonic Acid

8-Anilino-5-(*p*-hydroxy-anilino)-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{22}H_{18}N_2O_4S = 406$

FORMATION.—By condensation of phenyl-1-naphthylamine-8-sulfonic acid and *p*-amino-phenol

LITERATURE.—Lange, Schwefelfarbstoffe, 425

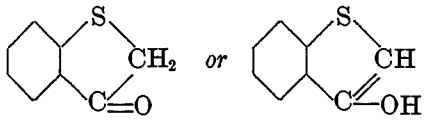
Dye Derived from 4-(*p*-Hydroxy-phenyl-amino)-1-phenylamino-naphthalene-8-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
746	Thional Green B Katigene Green	I '14:— 63,929 I '20:— 14,370	[Na_2S+S]	S

2-Hydroxy-thionaphthene (*C. A. and English nomen.*)

3-Hydroxy-1-thionaphthene (*German numbering*)

Thioindoxyl



$= C_8H_6OS = 150$

FORMATION.—Thiosalicylic acid with chloro-acetic acid gives phenyl thioglycolic-*o*-carboxylic acid:

$$C_6H_4\begin{cases}S.CH_2.COOH\\COOH\end{cases}$$

This body, by heating with a little water and caustic soda, closes up the second ring and forms 2-hydroxy-thionaphthene-1-carboxylic acid, which in warm acid solution decomposes, losing CO_2 and forming 2-hydroxy-thionaphthene

LITERATURE.—Lange, Zwischenprodukte, #2148–2163
Georgievics and Grandmougin, Dye Chemistry, 432–434
Schultz, Farbstofftabellen (5 auf.), #912
Cain, Intermediate Products (2d Ed.), 159

Dyes Derived from 2-Hydroxy-thionaphthene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
899	Ciba Gray G	I '14:— 675	2-Isatin anilide [Bromination]	V
900	Ciba Violet 3B	I '14:— 2,667	2-Isatin anilide [Bromination]	V
900	Thio Indigo Violet K		2-Isatin anilide [Bromination]	V
901	Ciba Violet B	I '14:— 20,836 I '20:— 18,287	2-Isatin anilide [Bromination]	V
905	Thio Indigo Scarlet R	I '20:— 270	Isatin	V
906	Thio Indigo Scarlet G	I '20:— 1,291	Isatin [Bromination]	V
907	Ciba Scarlet G	I '14:— 22,265 I '20:— 25,578	Acenaphthenequinone	V
908	Ciba Red R	I '14:— 1,001	Acenaphthenequinone [Bromination]	V
912	Thio Indigo Red B	I '14:— 1,102 I '20:— 275	2-Hydroxy-thionaphthene (2 mols)	V
919	Ciba Bordeaux B	I '14:— 899 I '20:— 1,786	2-Hydroxy-thionaphthene (2 mols) [Bromination] *or* [Bromination of Thio Indigo Red R]	V

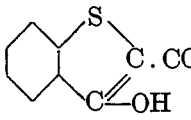
3-Hydroxy-thionaphthene

See, 2-Hydroxy-thionaphthene

2-Hydroxy-*t*hionaphthene-1-carboxylic Acid (*C. A. nomen.*)

3-Hydroxy-(1)-thionaphthene-2-carboxylic Acid (*German numbering*)

Thioindoxyl-carboxylic Acid



$= C_9H_6O_3S = 194$

FORMATION.—From phenyl-thioglycol-*o*-carboxylic acid through closing of the side chain upon fusion with caustic soda. (The carboxylic group is very easily split off with the formation of 2-hydroxy-thionaphthene.) Cf. 2-hydroxy-thionaphthene

LITERATURE.—Cain, Intermediate Products (2d Ed.), 159
Lange, Zwischenprodukte, #2148–2163

USES.—See 2-hydroxy-thionaphthene

I Acid

See, J Acid

***p*: *p'*-Imino-bisaniline** (*C. A. nomen.*)

See, *p*: *p'*-Diamino-diphenylamine

4: 4'-Imino-bis-*o*-toluidine (*C. A. nomen. $NH_2 = 1$*)

See, *p*: *p'*-Diamino-ditolyl-amine

Indanthrene

See, Indanthrone

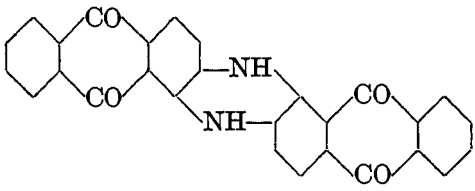
Indanthrene-sulfonic Acid

See, Indanthrone-sulfonic Acid

Indanthrone

Dianthraquinone-dihydroazine

Indanthrene (*C. A. nomen.*)



$= C_{28}H_{14}N_2O_4 = 442$

FORMATION.—Anthraquinone is sulfonated with oleum to 2-anthraquinone-sulfonic acid, which upon being heated in an autoclave with ammonia forms 2-amino-anthraquinone. This latter by the action of alkali at 200–300° is converted to indanthrone

LITERATURE.—Georgievics and Grandmougin, Dye Chemistry, 449–450
Barnett, Anthracene and Anthraquinone, 342
Schultz, Farbstofftabellen (1914 Ed.), #837

Dyes Derived from Indanthrone

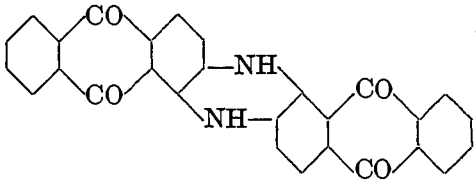
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
837	Indanthrene Blue R	I '14:— 500	[This is indanthrone]	V
838	Indanthrene Blue RS	I '14:—187,379 M '17:— ? I '20:— 16,385 M '20:— ?	[Reduction]	V
840	Indanthrene Blue	I '14:— 6,120 I '20:— 551	[Oxidation]	V
841	Indanthrene Blue 2GS	I '14:— 10,163 I '20:— 500	[?]	V
842	Indanthrene Blue GCD	I '14:—478,980 M '19:— ? I '20:—147,620	[Dichlorination]	V

Dyes Derived from Indanthrone (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
843	Indanthrene Blue GC	I '14:— 1,499 I '20:— 4,700	[Dibromination]	V
850	Indanthrene Blue WB	I '14:— 32,957 I '20:— 2,998	[?]	V

Indanthrone-sulfonic Acid

Indanthrene-sulfonic Acid (*C. A. nomen.*)



$=C_{28}H_{14}N_2O_7S=522$

FORMATION.—(1) From 2-amino-anthraquinone-sulfonic acid by fusion with caustic alkali at 200–300° C. (2) By sulfonating indanthrone (obtained by alkaline fusion of 2-amino-anthraquinone)

LITERATURE.—Barnett, Anthracene and Anthraquinone, 352
Thorpe, Dic. Chemistry, **3**, 101 *et seq.*

Dye Derived from Indanthrone-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
840	Indanthrene Blue	I '14:— 6,120 I '20:— 1,702		V

Indigo

Note.—Indigo is of course a dye and not an intermediate. However because of their close mutual connection, it was considered worth while to list together the dyes derived directly from indigo. All of these dyes are also classified by the various intermediates that are used for the manufacture of indigo, namely:—

1. *Phenyl-glycine (2 mols)*
2. *Phenyl-glycine-o-carboxylic Acid (2 mols)*
3. *Thiocarbanilide (2 mols)*
4. *Aniline (2 mols)*
5. *Phthalic anhydride (2 mols)*

Dyes Derived from Indigo

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
874	Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 I '20:—520,347 M '20:— 18,178,231		V
876	Indigo MLB Indigo White		[Reduction]	V
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 I '20:— 5,512 M '20:— 1,395,000	[Sulfonation]	A
878	Indigotine P		[Sulfonation]	A

Dyes Derived from Indigo (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
879	Brom Indigo Rathjen Indigo MLB/RR	I '14:— 53,610 M '20:— ?	[Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	[Bromination]	V
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	[Bromination]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	[Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	[Bromination]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	[Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	[Chlorination]	V
886	Brilliant Indigo BASF/G	I '14:— 12,057	[Chlorination, Bromination]	V
889	Indigo Yellow 3G		Benzoyl Chloride	V
890	Ciba Yellow G	I '14:— 48	Benzoyl Chloride [Bromination]	V

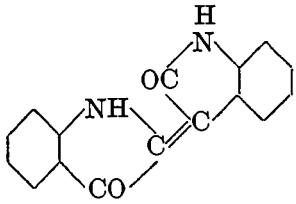
Indigo Red

See, Indirubin

Indirubin (*C. A. nomen.*)

Oxindole-[$\Delta^{3,2'}$]-pseudoindoxyl

Indigo Red



$= C_{16}H_{10}N_2O_2 = 262$

FORMATION.—By reaction of indoxyl on isatin in the " indoxyl melt "

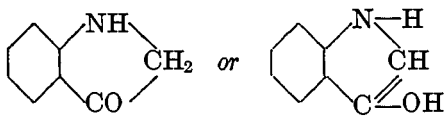
LITERATURE.—Georgievics and Grandmougin, Dye Chemistry, 410
Ger. Pat. 192,682; Frdl. **9**, 533

Dye Derived from Indirubin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
897	Ciba Heliotrope B		[Bromination]	V

Indoxyl (*C. A. nomen.*)

3-Hydroxy-indole



$= C_8H_7NO = 133$

FORMATION.—From phenyl-glycine by fusion with sodamide

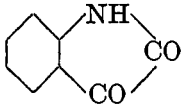
LITERATURE.—Lange, Zwischenprodukte, #2057–2084

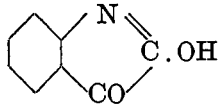
Dye Derived from Indoxyl

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
897	Ciba Heliotrope B		Isatin [Bromination]	V

Isatin (*C. A. nomen.*)

2-Hydroxy-3-pseudoindolone



or


$= C_8H_5NO_2 = 147$

STATISTICS.—Imported '14:—very small
Manufactured '20:— ?

FORMATION.—From indoxyl by oxidation

LITERATURE.—Lange, Zwischenprodukte, #1815, 2023, 2110–2116

Dyes Derived from Isatin

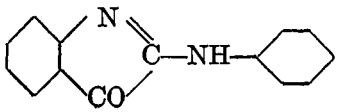
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
897	Ciba Heliotrope B		Indoxyl [Bromination]	V
898	Helindone Violet D		7-Methyl-indoxyl [Bromination]	V
904	Helindone Brown G	I '14.— 13,086 I '20.— 2,200	5-Amino-2-hydroxy-thionaphthene [Bromination]	V
905	Thio Indigo Scarlet R	I '20.— 370	2-Hydroxy-thionaphthene	V
906	Thio Indigo Scarlet G	I '20:— 1,291	2-Hydroxy-thionaphthene [Bromination]	V

2-Isatin Anilide

α-Isatin Anilide

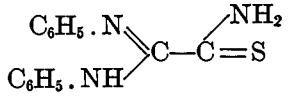
Isatin-2-phenylimide

2-Anilino-3-*p*seudoindolone (*C. A. nomen.*)



$= C_{14}H_{10}N_2O = 222$

FORMATION.—Aniline is condensed with carbon disulfide to thiocarbanilide $(C_3H_5 . NH)_2 CS$, which is treated in solution with potassium cyanide and lead carbonate, resulting in the formation of the corresponding cyanide. This cyanide is reacted with yellow ammonium sulfide (containing $NH_4 . S . S . NH_4$), and a thioamide is formed:



This compound upon being heated with sulfuric acid gives a good yield of 2-isatin anilide

LITERATURE.—Lange, Zwischenprodukte, #2132–2134
Georgievics and Grandmougin, Dye Chemistry, 413

Dyes Derived from 2-Isatin Anilide

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
894	Alizarin Indigo B	I '14:— 402 I '20:— 291	3-Hydroxy-acenaphthene	V
896	Helindone Blue 3GN	I '14:— 622 I '20:— 2,527	1-Hydroxy-anthranol	V
899	Ciba Gray G	I '14:— 675	2-Hydroxy-thionaphthene [Bromination]	V
900	Ciba Violet 3B	I '14:— 2,667	2-Hydroxy-thionaphthene [Bromination]	V
900	Thioindigo Violet K		2-Hydroxy-thionaphthene [Bromination]	V
901	Ciba Violet B	I '14:— 20,836 I '20:— 18,287	2-Hydroxy-thionaphthene [Bromination]	V

Dyes Derived from 2-Isatin Anilide (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
902	Helindone Brown 2R	I '14:— 876 I '20:— 1,778	5-Amino-1-hydroxy-thionaphthene [Bromination]	V
903	Helindone Brown 5R		5-Amino-1-hydroxy-thionaphthene [Bromination]	V

α-Isatin Anilide

See, 2-Isatin Anilide

Isatin-2-phenylimide

See, 2-Isatin Anilide

Isoanthraflavic Acid

2: 7-Dihydroxy-anthraquinone (*not considered herein*)

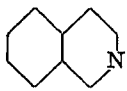
Iso-γ Acid

See, J Acid

Iso-naphthazarin

2: 3-Dihydroxy-1: 4-naphthoquinone (*not considered herein*)

Isoquinoline



$= C_9H_7N = 129$

STATISTICS.—Imported '14:—very small

FORMATION.—Isoquinoline is extracted from coal-tar or prepared by synthetical means

LITERATURE.—Lange, Zwischenprodukte, #1997

Dye Derived from Isoquinoline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
610	QUINOLINE DYE Quinoline Red		Benzo-trichloride Quinaldine	B

J Acid

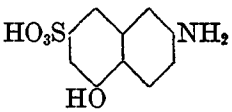
2-Amino-5-naphthol-7-sulfonic Acid

Amino-naphthol-sulfonic Acid J

6-Amino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)

I Acid

Iso-γ Acid



$= C_{10}N_9NO_4S = 239$

STATISTICS.—Imports '14:—1,153 lbs.
Manufactured '20:— ?

FORMATION.—β-Naphthylamine is disulfonated to a mixture of 2-naphthylamine-5:7-disulfonic acid and 2-naphthylamine-6:8-disulfonic acid. The latter is amino-G acid and is a step in the preparation of gamma acid. The former is fused with caustic soda in an autoclave to form J acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 235
Lange, Zwischenprodukte, #2542
Thorpe, Dic. Chemistry, 3, 640

Dyes Derived from J Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
279	Benzo Fast Scarlet	I '14:— 36,674 M '19:— ? I '20:— 24,153	J Acid (2 mols) Phosgene Aniline *or* Toluidine *or* Xylidine *or* β-Naphthylamine *or* Amino-azo-benzene (2 mols)	D
326	Oxamine Violet Oxy Diamine Violet BF	I '14:— 23,981 I '20:— 732	Benzidine J Acid (2 mols)	D
346	Oxamine Red	I '14:— 11,636 I '20:— 848	Benzidine Salicylic Acid	D
385	Oxamine Blue 4R	I '14:— 573 M '20:— ?	Tolidine Nevile-Winther's Acid	D

Juglone

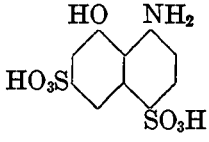
5-Hydroxy-1: 4-naphthoquinone (*not considered herein*)

K Acid[1]

1-Amino-8-naphthol-4: 6-disulfonic Acid

Amino-naphthol-disulfonic Acid K

8-Amino-1-*n*aphthol-3: 5-disulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_7S_2 = 319$

[1] K acid is also occasionally used as trivial name for 1:3- Dihydroxy-naphthalene-3: 5-disulfonic acid.

FORMATION.—Naphthalene is disulfonated to the 1:5 acid, and then further sulfonated to the 1:3:5-trisulfonic acid. This trisulfonic acid while still in the sulfonation mixture is diluted with a little ice, and cooled, and it is then nitrated cold with the theoretical amount of mixed acid. It is reduced with iron, forming 1-naphthylamine-4:6:8-trisulfonic acid, which upon being fused with caustic soda in an autoclave yields the K acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 239
Lange, Zwischenprodukte, #2728
Thorpe, Dic. Chemistry, **3**, 642

Dyes Derived from K Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
43	Tolane Red B, G		Aniline	A
	DISAZO DYES			
215	Blue Black N	I '14:— 2,653	Aniline *p*-Nitro-aniline	A
219	Chrome Patent Green N		Aniline Picramic Acid	ACr
335	Naphthamine Black RE	I '14:— 49,016	Benzidine Gamma Acid	D
338	Naphthamine Blue 2B *or* 3B	I '14:— 11,707 I '20:— 400	Benzidine *or* Tolidine K Acid (2 mols)	D

Kalle's Acid

1-Naphthylamine-2:7-disulfonic Acid (*not considered herein*)

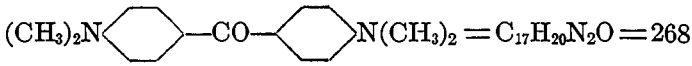
Ketone

Tetramethyl-diamino-benzophenone

p: *p'*-Bis(dimethylamino)-*b*enzophenone (*C. A. nomen.*)

Michler's Ketone

Ketone Base



$= C_{17}H_{20}N_2O = 268$

STATISTICS.—Imported '14:—small amount
Manufactured '17:— ?
Manufactured '18:— 73,208 lbs.
Manufactured '19:—281,057 lbs.
Manufactured '20:— 90,664 lbs.

FORMATION.—From dimethyl-aniline by reaction with phosgene

LITERATURE.—Cain, Intermediate Products (2d Ed.), 103
Lange, Zwischenprodukte, #1382

Dyes Derived from Ketone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AURAMINES			
493	Auramine	I '14:—449,276 M '17:— ? M '18:— 45,634 M '19:—127,567 I '20:— 74,414 M '20:— ?	[Ammonium chloride and Zinc chloride]	B
	TRIPHENYL-METHANE DYES			
516	Crystal Violet	I '14:— 51,872 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,919 M '20:— ?	Dimethyl-aniline	B
522	Victoria Blue 4R	I '14:— 9,599 I '20:— 152	Methyl-phenyl-*a*-naphthylamine	B

Dyes Derived from Ketone (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
527	Acid Violet 4BN	I '14:— 29,184 I '20:— 23,335	Benzyl-methyl-aniline	A
548	Acid Violet 6BN	I '14:— 6,861 I '20:— 5,582	3-Ethoxy-4′-methyl-diphenylamine [Sulfonation]	A
	DIPHENYL-NAPTHYL-METHANE DYES			
558	Victoria Blue R	I '14:— 4,171 I '20:— 97	Ethyl-α-naphthylamine	B
559	Victoria Blue B	I '14:—127,769 M '17:— ? M '18:— ? M '19:— ? I '20:— 11,782 M '20:— ?	Phenyl-α-napthyl-amine	B
561	Acid Violet 5BNS	I '14:— 1,896	Methyl-(Ethyl-) phenyl-β-naphthylamine	A
566	Wool Green S	I '14:— 60,073 M '17:— ? M '19:— ? I '20:—127,764 M '20:—212,362	β-Naphthol [Sulfonation]	A
	ACRIDINE DYE			
607	Rheonine	I '14:— 19,704	*m*-Phenylene-diamine	B

5-Keto-1-(*p*-sulfo-phenyl)-3-Δ^2-pyrazoline-carboxylic Acid (*C. A. nomen.*)

See, 1-(*p*-Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid

Koch's Acid

See, 1-Naphthylamine-3: 6: 8-trisulfonic Acid

L Acid

See, 1-Naphthol-5-sulfonic Acid (*C. A. nomen.*)
See Laurent's Acid
2: 6-Dihydroxy-naphthalene-3-carboxylic Acid (*not considered herein*)

Lambda Acid *or* **λ Acid**

See, 1-Naphthylamine-2-sulfonic Acid

Landschoff and Meyer's Acid

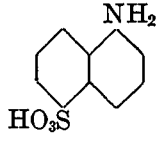
1-Naphthylamine-2: 5-disulfonic Acid (*not considered here*)

Laurent's α Acid

1-Nitro-naphthalene-5-sulfonic Acid (*not considered herein*)

Laurent's Acid

1-Naphthylamine-5-sulfonic Acid
α-Naphthylamine-sulfonic Acid L
5-Amino-1-naphthalene-sulfonic Acid (*C. A. nomen.*)
Naphthalidine-sulfonic Acid
Naphthalidinic Acid
Cleve's α Acid
L Acid
Laurent's Naphthalidinic Acid



$= C_{10}H_9NO_3S = 223$

TISTICS.—Imported '14:— 2,832
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:—294,352

MATION.—(1) From α-naphthylamine by sulfonation with oleum. (2) From α-naphthalene-sulfonic acid by nitration reduction and separation from the 1-naphthylamine-8-sulfonic acid also formed

ERATURE.—Cain, Intermediate Products (2d Ed.), 190
Lange, Zwischenprodukte, #2360–2
Thorpe, Dic, Chemistry, **3**, 590

Dyes Derived from Laurent's Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
53	Archil Substitute 3VN		*p*-Nitro-aniline	A
162	Brilliant Fast Red G		β-Naphthol	A
	DISAZO DYES	I '14:— 69,590	α-Naphthylamine *or*	
265	Sulfoncyanine Black B	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	1-Naphthylamine-6- *and* 7-sulfonic Acids Phenyl-1-naphthyl-amine-8-sulfonic Acid	A
308	Diazo Black B	I '14:— 62,854	Laurent's Acid (2 mols) Benzidine	D
364	Benzopurpurin 6B	I '14:— 9,171 I '20:— 4,743	Laurent's Acid (2 mols) Tolidine	D
	TRISAZO DYE			
480	Congo Brown R	I '14:— 3,045	Benzidine Resorcinol Salicylic Acid	D
	DIPHENYL NAPHTHYL-METHANE DYE			
563	New Patent Blue B	I '14:— 595 I '20:— 1,814	Hydrol [Substitution of NH_2 by SO_3H; Oxidation]	A

Laurent's Naphthalidinic Acid

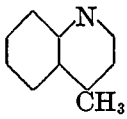
See, Laurent's Acid (1-Naphthylamine-5-sulfonic Acid)

Lepidine (*C. A. nomen.*)

4-Methyl-quinoline (*N = 1*)

γ-Methyl-quinoline

Cincholepidine



$= C_{10}H_9N = 143$

FORMATION.—(1) From cinchonine by distillation with caustic potash. (2) By saturating a mixture of methylal [$CH_2(OCH_3)_2$] and acetone with gaseous hydrochloric acid, and then heating this with aniline and concentrated hydrochloric acid

LITERATURE.—Thorpe, Dic. Chemistry, **4**, 478

Dye Derived from Lepidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	QUINOLINE DYE			
611	Quinoline Blue		Quinoline [Amyl-iodide]	Photography

p-Leucaniline

See, Triamino-triphenyl-methane

Leuco-*iso*-naphthazarin

1:2:3:4-Tetrahydroxy-naphthalene (*not considered herein*)

Leuco-naphthazarin

1:2:5:8-Tetrahydroxy-naphthalene (*not considered herein*)

Leucotrope

Benzyl-dimethyl-phenyl-ammonium Chloride (*not considered herein*)

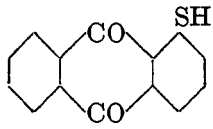
Liebman and Studer's Acid

1-Naphthol-7-sulfonic Acid (*not considered herein*)

M Acid

See, 1-Amino-5-naphthol-7-sulfonic Acid

1-(*or* 2-)Mercapto-*a*nthraquinone



$= C_{14}H_8O_2S = 240$

FORMATION.—By forming mercapto-benzoyl-benzoic acid and then closing the ring

LITERATURE.—Barnett, Anthracene and Anthraquinone, 183, 184
Lange, Zwischenproduckte, #3143–3147, 3527

Dye Derived from 1-(*or* 2-)Mercapto-anthraquinone

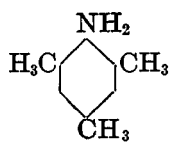
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
869	Algol Brown B	I '14:— 1,596 I '20:— 4,727		V

o-**Mercapto-benzoic Acid** (*C. A. nomen.*)

See, Thio-salicylic Acid

Mesidine (*C. A. nomen.*)

2:4:6-Trimethyl-aniline



$= C_9H_{13}N = 135$

FORMATION.—By the nuclear methylation of aniline, whereby aniline hydrochloride is heated with methanol (methyl alcohol) under pressure at 300–350°. There is formed, in addition to mesidine, *p*- and *o*-toluidine, *m*-xylidine, etc.

LITERATURE.—Ullmann, Enzy. tech. Chemie, **8**, 30

Dye Derived from Mesidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYE			
583	Acid Rosamine A	I '14:— 50 I '20:— 141	Mesidine (2 mols) Resorcinol (2 mols) Phthalic Anhydride [PCl_5; Sulfonation] *or* [Dichloro-fluoresceine; Mesidine (2 mols); Sulfonation]	A

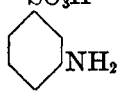
Meta = *m*

Note.—This is not considered in the alphabetical arrangement, e.g. meta-Phenylene-diamine is indexed as m-Phenylene-diamine under "P." However m-Phenylene-diamine precedes p-Phenylene-diamine

Metanilic Acid (*C. A. nomen.*)

m-Amino-benzene-sulfonic Acid

m-Sulfanilic Acid



$= C_6H_7NO_3S = 173$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:—249,922 lbs.
Manufactured '19:—453,137 lbs.
Manufactured '20:—499,304 lbs.

FORMATION.—By sulfonating nitro-benzene with oleum, and reduction with iron

LITERATURE.—Cain, Intermediate Products (2d Ed.), 47
Lange, Zwischenprodukte, #619, 620

Dyes Derived from Metanilic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
134	Metanil Yellow	I '14:—284,606 M'17:— ? M'18:— ? M'19:—477,143 I '20:— 8,456 M'20:—629,437	Diphenylamine	A
135	Metanil Yellow Brominated		Diphenylamine [Bromination]	A
136	Acid Yellow MGS, GG		Diphenylamine [Sulfonation]	A
	DISAZO DYES			
210	Cotton Orange R	I '14:— 16,459 I '20:— 51	Primuline-sulfonic Acid *m*-Phenylene-diamine-disulfonic Acid	D
256	Sulfon Black 3B		α-Naphthylamine Phenyl-1-naphthyl-amine-8-sulfonic Acid	A
257	Sulfoncyanine	I '14:—145,694 M'17: ? M'18:— ? M'19:— ? I '20:— 18,327 M'20:— ?	α-Naphthylamine *or* 1-Naphthylamine-6-*and* 7-sulfonic Acids Phenyl- *or* Tolyl-1-naphthylamine-8-sulfonic Acid	A
258	Naphthalene Acid Black 4B	I '14:— 7,994	1-Naphthylamine-6-*and* 7-sulfonic Acids α-Naphthylamine	A
	TRIPHENYL-METHANE DYE			
542	Agalma Green B	I '14:— 2,294	4-Chloro-3: 5-dinitro-benzene-sulfonic Acid Hydrol	A

Dyes Derived from Metanilic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
738	SULFUR DYE Cotton Black		1-Chloro-2: 4-dinitro-benzene [S+Na_2S]	S

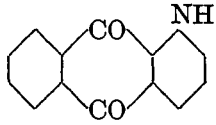
Methoxy-dimethylamino-benzophenone

See, 4-Dimethylamino-3-methoxy-benzophenone (*C. A. nomen.*)

6-Methoxy-*m*-toluidine (*C. A. nomen. $NH_2=1$*)

See, 2-Amino-*p*-cresol Methyl Ether

1-Methylamino-anthraquinone



$= C_{15}H_{11}NO_2 = 237$

FORMATION.—1-Chloro-anthraquinone is reacted with *p*-toluene-sulfon-methyl-amide ($CH_3 . C_6H_4 . SO_2 . NH . CH_3$), splitting off HCl and forming 1-(*p*-toluene-sulfon-methyl-amino)-anthraquinone. This latter readily decomposes in presence of sulfuric acid, forming 1-methylamino-anthraquinone

LITERATURE.—Lange, Zwischenprodukte, #3113, 3115, 3117, 3118, 3476
Barnett, Anthracene and Anthraquinone, 197, etc.

Dye Derived from 1-Methylamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
866	ANTHRAQUINONE AND ALLIED DYE Leucol Dark Green B	I '20:— 120		V

2-Methylamino-8-naphthol-6-sulfonic Acid

See, Methyl-gamma Acid

7-Methylamino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)

See, Methyl-gamma Acid

***N*-Methyl-aniline**

Methyl-aniline

$= C_7H_9N = 107$

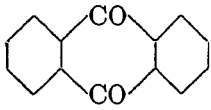
FORMATION.—By heating aniline and methanol (methyl alcohol) in the presence of sulfuric acid in an autoclave; or by heating aniline hydrochloride and methanol in an autoclave

LITERATURE.—Cain, Intermediate Products (2d Ed.), 61
Lange, Zwischenprodukte, #92

USES.—For preparation of ethyl-methyl-aniline and for benzyl-methyl-aniline

2-Methyl-anthraquinone (*C. A. nomen.*)

β-Methyl-anthraquinone



$= C_{15}H_{10}O_2 = 222$

FORMATION.—Phthalic anhydride is dissolved in toluene, and heated with $AlCl_3$ whereby *p*-toluyl-*o*-benzoic acid is formed, which latter, upon being dissolved in oleum and heated, forms the 2-methyl-anthraquinone

LITERATURE.—Cain, Intermediate Products (2d Ed.), 259
Heller and Schülke, Ber. **41**, 3632 (1908)
Cf. Elbs, J. pr. Chem. [II] **33**, 318 (1886)
Cf. Limpricht and Wiegand, Ann. **311**, 178 (1900)

Dyes Derived from 2-Methyl-anthraquinone

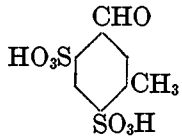
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
759	Anthraflavone G	I '14:— 7,143 I '20:— 2,354	2-Methyl-anthraquinone (2 mols)	V
792	Cibanone Orange R	I '20:— 6,125	[Sulfur]	V
795	Cibanone Yellow R	I '14:— 298 I '20:— 14,032	[Sulfur]	V

β-Methyl-anthraquinone

See, 2-Methyl-anthraquinone

3-Methyl-benzaldehyde-4: 6-disulfonic Acid

4-Formyl-6-methyl-*m*-benzene-disulfonic Acid (*C. A. nomen.*)



$= C_8H_8O_7S_2 = 280$

FORMATION.—Probably by oleum sulfonation of *m*-tolualdehyde (*m*-tolualdehyde can be made by oxidation of *m*-xylene)

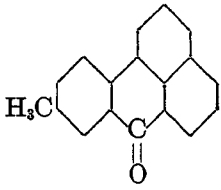
LITERATURE.—Thorpe, Dic Chemistry, **5**, 516
Cf. Lange, Zwischenprodukte, #784

Dyes Derived from 3-Methyl-benzaldehyde-4: 6-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
507	Xylene Blue VS	I '14:— 2,130 I '20:— 27,254	Diethyl-aniline (2 mols) [Oxidation]	A
508	Xylene Blue AS	I '14:— 8,238 I '20:— 5,573	Benzyl-ethyl-aniline (2 mols) [Oxidation]	A

Methyl-benzanthrone

9-Methyl-7-*meso*-benzanthrenone (*C. A. nomen.*)



$= C_{18}H_{12}O = 244$

FORMATION.—By condensation of 2-methyl-anthrone with glycerol and sulfuric acid at about 120° C.

LITERATURE.—Barnett, Anthracene and Anthraquinone, 324
Fr. Pat. 407,593
Cf. Ger. Pat. 209,351. Frdl. **9**, 836

Dyes Derived from Methyl-benzanthrone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
793	Cibanone Blue 3G		[Sulfur]	V
794	Cibanone Black B	I '14:— 2,802	[Sulfur]	V

1-Methyl-2: 4-diamino-benzene-5-sulfonic Acid

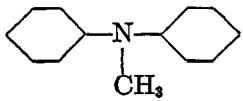
See, 4: 6-Diamino-*m*-toluene-sulfonic Acid (*C. A. nomen. SO₃H = 1*)

1-Methyl-2: 6-diamino-benzene-4-sulfonic Acid

See, 3: 5-Diamino-*p*-toluene-sulfonic Acid (*C. A. nomen. SO₃H = 1*)

***N*-Methyl-*di*phenylamine** (*C. A. nomen.*)

Diphenyl-methyl-amine



$= C_{13}H_{13}N = 183$

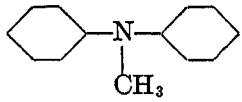
FORMATION.—From diphenylamine by heating with hydrochloric acid and methanol (methyl alcohol) in an autoclave at 250°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 73

Dyes Derived from *N*-Methyl-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
532	Alkali Violet 6B	I '14:— 3,020	Tetraethyl-diamino-benzophenone [Sulfonation]	A
534	Acid Violet 7B	I '14:— 21,665 I '20:— 51	Diethyl-*p*-amino-benzoyl Chloride *N*-Methyl-diphenyl-amine (2 mols)	A
547	Ketone Blue 4BN		Methoxy-dimethyl-amino-benzophenone [Sulfonation]	A

_N_-Methyl-diphenylamine-sulfonic Acid



$= C_{13}H_{13}NO_3S = 263$

FORMATION.—By sulfonation of methyl-diphenylamine

LITERATURE.—Beilstein, Organische Chemie (3 auf.), II spl., 324

Dye Derived from *N*-Methyl-diphenylamine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
533	Acid Violet 7BN		*p*-Dimethylamino-benzoyl chloride *N*-Methyl-diphenyl-amine-sulfonic Acid (2 mols)	A

p:p'-Methylene-bisaniline (*C. A. nomen.*)

See, p:p'-Diamino-diphenyl-methane

p:p'-Methylene-bis(N:N-diethyl-aniline) (*C. A. nomen.*)

See, p:p'-Tetraethyl-diamino-diphenyl-methane

p:p'-Methylene-bis(N:N-dimethyl-aniline) (*C. A. nomen.*)

See, p:p'-Tetramethyl-diamino-diphenyl-methane

4:4'-Methylene-bis(N-methyl-o-toluidine) (*C. A. nomen.*)

See, 4:4'-Dimethyl-diamino-3:3'-ditolyl-methane

4:4'-Methylene-bis-o-toluidine (*C. A. nomen.*)

See, p:p'-Diamino-ditolyl-methane

Methylene-bisxylidine (*C. A. nomen.*)

See, Diamino-dixylyl-methane

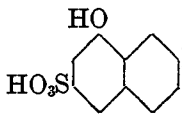
Methyl-ethyl-aniline

See, Ethyl-methyl-aniline

Methyl-gamma Acid

2-Methylamino-8-naphthol-6-sulfonic Acid

7-Methylamino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)



$= C_{11}H_{11}NO_4S = 253$

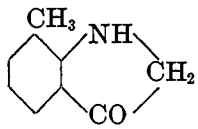
FORMATION.—G salt (Sodium salt of 2-naphthol-6:8-disulfonic acid) is heated in an autoclave with methylamine; and the resulting 2-methylamino-naphthalene-6:8-disulfonic acid is fused with caustic soda in an autoclave, forming methyl-gamma acid. (See Gamma acid)

LITERATURE.—Lange, Zwischenprodukte, #2550

Dye Derived from Methyl-gamma Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
347	DISAZO DYE Diphenyl Brown RN		Benzidine Salicylic Acid	D

7-Methyl-indoxyl



$= C_9H_9NO = 147$

FORMATION.—*o*-Toluidine is reacted with chloro-acetic acid, forming *o*-tolyl-glycine. This body upon fusion with sodamide will in all probability form 7-methyl-indoxy. (There is no direct reference in the literature to 7-methyl-indoxyl)

LITERATURE.—Lange, Zwischenprodukte, #241

Dye Derived from 7-Methyl-indoxyl

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
898	INDIGO GROUP DYE Helindone Violet D		Isatin [Bromination]	V

9-Methyl-7-*meso*-benzanthrenone (*C. A. nomen.*)

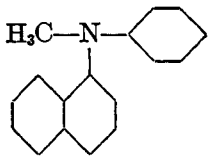
See, Methyl-benzanthrone

***N*-Methyl-*p*-nitroso-aniline** (*C. A. nomen.*)

See, *p*-Nitroso-methyl-aniline

Methyl-phenyl-α-naphthylamine

N-Methyl-*N*-phenyl-1-naphthylamine (*C. A. nomen.*)



$= C_{17}H_{15}N = 233$

FORMATION.—Phenyl-α-naphthylamine is methylated by heating with methanol (methyl alcohol) and hydrochloric acid under pressure

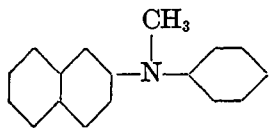
LITERATURE.—Schultz, Chemie des Steinkohlentheers (3 aufl. 1900) **1**, 117

Dye Derived from Methyl-phenyl-α-naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
522	Victoria Blue 4R	I '14:— 9,599 I '20:— 152	Ketone	B

Methyl-(Ethyl-)phenyl-β-naphthylamine

N-Methyl-(Ethyl-)*N*-phenyl-2-naphthylamine (*C. A. nomen.*)



$= C_{17}H_{15}N = 233$

FORMATION.—Phenyl-β-naphthylamine is methylated by heating in an autoclave with methanol (methyl alcohol) and hydrochloric acid

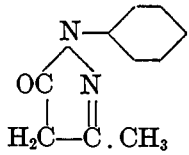
LITERATURE.—Lange, Zwischenprodukte, #2897

Dye Derived from Methyl-(Ethyl-) phenyl-β-naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYE			
561	Acid Violet 5BNS	I '14:— 1,896	Ketone [Sulfonation]	A

3-Methyl-1-phenyl-5-*pyrazolone* (*C. A. nomen.*)

1-Phenyl-3-methyl-5-pyrazolone



$=C_{10}H_{10}N_2O=174$

STATISTICS.—Imported '14:—449 lbs.

FORMATION.—By heating the reaction product of phenyl-hydrazine and aceto-acetic ethyl ester

LITERATURE.—Lange, Zwischenprodukte. #138

Dyes Derived from 3-Methyl-1-phenyl-5-pyrazolone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYES			
21	Pigment Chrome Yellow L		Toluidine	CL
24	Pigment Fast Yellow R		*o*-Toluidine-*m*-sulfonic Acid	CL
26	Dianil Yellow R		Primuline-sulfonic Acid	D
28	Pigment Fast Yellow G	M '19:— ? I '20:— 170	*p*-Sulfo-anthranilic Acid	CL
29	Eriochrome Red B	I '14:— 5,491	1-Amino-2-naphthol-4-sulfonic Acid	CL

2-Methyl-quinoline

See, Quinaldine (*C. A. nomen.*)

4-Methyl-quinoline (*N=1*)

See, Lepidine (*C. A. nomen.*)

α-Methyl-quinoline

See, Quinaldine (*C. A. nomen.*)

γ-Methyl-quinoline

See, Lepidine (*C. A. nomen.*)

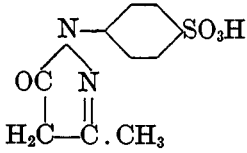
Methyl Resorcinol

See, Resorcinol Methyl Ether

3-Methyl-1-(*p*-sulfo-phenyl)-5-pyrazolone

1-(*p*-Sulfophenyl)-3-methyl-5-pyrazolone

p-(4: 5-Dihydro-5-keto-3-methyl-1-pyrazolyl)-benzene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{10}N_2O_4S = 254$

FORMATION.—(1) By sulfonating 3-methyl-1-phenyl-5-pyrazolone by heating with 4 parts of 30 per cent oleum. (2) By heating phenyl-hydrazine-*p*-sulfonic acid with aceto-acetic ethyl ester in 50 per cent acetic acid solution for few hours

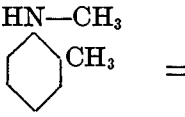
LITERATURE.—Cain, Intermediate Products (2d Ed.), 169
Lange, Zwischenprodukte, #138

Dyes Derived from 3-Methyl-1-(*p*-sulfo-phenyl)-5-pyrazolone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYES			
19	Flavazine L Fast Light Yellow	I '14:— 38,908 I '20:— 9,327	Aniline	A
27	Dianil Yellow 2R		Primuline-sulfonic Acid	D

***N*-Methyl-*o*-toluidine** (*C. A. nomen. NHR=1*)

Methyl-*o*-toluidine



$= C_8H_{11}N = 121$

STATISTICS.—Manufactured '19:— ?

FORMATION.—(1) By heating *o*-toluidine, methanol (methyl alcohol) and hydrochloric acid in an autoclave. (2) By condensing *o*-toluidine and formaldehyde, and reducing to methyl-*o*-toluidine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 60, 70
Cf. Lange, Zwischenprodukte, #128

Dyes Derived from *N*-Methyl-*o*-toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AURAMINE DYE			
494	Auramine G	I '14:— 1,902	Methyl-*o*-toluidine (2 mols) [Formaldehyde, sulfur, ammonium chloride, etc.]	B
	TRIPHENYL-METHANE DYE			
501	Glacier Blue Brilliant Glacier Blue	I '14:— 2,495	Methyl-*o*-toluidine (2 mols) 2:5-Dichloro-benzaldehyde [Oxidation]	B
	AZINE DYE			
684	Brilliant Rhoduline Red		N^3-Ethyl-4-*m*-tolylene-diamine Aniline	B

Michler's Hydrol
See, Hydrol

Michler's Ketone *or* **Base**
See, Ketone

Monochloro-benzene[1]
See, Chloro-benzene

Monoethyl-aniline[1]
See, Ethyl-aniline

Monomethyl-aniline[1]
See, Methyl-aniline

Mononitro-chloro-benzene[1]
See, Chloro-nitro-benzene

Monosulfonic Acid F
See, 2-Naphthol-7-sulfonic Acid

Monosulfo Acid H
1-Amino-8-naphthol-3-sulfonic Acid (*not considered herein*)

Mu Acid
See, 1-Naphthylamine-6-sulfonic Acid

Myrbane Oil
See, Nitro-benzene

Naphtha-
See also, Naphtho-

α-Naphthahydroquinone
1:4-Dihydroxy-naphthalene (*not considered herein*)

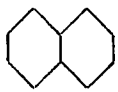
β-Naphthahydroquinone
1:2-Dihydroxy-naphthalene (*not considered herein*)

[1] "Mono" is superfluous and is consequently not recommended.

Naphthalene (*C. A. nomen.*)

Naphthalin

Note.—Naphthalene is a crude and not an intermediate as a rule



$=C_{10}H_8=128$

STATISTICS.—

	Refined Naphthalene Manufactured	*Imported*
Calendar Year 1917:—	35,342,911 lbs.	267,057 lbs.
" " 1918:—	33,701,779 lbs.	2,795 lbs.
" " 1919:—	17,625,235 lbs.	7,650 lbs.
" " 1920:—	30,230,734 lbs.	3,697,562 lbs.

FORMATION.—From coal tar by extraction and purification

LITERATURE.—Thorpe, Dic. Chemistry, **3**, 560

Dyes Derived from Naphthalene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYE			
564	Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	Hydrol	A
	ANTHRAQUINONE AND ALLIED DYES			
758	Sirius Yellow G		Phthalic anhydride	CL

1: 5-Naphthalenediol (*C. A. nomen.*)

See, 1: 5-Dihydroxy-naphthalene

2: 7-Naphthalenediol (*C. A. nomen.*)

See, 2: 7-Dihydroxy-naphthalene

Naphthalene-1: 5- *and* 1: 6-disulfonic Acids

he 1: 5 acid is also called:

Armstrong's Acid

Armstrong's δ Acid

Naphthalene-γ-disulfonic Acid of Armstrong and Wynne

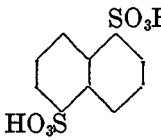
Naphthalene-δ-disulfonic Acid of Beilstein and Schultz

he 1: 6-acid is also called:

Ewer and Pick's Acid

Naphthalene-? : β-disulfonic Acid of Armstrong and Wynne

Naphthalene-γ-disulfonic Acid of Beilstein and Schultz



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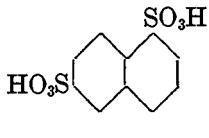


$= C_{10}H_8O_6S_2 = 288$

ORMATION.—The above acids are prepared by sulfonation of naphthalene with five parts of 23 per cent oleum at 60°; or with five parts of ordinary sulfuric acid (66°) using first one part at 180° to form the β-sulfonic acid and then four parts at 95-100° for 20–24 hours

If the 1: 5-acid alone is wanted the conditions of sulfonation are varied slightly, generally starting with the α-sulfonic acid. The separation is effected by crystallizing out the 1: 5 acid or its sodium salt from the diluted sulfonation product

ITERATURE.—Cain, Intermediate Products (2d Ed.), 176, 177
Thorpe, Dic. Chemistry, **3**, 575

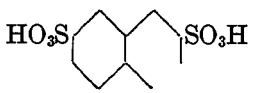
SES.—The mixed acids are used for the preparation of 1-naphthylamine-3: 8- *and* 4: 8-disulfonic acids, and the separation then made

The 1: 5-acid is used for making naphthalene-1: 3: 5-trisulfonic acid

Naphthalene-2: 7-disulfonic Acid

α-Naphthalene-disulfonic Acid (of Ebert and Merz)

Ebert and Merz α Acid



$= C_{10}H_8O_6S_2 = 288$

STATISTICS.—Manufactured 1918, 1919, 1920 in undisclosed quantities

FORMATION.—Sodium 2-naphthalene-sulfonate is further sulfonated by dissolving in about two parts of monohydrate or a larger amount of 66° sulfuric acid, and heating to 180° for 6-8 hours. There is formed principally naphthalene-2: 6- and 2: 7-sulfonic acids, and the separation is effected through the calcium salts, the 2: 6 salt being less soluble

LITERATURE.—Lange, Zwischenprodukte, #2442
Ger. Pat. 61,730
Thorpe, Dic. Chemistry, **3**, 577

Dyes Derived from Naphthalene-2: 7-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYE			
564	Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	Hydrol [Oxidation]	A

Naphthalene-? : β-disulfonic Acid of Armstrong and Wynne

See, Naphthalene-1: 6-disulfonic Acid

Naphthalene-γ-disulfonic Acid of Armstrong and Wynne

See, Naphthalene-1: 5-disulfonic Acid

Naphthalene-δ-disulfonic Acid of Beilstein and Schultz

See, Naphthalene-1: 5-disulfonic Acid

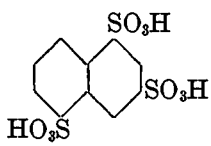
Naphthalene-γ-disulfonic Acid of Beilstein and Schultz

See, Naphthalene-1: 6-disulfonic Acid

α-Naphthalene-disulfonic Acid of Ebert and Merz

See, Naphthalene-2: 7-disulfonic Acid

Naphthalene-1: 3: 5-trisulfonic Acid



$= C_{10}H_8O_9S_3 = 368$

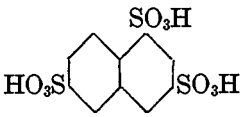
FORMATION.—By sulfonation of naphthalene-1: 5-disulfonic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 179
Thorpe, Dic. Chemistry, **3**, 578

USES.—For preparation of 1-naphthylamine-4: 6: 8-trisulfonic acid

Naphthalene-1: 3: 6-trisulfonic Acid

Trisulfonic Acid



$= C_{10}H_8O_9S_3 = 368$

FORMATION.—By sulfonating naphthalene for some hours at 180° with 24 per cent oleum, or preferably by sulfonating sodium naphthalene-β-sulfonate at a low temperature with forty per cent oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 181
Lange, Zwischenprodukte, #2662
Thorpe, Dic. Chemistry, **3**, 578

USES.—For preparation of 1-naphthol-3:6-disulfonic acid and 1-naphthylamine-3: 6: 8-trisulfonic acid. The latter acid is the last step prior to the manufacture of H acid (1-amino-8-naphthol-3: 6-disulfonic Acid)

Naphthalic Acid

Naphthalene-1: 8-dicarboxylic Acid (*not considered herein*)

Naphthalidam

See, α-Naphthylamine

Naphthalidine

See, α-Naphthylamine

Naphthalidine-sulfonic Acid

See, Laurent's Acid

Naphthalidinic Acid

See, Laurent's Acid

Naphthalin

See, Naphthalene

Naphthapyrogallol

1: 2: 3-Trihydroxy-naphthalene (*not considered herein*)

α-Naphthaquinol

1: 4-Dihydroxy-naphthalene (*not considered herein*)

β-Naphthaquinol

1: 2-Dihydroxy-naphthalene (*not considered herein*)

1: 2-Naphthaquinone

See, 1: 2-Naphthoquinone (*C. A. nomen.*)

α-Naphthaquinone

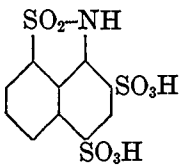
1: 4-Naphthoquinone (*not considered herein*)

β-Naphthaquinone

See, 1: 2-Naphthoquinone

1: 8-Naphthasultam-2: 4-disulfonic Acid

4-Amino-4: 5-sultam-1: 3: 5-naphthalene-trisulfonic Acid (*C. A. nomen.*)



$= C_{10}H_7NO_8S_3 = 365$

FORMATION.—The acid sodium 1-naphthylamine-4: 8-disulfonate is sulfonated with two parts of 40 per cent oleum, and warmed to 80–90°. This warming is continued until a sample no longer diazotizes and does not form a dye with diazotized sulfanilic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 201

USES.—For preparation of 1-amino-8-naphthol-2: 4-disulfonic Acid

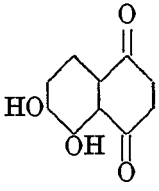
Naphthazarin (*C. A. nomen.*)

5: 6-Dihydroxy-1: 4-naphthoquinone

5: 6-Dihydroxy-α-naphthoquinone

1: 2-Dihydroxy-naphthoquinone

Oxy-juglone



$= C_{10}H_6O_4 = 190$

FORMATION.—Crude dinitro-naphthalene (a mixture of 1: 5- and 1: 8-dinitro-naphthalene) is treated with oleum and sulfur

LITERATURE.—Georgievics and Grandinougin, Dye Chemistry, 333
Cf. Lange, Zwischenprodukte, #2759
Schultz, Farbstofftabellen (1914), #774
Thorpe, Dic. Chemistry, 3, 656, 569

Dyes Derived from Naphthazarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
774	Alizarin Black	I '14:—205,439 I '20:— 17,421	[$NaHSO_3$]	M
775	Alizarin Dark Green W		Phenol	M

1: 2-β-Naphthazoledione (*C. A. nomen.*)

See, β-Naphthisatin

o-Naphthionic Acid

See, 1-Naphthylamine-2-sulfonic Acid

Naphthionic Acid

Naphtholic Acid

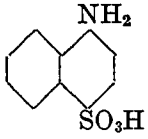
Piria's Acid

1-Naphthylamine-4-sulfonic Acid

1-Amino-naphthalene-4-sulfonic Acid

4-Amino-1-naphthalene-sulfonic Acid (*C. A. numbering*)

Note.—C. A. nomenclature is Naphthionic Acid, but C. A. numbers rom the -SO_3H group, instead of from -NH_2 group, as is the usual procedure



$= C_{10}H_9NO_3S = 223$

TATISTICS.—Manufactured '17:— ?
Manufactured '18:—1,462,216 lbs.
Manufactured '19:—2,008,189 lbs.
Manufactured '20:—3,773,191 lbs.

ORMATION.—By "baking" α-naphthylamine and sulfuric acid plus a little oxalic acid in pans in an oven

ITERATURE.—Cain, Intermediate Products (2d Ed.), 189
Lange, Zwischenprodukte, #2359
Thorpe, Dic. Chemistry, **3**, 590

Dyes Derived from Naphthionic Acid

chultz umber r Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
52	Archil Substitute V		*p*-Nitro-aniline	A
91	Anthracyl Chrome Green AD	I '14:— 4,596 M '18:— ? I '20:— 3,316	Picramic Acid	ACr

Dyes Derived from Naphthionic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
160	Naphthylamine Brown Fast Brown N	I '14:— 68,281 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	α-Naphthol	ACr
161	Fast Red A	I '14:— 46,359 M '17:—191,424 M '18:—242,215 M '19:—267,582 I '20:— 948 M '20:—433,989	β-Naphthol	A
163	Azo Rubine	I '14:—230,763 M '17:—197,621 M '18:— 79,779 M '19:—187,264 I '20:— 1,102 M '20:—470,949	Nevile-Winther's Acid	A
164	Fast Red VR	I '14:— 20,714 M '17:— ? M '18:— ? M '19:— ? I '20:— 6,290 M '20:— ?	1-Naphthol-5-sulfonic Acid	ACr
165	Azo Red A		1-Naphthol-3: 6-disulfonic Acid	A
166	Fast Red E	I '14:— 2,473 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Schaeffer's Acid	A
167	Croceine Scarlet 3BX	I '14:— 13,101 M '17:— ? M '18:— ? M '19:— ? I '20:— 651 M '20:— ?	Croceine Acid	A

Dyes Derived from Naphthionic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
168	Amaranth	I '14:— 86,067 M'17:— 66,069 M'18:— 73,539 M'19:—294,416 I '20:— 110 M'20:—204,958	R Acid	A
169	Cochineal Red A	I '14:— 32,645 M'17:— ? M'18:— ? M'19:—231,519 M'20:—288,945	G Acid	A
170	Ponceau 6R		2-Naphthol-3: 6: 8-trisulfonic Acid	A
171	Chromotrope 8B	M'18:— ?	Chromotropic Acid	A
	DISAZO DYES			
209	Terra Cotta FC	I '14:— 551	Primuline *or* Dehydro-thio-toluidine-sulfonic Acid *m*-Phenylene-diamine	D
213	Fast Brown	I '14:— 3,206 M'17:— ? M'18:— ? M'19:— ? M'20:— ?	Resorcinol Naphthionic Acid (2 mols)	A
264	Fast Sulfon Black F	M'19:— ? I '20:— 2,204 M'20:— ?	H Acid β-Naphthol	A
307	Congo Red	I '14:— 20,629 M'17:— ? M'18:—587,153 M'19:—873,734 M'20:— 1,502,630	Benzidine Naphthionic Acid (2 mols)	D

Dyes Derived from Naphthionic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
309	Glycine Red		Benzidine α-Naphthyl-glycine	D
311	Orange TA	I '14:— 602 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine Cresol	D
312	Congo Corinth G	I '14:— 44,157 M '17:— ? M '18:— ? M '19:—137,704 M '20:—242,503	Benzidine Nevile-Winther's Acid	D
313	Congo Rubine	I '14:— 46,213 M '17:— ? M '18:— ? I '20:— 2,601	Benzidine Croceine Acid	D
340	Benzo Orange R	I '14:— 1,073 M '17:— ? M '18:— 50,422 M '19:— 42,807 I '20:— 220 M '20:— 86,210	Benzidine Salicylic Acid	D
356	Dianol Red 2B	I '14:— 4,422 I '20:— 17,632	Dichloro-benzidine Naphthionic Acid (2 mols)	D
363	Benzo Purpurin 4B	I '14:—351,712 M '17:— ? M '18:—356,522 M '19:—288,021 I '20:— 3,492 M '20:—617,629	Tolidine Naphthionic Acid (2 mols)	D
368	Brilliant Purpurin 4B	I '14:— 6,634	Tolidine Broenner's Acid	D

Dyes Derived from Naphthionic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
369	Brilliant Purpurin R	I '14:— 8,051	Tolidine Amino-R Acid	D
374	Congo 4R Congo Red 4R	M '18:— ?	Tolidine Resorcinol	D
375	Congo Corinth B	I '14:— 2,196 M '19:— ?	Tolidine Nevile-Winther's Acid	D
405	Benzopurpurin 10B	I '14:— 47,768 M '18:— ? M '19:— ? I '20:— 2,205 M '20:— 41,265	Dianisidine Naphthionic Acid (2 mols)	D
407	Azo Violet		Dianisidine Nevile-Winther's Acid	D
	TRISAZO DYES			
479	Dianil Black R		Benzidine Chromotropic Acid *m*-Phenylene-diamine	D
481	Azo Corinth		Tolidine Resorcinol 3-Amino-1-phenol-4-sulfonic Acid	D
	TETRAKISAZO DYES			
487	Benzo Brown B	I '14:— 438 M '20:— ?	*m*-Phenylene-diamine (3 mols) Naphthionic Acid (2 mols)	D
488	Toluylene Brown R	I '14:— 201	3:5-Diamino-*p*-toluene-sulfonic Acid *m*-Phenylene-diamine (2 mols) Naphthionic Acid (2 mols)	D

Dyes Derived from Naphthionic Acid (*continued*)

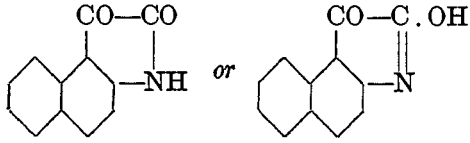
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TETRAKISAZO DYES (*continued*)			
490	Cotton Brown A	I '14:— 29,074	Benzidine *m*-Phenylene-diamine (2 mols) Naphthionic Acid (2 mols)	D
	DIPHENYL-NAPHTHYL--METHANE DYE			
563	New Patent Blue B	I '14:— 595 I '20:— 1,814	Hydrol [Substitution of NH_2 by SO_3H; Oxidation]	A

β-Naphthisatin

2-Naphthisatin

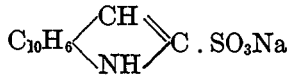
1: 2-β-Naphthazoledione (*C. A. nomen. for keto form*)

1: 2-Diketo-1: 2-dihydro-β-naphthindole

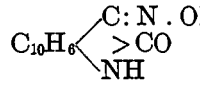


$= C_{12}H_7NO_2 = 197$

FORMATION.—β-Naphthylamine is reacted with glyoxal sodium bisulfite compound forming β-naphthindol-sulfonate



By adding acetic acid and sodium nitrite to a solution of this latter body in warm water, there results isonitroso-naphthoxindole



, which upon being boiled with sulfuric acid forms the β-naphthisatin

LITERATURE.—Beilstein, Organische Chemie (2 auf.) II, 624; II spl. 342
Cf. Lange, Zwischenprodukte, #2965

Dyes Derived from β-Naphthisatin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
891	Ciba Green G	I '14:— 119	β-Naphisatin (2 mols) [Bromination]	V
892	Helindone Green G	I '20:— 1,248	β-Naphthisatin (2 mols) [Bromination]	V

2-Naphthisatin

See, β-Naphthisatin

1-Naphthol

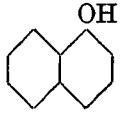
See, α-Naphthol

2-Naphthol

See, β-Naphthol

α-Naphthol

1-Naphthol (*C. A. nomen.*)



$= C_{10}H_8O = 144$

STATISTICS.—Imported '14:—405,578 lbs.
Manufactured '17:— 72,329 lbs.
Manufactured '18:—136,723 lbs.
Manufactured '19:—135,025 lbs.
Manufactured '20:— ?

FORMATION.—(1)Naphthalene is sulfonated cold to α-naphthalene-sulfonic acid, which is then fused with caustic soda to form the α-naphthol. (2) α-Naphthylamine hydrochloride or sulfate is hydrolyzed to α-Naphthol by heating with water in an autoclave

LITERATURE.—Cain, Intermediate Products (2d Ed.), 212
Lange, Zwischenprodukte, #2269–2271
Thorpe, Dic. Chemistry, **3**, 614

Dyes Derived from α-Naphthol

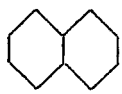
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	NITRO DYES			
6	Martius Yellow	I '14:— 3,295 I '20:— 26	[Dinitration]	A
7	Naphthol Yellow S	I '14:—251,222 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	[Dinitration, Sulfonation]	A
	MONOAZO DYES			
105	Sudan Brown	M '17:— ? M '18:— ? M '19:— ?	α-Naphthylamine	ss
144	Orange I	I '14:— 8,305 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,323 M '20:— 14,684	Sulfanilic Acid	A
160	Naphthylamine Brown Fast Brown N	I '14:— 68,281 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Naphthionic Acid	ACr
172	Fast Brown 3B	I '14:— 1,477	Broenner's Acid	A
180	Erio Chrome Blue Black B	I '14:— 57,000 M '17:— 9,326 M '18:— ? M '19:— ? I '20:— 20,371 M '20:— 29,255	1-Amino-2-naphthol-4-sulfonic Acid	ACr
183	Erio Chrome Black T	I '14:—129,550 M '18:— ? M '19:— ? I '20:— 2,624 M '20:— ?	Nitro-1-amino-2-naphthol-4-sulfonic Acid	ACr

Dyes Derived from α-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
212	Fast Brown G Acid Brown G	I '14:— 17,407 I '20:— 485	Sulfanilic Acid (2 mols)	A
214	Fast Brown O	I '14:— 2,000	Xylidine-sulfonic Acid (2 mols)	A
	INDOPHENOL DYE			
619	Indophenol	M '17:— ? M '18:— ? M '19:—126,611 M '20:— ?	Nitroso-dimethyl-aniline *or* Dimethyl-*p*-phenylene-diamine	V
	SULFUR DYE			
731	Thiophor Indigo CJ		Dimethyl-*p*-phenylene-diamine [S+Na_2S]	S
895				
	INDIGO GROUP DYE			
	Alizarin Indigo 3R	I '20:— 3,514	Dibromo-isatin Chloride	V

β-Naphthol

2-Naphthol (*C. A. nomen.*)



$= C_{10}H_8O = 144$

STATISTICS.—Imported '14:— 1,264,525 lbs.
Manufactured '17:— 5,952,772 lbs.
Manufactured '18:— 5,254,637 lbs.
Manufactured '19:— 4,916,416 lbs.
Manufactured '20:—11,920,714 lbs.

FORMATION.—Naphthalene is sulfonated to β-naphthalene-sulfonic acid; this is fused with caustic soda, and the resulting β-naphthol is isolated and purified

LITERATURE.—Cain, Intermediate Products (2d Ed.), 212
Thorpe, Dic. Chemistry, **3**, 614, 622

Dyes Derived from β-Naphthol

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	NITROSO DYE			
2	Gambine Y Fast Printing Green		[Nitroso-derivative]	M
	MONOAZO DYES			
36	Sudan I Oil Orange	I '14:— 4,554 M '17:— 32,455 M '18:— 29,670 M '19:— 75,868 M '20:—116,624	Aniline	ss
46	*m*-Nitraniline Orange		*m*-Nitro-aniline	MF
56	Paranitraniline Red	I '14:—49,847 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	*p*-Nitro-aniline	MF
72	Pigment Orange R		*p*-Nitro-*o*-toluidine	CL MF
73	Pigment Fast Red HL Lithol Fast Scarlet R Helio Fast Red RL	I '14:— 49,708 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,001 M '20:— ?	*m*-Nitro-*p*-toluidine	CL
74	Tannin Orange R	I '14:— 2,202 I '20:— 347	*o*- *and p*-Amino-benzyl-dimethyl-amine	B
76	Sudan II	I '14:— 501 M '17:— 27,595 M '18:— 23,692 M '19:— ? M '20:—170,658	Xylidine	ss
86	Azarine S		2-Amino-4: 6-dichloro-phenol	M
93	Pigment Purple A Sudan R	I '14:— 99	*o*-Anisidine	CL

Dyes Derived from β-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
97	Chloranisidine Scarlet		Chloro-anisidine	MF
98	Naphthol Pink Nitrosamine Pink BX	I '14:— 99	*p*-Nitro-*o*-anisidine	MF
99	Tuscaline Orange G		*m*-Nitro-*o*-anisidine	CL MF
106	Carmine Naphth Garnet Autol Red RL	I '14:— 6,565 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	α-Naphthylamine	CL
115	Azo Turkish Red		β-Naphthylamine	MF
126	Indoin Blue R Union Blue R	I '14:— 15,353 M '17:— ? M '18:— ?	Safranine *or* *m*-Tolylene-diamine *o*-Toluidine Aniline	B
131	Permanent Orange R		2-Amino-6-chloro-benzene-sulfonic Acid	CL
132	Lake Red P	I '14:— 60,345 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,750	*p*-Nitro-aniline-*o*-sulfonic Acid	CL
145	Orange II	I '14:—128,877 M '17:—712,586 M '18:—916,890 M '19:— 1,133,925 I '20:— 2,265 M '20:— 1,850,341	Sulfanilic Acid	A

Dyes Derived from β-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
148	Fast Orange O	I '14:— 1,250 M '17:— ?	*o*-Nitro-aniline-*p*-sulfonic Acid	CL
151	Orange T and RO	I '14:— 90,747 M '17:— ? M '19:— ? I '20:— 20 M '20:— ?	*o*-Toluidine-*m*-sulfonic Acid	A
153	Lake Red C	I '14:—306,607 M '19:— ? I '20:— 4,105 M '20:— ?	2-Chloro-5-toluidine-4-sulfonic Acid	CL
156	Acid Alizarin Violet N Palatine Chrome Violet	I '14:— 1,199 M '19:— ? M '20:— ?	*o*-Amino-phenol-*p*-sulfonic Acid	ACr
159	Acid Alizarin Black R	I '14:— 16,800 M '19:— ? I '20:— 439 M '20:— ?	2-Amino-6-nitro-1-phenol-4-sulfonic Acid	M
161	Fast Red A	I '14:— 46,359 M '17:—191,424 M '18:—242,215 M '19:—267,582 I '20:— 948 M '20:—433,989	Naphthionic Acid	A
162	Brilliant Fast Red G		Laurent's Acid	A
173	Lithol Red R	I '14:—281,963 M 17:— ? M '18:—353,104 M '19:—269,169 M '20:— ?	2-Naphthylamine-1-sulfonic Acid	CL

Dyes Derived from β-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
174	Double Brilliant Scarlet	I '14:—210,429 M '17:— ? M '20:— ?	Broenner's Acid	A
175	Ponceau for Silk	I '14:— 727	2-Naphthylamine-8-*and* 5-sulfonic Acids	A
181	Palatine Chrome Black 6B Salicine Black U	I '14:—248,721 M '17:— ? M '18:—469,159 M '19:—739,372 M '20:— 2,001 M '20:— 1,074,248	1-Amino-2-naphthol-4-sulfonic Acid	ACr
184	Erio Chrome Black A	I '14:— 96,570 M '17:— ? M '18:— ? M '19:—686,700 I '20:— 14,262 M '20:— ?	Nitro-1-amino-2-naphthol-4-sulfonic Acid	ACr
185	Anthracene Chrome Black	I '14:— 51,577 I '20:— 2,339	2-Amino-3-naphthol-6-sulfonic Acid	M
193	Clayton Cloth Red Stanley Red	I '14:— 100 M '18:— ? M '19:— ? M '20:— ?	Dehydro-thio-*p*-toluidine-sulfonic Acid	A
200	Lake Red D	I '14:— 2,428 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Anthranilic Acid	CL
	DISAZO DYES			
223	Sudan III	I '14:— 2,409 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Amino-azo-benzene	ss MF

Dyes Derived from β-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
232	Sudan IV	I '14:— 51 M '17:— 13,334 M '18:— 14,904 M '19:— ? M '20:— ?	*o*-Amino-azo-toluene	ss MF
239	Azotol C		Amino-chrysoidine *or* *p*-Amino-acetanilide *and* *m*-phenylene-diamine *or* *N*-Dimethyl-*p*: *p'*-diamino-azo-benzene	MF
240	Janus Red B	I '14:— 250 I '20:— 176	*m*-Amino-phenyl-trimethyl-ammonium Chloride *m*-Toluidine	B
246	Cloth Scarlet G	I '14:— 9 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Amino-azo-benzene-sulfonic Acid	A
247	Double Scarlet Scarlet EC	I '14:— 39,522 M '17:— ? M '18:— 74,203 M '19:— ? M '20:— ?	Amino-azo-benzene-disulfonic Acid	A
252	Cloth Scarlet R		*o*-Amino-azo-toluene-sulfonic Acid	M
260	Erio Chrome Verdon A	I '14:— 882	Sulfanilic Acid *m*-Amino-*p*-cresol	ACr
264	Fast Sulfon Black F	M '19:— ? I '20:— 2,204 M '20:— ?	Naphthionic Acid H Acid	A

Dyes Derived from β-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
271	Diamine Blue 6G		Amino-G Acid 1-Amino-2-naphthol Ethyl Ether	D
288	Acid Alizarine Black SE Palatine Chrome Black F	I '14:— 19,185 I '20:— 34,302	2: 6-Diamino-phenol-4-sulfonic Acid β-Naphthol (2 mols)	ACr
289	Acid Alizarine Black SN Palatine Chrome Black S	M '17:— ? M '18:— ? M '19:— ?	2: 6-Diamino-phenol-4-sulfonic Acid Schaeffer's Acid	ACr
318	Benzidine Puce		Benzidine β-Naphthol (2 mols)	MF
322	Trisulfon Violet B	I '14:— 1,124 M '17:— ? M '18:— ? M '19:— ? I '20:— 7,927 M '20:— ?	Benzidine 1-Naphthol-3: 6: 8-trisulfonic Acid	D
378	Trisulfon Blue R	I '14:— 911 M '19:— ? M '20:— ?	1-Naphthol-3: 6: 8-trisulfonic Acid Tolidine	D
400	Milling Scarlet 4R Acid Anthracene Red 3B	I '14:— 18,330 I '20:— 2,336	o-Tolidine-disulfonic Acid β-Naphthol (2 mols)	A
406	Diazurine B		Dianisidine 1-Naphthylamine-6-sulfonic Acid (2 mols) β-Naphthol (2 mols on fiber)	D

Dyes Derived from β-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
408	Dianisidine Blue	I '14:— 240	Dianisidine β-Naphthol (2 mols)	D
409	Trisulfon Blue C	I '14:— 813	Dianisidine 1-Naphthol-3: 6: 8-trisulfonic Acid	D
419	Chicago Blue RW	I '14:— 15,176 M '19:— ? I '20:— 351 M '20:— ?	Dianisidine 1-Amino-8-naphthol-2: 4-disulfonic Acid	D
434	Coomassie Navy Blue	I '20:— 42,357	1: 4-Naphthylene-diamine-2-sulfonic Acid R Acid	A
	DIPHENYL-NAPHTHYL-METHANE DYE			
566	Wool Green S	I '14:— 60,073 M '17:— ? M '19:— ? I '20:—127,764 M '20:—212,362	Ketone [Sulfonation]	A
	OXAZINE DYES			
649	New Blue R Meldola's Blue Cotton Blue	I '14:— 32,509 M '17:— ? M '18:— 22,613 M '19:— ? I '20:— 5,240 M '20:— ?	Nitroso-dimethyl-aniline	B
650	New Blue B		Nitroso-dimethyl-aniline (2 mols)	B

Dyes Derived from β-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES (*continued*)			
651	New Methylene Blue GG		Nitroso-dimethyl-aniline [Dimethyl-amine, Oxidation] *or* [Meldola's Blue, Dimethyl-amine, Oxidation]	B
652	New Fast Blue F	I '14:— 2,502	Nitroso-dimethyl-aniline Hydrol *or* [Meldola's Blue; Hydrol]	B

α-Naphthol-carboxylic Acid

See, 1-Hydroxy-2-naphthoic Acid

β-Naphthol-carboxylic Acid

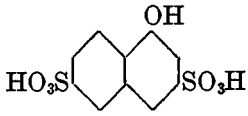
See, 3-Hydroxy-2-naphthoic Acid

1-Naphthol-3: 6-disulfonic Acid (*C. A. nomen.*)

R G Acid

G R Acid

α-Naphthol-disulfonic Acid R G



$= C_{10}H_8O_7S_2 = 304$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—(1) By fusing sodium naphthalene-1:3:6-trisulfonate with half its weight of caustic soda and half its weight of water in an autoclave. (2) By diazotizing 1-naphthylamine-3:6-disulfonic acid and adding to boiling dilute sulfuric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 218
Lange, Zwischenprodukte, #2636
Thorpe, Dic. Chemistry, **3**, 619

Dyes Derived from 1-Naphthol-3:6-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
64	Azo Acid Red B Lanafuchsine	I '14:— 78,305 M'17:— ? M'18:— ? M'19:— 15,272 I '20:— 674 M'20:— ?	*p*-Amino-acetanilide	A
81	Palatine Scarlet A Brilliant Cochineal 2R	I '14:— 7,510	*m*-Xylidine	A
109	Palatine Red A	I '14:— 300 M'18:— ? M'19:— ?	α-Naphthylamine	A
165	Azo Red A		Naphthionic Acid	A
	DISAZO DYES			
225	Croceine AZ	I '14:— 500 I '20:— 100	Amino-azo-benzene	A

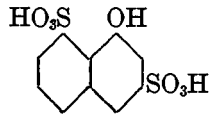
1-Naphthol-3:8-disulfonic Acid (*C. A. nomen.*)

Andresen's Acid

ε-Acid *or* Epsilon Acid

α-Naphthol-ε-disulfonic Acid

Disulfo Acid E



$= C_{10}H_8O_7S_2 = 304$

STATISTICS.—Manufactured '20:— ?

FORMATION.—Heat a solution of the acid sodium salt of 1-naphthylamine-3: 8-disulfonic acid in an autoclave for 5 hours at 180°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 219
Lange, Zwischenprodukte, #2638, 2639
Thorpe, Dic. Chemistry, **3**, 619

Dyes Derived from 1-Naphthol-3: 8-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
100	Eosamine B	I '14:— 1,914 I '20:— 1,600	*m*-Amino-*p*-cresol-methyl ether	A
117	Erica 2 GN	I '14:— 1,171 M '19:— ? I '20:— 337	Dehydro-thio-*p*-toluidine	D
121	Erica B	I '14:— 5,349 M '19:— ? I '20:— 2,393	Dehydro-thio-*m*-xylidine	D
	DISAZO DYES			
325	Columbia Blue R	I '14:— 3,071	Benzidine 1-Amino-8-naphthol-4-sulfonic Acid	D
387	Columbia Blue G	I '14:— 7,094	Tolidine 1-Amino-8-naphthol-4-sulfonic Acid	D
	TRISAZO DYES			
451	Congo Fast Blue R	I '14:— 4,449 M '18:— ? I '20:— 723	Tolidine α-Naphthylamine 1-Naphthol-3: 8-disulfonic Acid (2 mols)	D
456	Congo Fast Blue B Benzo Fast Blue B	I '14:—100,495 I '20:— 1,821	Dianisidine α-Naphthylamine 1-Naphthol-3: 8-disulfonic Acid (2 mols	D

1-Naphthol-4: 8-disulfonic Acid (*C. A. nomen.*)

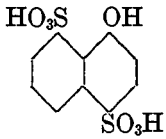
Schoellkopf's Acid

α-Naphthol-disulfonic Acid Sch

α-Naphthol-δ-disulfonic Acid

α-Naphthol-disulfonic Acid S

S Acid



$= C_{10}H_8O_7S_2 = 304$

STATISTICS.—Manufactured '19:— ?

FORMATION.—From 1-naphthylamine-4: 8-disulfonic acid by diazotizing and running this diazo solution into dilute sulfuric acid. This latter is now boiled to complete the decomposition

LITERATURE.—Cain, Intermediate Products (2d Ed.), 219
Lange, Zwischenprodukte, #2647
Thorpe, Dic. Chemistry, **3**, 620

Dyes Derived from 1-Naphthol-4: 8-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
80	Wool Scarlet R	I '14:— 39,888	Xylidine	A
95	Azo Cochineal Cochineal Scarlet B	I '14:— 952	*o*-Anisidine	A
110	Buffalo Rubine		α-Naphthylamine	A
118	Geranine	I '14:— 18,917 M '19:— ? I '20:— 527	Dehydro-thio-*p*-toluidine	D
	DISAZO DYES			
226	Croceine B		Amino-azo-benzene	A
235	Croceine 3B	M '19:— ? M '20:— ?	Amino-azo-toluene	A
321	Heliotrope 2B	I '14:— 1,473 I '20:— 60	Benzidine Croccine Acid	D

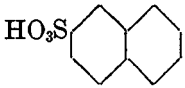
2-Naphthol-3: 6-disulfonic Acid

See, R Acid

2-Naphthol-3: 7-disulfonic Acid (*C. A. nomen.*)

β-Naphthol-δ-disulfonic Acid

β-Naphthol-disulfonic Acid F



$= C_{10}H_8O_7S_2 = 304$

FORMATION.—2-Naphthol-7-sulfonic acid is heated with 66° sulfuric acid for a considerable time at 120°

LITERATURE.—Lange, Zwischenprodukte, #2653, 2654
Thorpe, Dic. Chemistry, **3**, 627

Dye Derived from 2-Naphthol-3: 7-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
402	DISAZO DYE Diamine Blue Black E		Ethoxy-benzidine Gamma Acid	D

2-Naphthol-6: 8-disulfonic Acid

See, G Acid

α-Naphthol-δ-disulfonic Acid

See, 1-Naphthol-4: 8-disulfonic Acid

α-Naphthol-ε-disulfonic Acid

See, 1-Naphthol-3: 8-disulfonic Acid

α-Naphthol-disulfonic Acid GR

See, 1-Naphthol-3: 6-disulfonic Acid

α-Naphthol-disulfonic Acid RG

See, 1-Naphthol-3: 6-disulfonic Acid

α-Naphthol-disulfonic Acid S

See, 1-Naphthol-4: 8-disulfonic Acid

α-Naphthol-disulfonic Acid Sch

See, 1-Naphthol-4: 8-disulfonic Acid

β-Naphthol-α-disulfonic Acid

See, R Acid

β-Naphthol-β-disulfonic Acid

See, G Acid

β-Naphthol-γ-disulfonic Acid

See, G Acid

β-Naphthol-δ-disulfonic Acid

See, 2-Naphthol-3: 7-disulfonic Acid

β-Naphthol-disulfonic Acid C

2-Naphthol-4: 8-disulfonic Acid (*not considered herein*)

β-Naphthol-disulfonic Acid F

See, 2-Naphthol-3: 7-disulfonic Acid

β-Naphthol-disulfonic Acid G

See, G Acid

β-Naphthol-disulfonic Acid R

See, R Acid

Naphtholic Acid

See, Naphthionic Acid

1-Naphthol-4-sulfonic Acid

See, Nevile-Winther's Acid

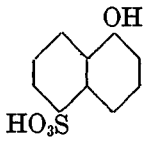
1-Naphthol-5-sulfonic Acid (*C. A. nomen.*)

L Acid

Cleve's Acid

α-Naphthol-sulfonic Acid C

α-Naphthol-sulfonic Acid L



$= C_{10}H_8O_4S = 224$

STATISTICS.—Imported '14:—25,126 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—(1) From naphthalene-1: 5-disulfonic acid by fusion with caustic soda. (2) From 1-naphthylamine-5-sulfonic acid by diazotizing, and boiling the diazo solution with dilute sulfuric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 218
Lange, Zwischenprodukte, #2422–2424
Thorpe, Dic. Chemistry, **3**, 617

Dyes Derived from 1-Naphthol-5-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
78	Cochineal Scarlet 4R		Xylidine	A
108	Double Ponceau R		α-Naphthylamine	A
164	Fast Red VR	I '14:— 20,714 M '17:— ? M '18:— ? M '19:— ? I '20:— 6,290 M '20:— ?	Naphthionic Acid	ACr

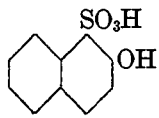
Dyes Derived from 1-Naphthol-5-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
275	Diamond Black F	I '14:—462,306 M '17:— ? M '18:— ? M '19:—222,938 I '20:— 2,226 M '20:— ?	Amino-salicylic Acid α-Naphthylamine	ACr
411	Benzoazurine 3G	I '20:— 201	Dianisidine 1-Naphthol-5-sulfonic Acid (2 mols)	D

2-Naphthol-1-sulfonic Acid

Tobias Acid

(*Falsely called* β-naphthyl-sulfuric Acid)



$= C_{10}H_8O_4S = 224$

STATISTICS.—Manufactured in 1918, 1919, 1920 in indeterminate amounts

FORMATION.—By sulfonating β-naphthol with 2–2½ parts of 90–92 per cent sulfuric acid at about 40°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 222
Lange, Zwischenprodukte, #2427
Thorpe, Dic. Chemistry, **3**, 624

USES.—For preparation of 2-naphthylamine-1-sulfonic acid

2-Naphthol-6-sulfonic Acid

See, Schaeffer's Acid

2-Naphthol-7-sulfonic Acid (*C. A. nomen.*)

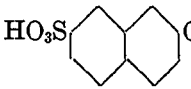
β-Naphthol-δ-sulfonic Acid

β-Naphthol-sulfonic Acid F

F Acid

Monosulfonic Acid F

Cassella's Acid



$= C_{10}H_8O_4S = 224$

STATISTICS.—Imported '14:—1,996 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By fusing sodium naphthalene-2: 7-disulfonate with caustic soda solution in an autoclave

LITERATURE.—Cain, Intermediate Products (2d Ed.), 224
Lange, Zwischenprodukte, #2434
Thorpe, Dic. Chemistry, **3**, 625

Dyes Derived from 2-Naphthol-7-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
56	MONOAZO DYE Paranitraniline Red	I '14:— 49,847 M '17:— ? M '18:— ? M '19:— ?	*p*-Nitro-aniline [β-Naphthol]	MF

2-Naphthol-8-sulfonic Acid

See, Croceine Acid

α-Naphthol-sulfonic Acid δ

1-Naphthol-8-sulfonic Acid (*not considered herein*)

α-Naphthol-sulfonic Acid C

See, 1-Naphthol-5-sulfonic Acid

α-Naphthol-sulfonic Acid L

See, 1-Naphthol-5-sulfonic Acid

α-Naphthol-sulfonic Acid NW

See, Nevile-Winther's Acid

α-Naphthol-sulfonic Acid S

1-Naphthol-8-sulfonic Acid (*not considered herein*)

β-Naphthol-α-sulfonic Acid of Armstrong and Schultz

See, Schaeffer's Acid

β-Naphthol-α-sulfonic Acid (*of Bayer & Co.'s patents*)

See, Croceine Acid

β-Naphthol-β-sulfonic Acid

See, Schaeffer's Acid

β-Naphthol-γ-sulfonic Acid

2-Naphthol-5-sulfonic Acid (*not considered herein*)

β-Naphthol-δ-sulfonic Acid

See, 2-Naphthol-7-sulfonic Acid

β-Naphthol-sulfonic Acid B

See, Croceine Acid

β-Naphthol-sulfonic Acid F

See, 2-Naphthol-7-sulfonic Acid

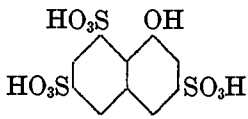
β-Naphthol-sulfonic Acid S

See, Schaeffer's Acid

β-Naphthol-sulfonic Acid Schaeffer

See, Schaeffer's Acid

1-Naphthol-3: 6: 8-trisulfonic Acid (*C. A. nomen.*)



$= C_{10}H_8O_{10}S_3 = 384$

STATISTICS.—Imported '14:—6,443 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—From 1-naphthylamine-3: 6: 8-trisulfonic acid by diazotizing in the presence of a large excess of sulfuric acid and then boiling and purifying

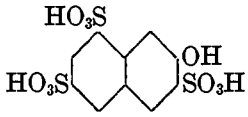
LITERATURE.—Cain, Intermediate Products (2d Ed.), 221
Lange, Zwischenprodukte, #2785, 2786
Thorpe, Dic. Chemistry, 3, 621

Dyes Derived from 1-Naphthol-3: 6: 8-trisulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
322	Trisulfon Violet B	I '14:— 1,124 M '17:— ? M '18:— ? M '19:— ? I '20:— 7,927 M '20:— ?	Benzidine β-Naphthol.	D
378	Trisulfon Blue R	I '14:— 911 M '19:— ? M '20:— ?	Tolidine β-Naphthol	D
409	Trisulfon Blue B	I '14:— 813	Dianisidine β-Naphthol	D

2-Naphthol-3: 6: 8-trisulfonic Acid (*C. A. nomen.*)

β-Naphthol-trisulfonic Acid



$= C_{10}H_8O_{10}S_3 = 384$

STATISTICS.—Manufactured '19:— ?

FORMATION.—From β-naphthol by sulfonation with 2 parts of concentrated sulfuric acid at 70–80°, then with 2 more parts of concentrated sulfuric acid at 120°, and finally with 2 parts of 40 per cent oleum at 150°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 229
Lange, Zwischenprodukte, #2792
Thorpe, Dic. Chemistry, **3**, 628
Ullmann, Enzy. tech. Chemie, 8, 351

Dyes Derived from 2-Naphthol-3: 6: 8-trisulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
170	Ponceau 6R		Naphthionic Acid	A
	DISAZO DYE			
228	Ponceau 5R	I '14:— 2,880	Amino-azo-benzene	A
	Erythrine P	M '17:— ?		
		M '18:— ?		

β-Naphthol-trisulfonic Acid

See, 2-Naphthol-3: 6: 8-trisulfonic Acid

α-Naphthol-trisulfonic Acid S

1-Naphthol-2: 4: 8-trisulfonic Acid (*not considered herein*)

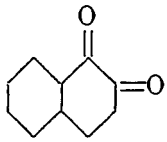
Naphtho-picric Acid

2: 4: 5-Trinitro-1-naphthol (*not considered herein*)

1: 2-Naphthoquinone (*C. A. nomen.*)

β-Naphthaquinone

1: 2-Naphthaquinone



$= C_{10}H_6O_2 = 158$

FORMATION.—From Orange II as follows: Sulfanilic acid is diazotized and coupled with β-naphthol to form Orange II. This azo dye is reduced with stannous chloride to 1-amino-2-naphthol, which is oxidized with sodium bichromate and sulfuric acid to β-naphthoquinone

LITERATURE.—Thorpe, Dic. Chemistry, **3**, 654
Lange, Zwischenprodukte, #23, 648, 2408

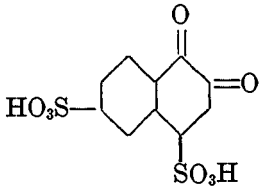
Dye Derived from 1: 2-Naphthoquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	THIAZINE DYE			
667	Brilliant Alizalin Blue G Indochromine T	I '14 — 19,481 M '19 — ? I '20.— 3,214 M '20 — ?	Ethyl-sulfobenzyl-*p*-phenylene-diamine-thiosulfonic Acid	M

1: 2-Naphthoquinone-4: 6-disulfonic Acid

β-Naphthoquinone-4: 6-disulfonic Acid

3: 4-Dihydro-3: 4-diketo-1: 7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)



$= C_{10}H_6O_8S_2 = 318$

FORMATION.—1-Nitroso-2-naphthol-6-sulfonic acid is treated with bisulfite forming 1-amino-2-naphthol-4: 6-disulfonic acid. This latter body is now oxidized with nitric acid under 15°, resulting in 1: 2-naphthoquinone-4: 6-disulfonic acid

LITERATURE.—Ullmann, Enzy. tech. Chemie, **8**, 358
Cf. Lange, Zwischenprodukte, #2408
Thorpe, Dic. Chemistry, **3**, 657

Dyes Derived from 1: 2-Naphthoquinone-4: 6-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	THIAZINE DYES			
666	Indochromogen S		Diethyl-*p*-phenylene-diamine-thiosulfonic-Acid	M
667	Brilliant Alizarin Blue G Indochromine T	I '14:— 19,481 M '19:— ? I '19:— 3,214 M '20:— ?	Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid	M

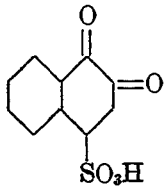
β-Naphthoquinone-4: 6-disulfonic Acid

See, 1: 2-Naphthoquinone-4: 6-disulfonic Acid

1: 2-Naphthoquinone-4-sulfonic Acid

β-Naphthoquinone-4-sulfonic Acid

3: 4-Dihydro-3: 4-diketo-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_6O_5S = 238$

FORMATION.—2-Amino-1-naphthol-4-sulfonic acid or 1-amino-2-naphthol-4-sulfonic acid is oxidized with nitric acid

LITERATURE.—Ullmann, Enzy. tech. Chemie, **8**, 358
Thorpe, Dic. Chemistry, **3**, 657
Cf. Lange, Zwischenprodukte, #2631

Dyes Derived from 1: 2-Naphthoquinone-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*		*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES				
656	Alizarin Green G	M '19:—	?	1-Amino-2-naphthol-6-sulfonic Acid	M
657	Alizarin Green B	I '14:—	551	2-Amino-1-naphthol-4-sulfonic Acid	M

β-Naphthoquinone-4-sulfonic Acid

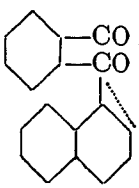
See, 1: 2-Naphthoquinone-4-sulfonic Acid

Naphtho-resorcin

1: 3-Dihydroxy-naphthalene (*not considered herein*)

Naphthoyl-benzoic Acid

o-1-Naphthoyl-*benzoic* Acid (*C. A. nomen.*)



$= C_{18}H_{12}O_3 = 276$

FORMATION.—From phthalic anhydride and naphthalene by heating together in the presence of benzene and aluminium chloride

LITERATURE.—Lange, Zwischenprodukte, #2812
Schultz, Farbstofftabellen (1914), #758

Dye Derived from Naphthoyl-benzoic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
758	Sirius Yellow G			CL

Naphthsultam-disulfonic Acid S

1-Naphthylamine-2:4:8-trisulfonic Acid (*not considered herein*)

1-Naphthylamine

See, α-Naphthylamine

2-Naphthylamine

See, β-Naphthylamine

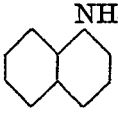
α-Naphthylamine

1-Naphthylamine (*C. A. nomen.*)

α-Amino-naphthalene

Naphthalidam

Naphthalidine



$= C_{10}H_9N = 143$

STATISTICS.—Imported '14:— 112,226 lbs.
Manufactured '17:—3,516,686 lbs.
Manufactured '18:—2,671,601 lbs.
Manufactured '19:—1,552,828 lbs.
Manufactured '20:—5,177,547 lbs.

FORMATION.—Naphthalene is mononitrated, using mixed acid, and the resulting α-nitro-naphthalene is reduced with iron and hydrochloric acid to α-naphthylamine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 181
Lange, Zwischenprodukte, #2262
Thorpe, Dic. Chemistry, 3, 586

Dyes Derived from α-Naphthylamine

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	MONOAZO DYES			
105	Sudan Brown	M'17:— ? M'18:— ? M'19:— ?	α-Naphthol	ss
106	Carmine Naphth Garnet Autol Red RL	I '14:— 6,565 M'17:— ? M'18:— ? M'19:— ? M'20:— ?	β-Naphthol	CL
107	Sulfamine Brown A	I '14:— 132 M'18:— ? M'19:— ? I '20:— 2,630 M'20:— ?	Nitroso-β-naphthol	M
108	Double Ponceau R		1-Naphthol-5-sulfonic Acid	A
109	Palatine Red A	I '14:— 300 M'18:— ? M'19:— ?	1-Naphthol-3: 6-disulfonic Acid	A
110	Buffalo Rubine		1-Naphthol-4: 6-disulfonic Acid	A
111	Fast Red BT	M'17:— ? M'18:— ? M'19:— ?	Schaeffer's Acid	A
112	Fast Red B Bordeaux B	I '14:— 25,821 M'17:—120,595 M'18:—200,415 M'19:—161,862 I '20:— 7,882 M'20:—217,406	R Acid	A
113	Crystal Ponceau	I '14:— 628	G Acid	A
114	Chromotrope 10B	M'19:— ?	Chromotropic Acid	A

Dyes Derived from α-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
218	Nigrophor B A S F		1-Amino-8-naphthol-5-sulfonic Acid 2: 5-Dichloro-aniline	MF
220	Palatine Black A	I '14:—299,274 I '20:— 200	1-Amino-8-naphthol-4-sulfonic Acid Sulfanilic Acid	A
241	Neutral Gray G	I '14:— 2,546 M '19:— ? I '20:— 3,472 M '20:— ?	Aniline Gamma Acid	D
243	Coomassie Wool Black R		Acetyl-*p*-phenylene-diamine Schaeffer's Acid	A
244	Coomassie Wool Black S	M '18:— ? M '19:— ?	Acetyl-*p*-phenylene-diamine R Acid	A
245	Nyanza Black B		*p*-Nitro-aniline [Reduced] Gamma Acid	D
256	Sulfon Black 3B		Metanilic Acid Phenyl-1-naphthyl-amine-8-sulfonic Acid	A
257	Sulfoncyanine	I '14:—145,694 M '17:— ? M '18:— ? M '19:— ? I '20:— 18,327 M '20:— ?	Metanilic Acid Phenyl- *or* Tolyl-1-naphthylamine-8-sulfonic Acid	A
258	Naphthalene Acid Black 4B	I '14:— 7,994	Metanilic Acid 1-Naphthylamine-6- *and* 7-sulfonic Acids	A
261	Buffalo Black 10B	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Sulfanilic Acid H Acid	A

Dyes Derived from α-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
262	Victoria Black B	I '14:— 557	Sulfanilic Acid 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	A
263	Jet Black R		Aniline-2: 4-disulfonic Acid Phenyl-α-naphthylamine	A
265	Sulfocyanine Black B	I '14:— 69,590 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Laurent's Acid Phenyl-1-naphthylamine-8-sulfonic Acid	A
266	Naphthylamine Black D	I '14:—152,141 M '17:— ? M '18:— 29,724 M '19:— ? I '20:— 1,687 M '20:— ?	Freund's Acid α-Naphthylamine (2 mols)	A
267	Anthracite Black	I '14:— 99 M '17:— ? I '20:— 220	Freund's Acid Diphenyl-*m*-phenylenediamine	A
267	Phenylene Black		1-Naphthylamine-4: 7-disulfonic Acid Diphenyl-*m*-phenylenediamine	A
268	Naphthyl Blue Black N		1-Naphthylamine-4: 6-*and* 4: 7-disulfonic Acids 1-Amino-2-naphthol Ethyl Ether	A
269	Naphthol Black 6B	I '14:—120,512 I '20:— 1,500 M '20:— ?	1-Naphthylamine-4: 6-*and* 4: 7-disulfonic Acids R Acid	A

Dyes Derived from α-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
272	Naphthol Black B Brilliant Black B	I '14:—103,598 M '19:— ? I '20:— 50	Amino-G Acid R Acid	A
273	Diaminogen Blue BB	I '14:— 8,308 M '17:— ? I '20:— 5,936	Acetyl-1: 4-diamino-naphthalene-6-sulfonic Acid Schaeffer's Acid	D
274	Diaminogen B	I '14:—313,629 I '20:— 18,120	Acetyl-1: 4-diamino-naphthalene-6-sulfonic Acid Gamma Acid	D
275	Diamond Black F	I '14:—462,306 M '17:— ? M '18:— ? M '19:—222,938 I '20:— 2,226 M '20:— ?	Amino-salicylic Acid Nevile-Winther's Acid *or* 1-Naphthol-5-sulfonic Acid	ACr
276	Diamond Green B	I '14:— 8,622 M '18:— ? I '20:— 4,061	Amino-salicylic Acid 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	ACr
278	Biebrich Patent Black		1-Naphthylamine-6-*and* 7-sulfonic Acids etc.	A
290	Violet Black		Nevile-Winther's Acid *p*-Phenylene-diamine *or* Amino-acetanilide	D
382	Azo Mauve B	M '17:— ? M '20:— ?	Tolidine H Acid	D

Dyes Derived from α-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
432	Diamine Cutch Naphthylene Violet		1: 5-Naphthylene-diamine-3: 7-disulfonic Acid α-Naphthylamine (2 mols)	D
	TRISAZO DYES			
435	Janus Brown B		Trimethyl-*m*-amino-phenyl-ammonium Chloride Aniline *m*-Phenylene-diamine *or* *p*-Amino-benzyl-diethyl-amine Resorcinol *m*-Phenylene-diamine	B
441	Diazo Blue Black RS	M '19:— ? M '20:— ?	Benzidine H Acid (2 mols)	D
442	Direct Black V	I '14:—145,738	Benzidine 2R Acid Gamma Acid	D
443	Direct Indone Blue R		Benzidine 2R Acid H Acid	D
446	Benzo Olive	I '14:— 1,149	Benzidine Salicylic Acid H Acid	D
447	Benzo Gray S	I '14:— 802	Benzidine Salicylic Acid Nevile-Winther's Acid	D
450	Benzo Black Blue R		Tolidine Nevile-Winther's Acid (2 mols)	D

Dyes Derived from α-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
451	Congo Fast Blue R	I '14:— 4,449 M '19:— ? I '20:— 723	Tolidine 1-Naphthol-3: 8-disulfonic Acid (2 mols)	D
452	Benzo Indigo Blue		Tolidine 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
456	Congo Fast Blue B Benzo Fast Blue B	I '14:—100,495 I '20:— 1821	Dianisidine 1-Naphthol-3: 8-disulfonic Acid	D
459	Benzo Black Blue G		Benzidine-disulfonic Acid Nevile-Winther's Acid (2 mols)	D
460	Benzo Black Blue 5G	I '14:— 602	Benzidine-disulfonic Acid 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
	OXAZINE DYE			
653	Nile Blue A	I '14:— 1,518 I '20:— 1,241	5-Diethylamino-2-nitroso-phenol	B
	AZINE DYES			
671	Induline Scarlet	I '14:— 198 I '20:— 154	Ethyl-*p*-toluidine	B
672	Azo Carmine G	I '14:— 17,500 M '17:— ? M '18:— ? M '19:— ? I '20:— 196 M '20:— ?	Aniline (3 mols) [Disulfonation]	A
673	Azo Carmine B	I '20:— 549	Aniline (3 mols) [Trisulfonation]	A

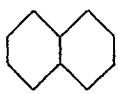
Dyes Derived from α-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES (*continued*)			
674	Rosinduline 2G	I '20:— 201	Aniline (3 mols) [Trisulfonation, heated to 160°] *or* [Azo Carmine B heated to 160°]	A
693	Milling Blue	I '14:— 3,082	Aniline (3 mols) α-Naphthylamine (2 mols) [Sulfonation]	M
694	Rose Magdala Fast Pink for Silk	I '14:— 597	α-Amino-azo-naphthalene	A

β-Naphthylamine

2-Naphthylamine (*C. A. nomen.*)

β-Amino-naphthalene



$= C_{10}H_9N = 143$

STATISTICS.—Imported '14:—11,204 lbs.
Manufactured '17:— ?
Manufactured '18:—31,317 lbs.
Manufactured '19:—99,597 lbs.
Manufactured '20:— ?

FORMATION.—From β-naphthol by heating in an autoclave with ammonium sulfite and ammonia.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 187
Lange, Zwischenprodukte, #2262
Thorpe, Dic. Chemistry, **3**, 598

Dyes Derived from β-Naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
115	Azo Turkish Red		β-Naphthol	MF
116	Sulfamine Brown B		Nitroso-β-naphthol [Sodium bisulfite]	M
	DISAZO DYES			
281	Azidine Fast Scarlet 4BS		*o*-Toluidine Sulfo-*m*-tolylene-diamine-bis(carbonyl-amino-naphthol-sulfonic Acid)	D
282	Azidine Fast Scarlet 7BS		β-Naphthylamine (2 mols) Sulfo-*m*-tolylene-diamine-bis(carbonyl-amino-naphthol-sulfonic Acid)	D
287	Toluylene Orange RR	I '14:— 500	β-Naphthylamine (2 mols) 3:5-Diamino-*p*-toluene-sulfonic Acid	D
301	Hessian Purple N	I '14:— 465	β-Naphthylamine (2 mols) Diamino-stilbene-disulfonic Acid	D
383	Naphthazurine B	I '14:— 4,782	Tolidine H Acid	D
433	Coomassie Black B		1:4-Naphthylene-diamine-2-sulfonic Acid R Acid	A

Dyes Derived from β-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
541	Brilliant Dianil Blue 6G		β-Naphthylamine (3 mols) Aniline o-Toluidine p-Toluidine [Disulfonation] *or* β-Naphthylamine (3 mols) [Rosaniline; Disulfonation]	B
	ANTHRAQUINONE DYE			
831	Indanthrene Red BN	I '14:— 6,056 I '20:— 4,766	1-Chloro-anthraquinone-2-carboxylic Acid	V

1-Naphthylamine-3: 6-disulfonic Acid

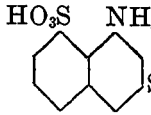
See, Freund's Acid

1-Naphthylamine-3: 8-disulfonic Acid

α-Naphthylamine-ε-disulfonic Acid

ε Acid *or* Epsilon Acid

8-Amino-1: 6-naphthalene-disulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_6S_2 = 303$

STATISTICS.—Manufactured in 1919 and 1920 but in undisclosed quantities

FORMATION.—Naphthalene-1: 5- *and* 1: 6-disulfonic acids are nitrated and reduced, resulting in 1-naphthylamine-3: 8- *and* 4: 8-disulfonic acids. The separation is effected by crystallizing out the acid sodium salt of 1-naphthylamine-3: 8-disulfonic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 196
Lange, Zwischenprodukte, #2575, 2576
Thorpe, Dic. Chemistry, **3**, 592

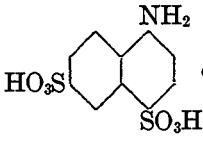
1-Naphthylamine-4: 6- ***and*** **4: 7-disulfonic Acids**

α-Naphthylamine-disulfonic Acids D

Dahl's Acids II *and* III (*respectively*)

4-Amino-1: 6-naphthalene-disulfonic Acid (*C. A. nomen.*)

4-Amino-1: 7-naphthalene-disulfonic Acid (*C. A. nomen*)



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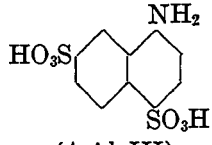


$= C_{10}H_9NO_6S_2 = 303$

(Acid II) (Acid III)

STATISTICS.—Manufactured '20:— ?

FORMATION.—From naphthionic acid by sulfonation with 25 per cent oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 198
Thorpe, Dic. Chemistry, **3**, 593, 594
Lange, Zwischenprodukte, #2577–2582

Dyes Derived from 1-Naphthylamine-4: 6- ***and*** **4: 7-disulfonic Acids**

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
54	Apollo Red B	I '14:— 904	*p*-Nitro-aniline	A
	DISAZO DYES			
267	Phenylene Black	I '14:— 99 M '17:— ? I '20:— 220	α-Naphthylamine Dipheny-*m*-phenylene-diamine [4: 7 Acid only]	A
268	Naphthyl Blue Black N		α-Naphthylamine 1-Amino-2-naphthol Ethyl Ether	A
269	Naphthol Black 6B	I '14:—120,512 I '20:— 1,500 M '20:— ?	α-Naphthylamine R Acid	A

1-Naphthylamine-4: 8-disulfonic Acid

δ Acid *or* Delta Acid

Schoellkopf's Acid

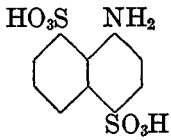
Disulfo-acid S

4-Amino-1: 5-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)

α-Naphthylamine-δ-disulfonic Acid

α-Naphthylamine-disulfonic Acid S

S Acid



$= C_{10}H_9NO_6S_2 = 303$

STATISTICS.—Manufactured in 1919 and 1920 in undisclosed amounts

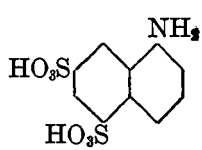
FORMATION.—When naphthalene-1: 5- *and* 1: 6-disulfonic acids are nitrated and reduced, there is formed a mixture of 1-naphthylamine-3: 8- *and* 4: 8-disulfonic acids. See under 1-naphthylamine-3: 8-disulfonic acid. The 4: 8-acid is also made by sulfonating 1-naphthylamine-8-sulfonic acid with three parts of 10 per cent oleum.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 200
Lange, Zwischenprodukte, #2575, 2583–2585
Thorpe, Dic. Chemistry, **3**, 594

USES.—For making 1-amino-8-naphthol-4-sulfonic acid, 1: 8-dihydroxy-naphthalene-4-sulfonic acid, and 1: 8-naphthasultam-2: 4-disulfonic acid

1-Naphthylamine-5: 7-disulfonic Acid

5-Amino-1: 3-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_6S_2 = 303$

FORMATION.—By sulfonation of the acetyl derivative of 1-naphthylamine-5-sulfonic acid or of α-naphthylamine

LITERATURE —Cain, Intermediate Products (2d Ed), 200
Lange, Zwischenprodukte, #2586
Thorpe, Dic. Chemistry, 3, 594

USES.—For preparation of 1-amino-5-naphthol-7-sulfonic acid

2-Naphthylamine-3: 6-disulfonic Acid

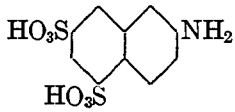
See, Amino-R Acid

2-Naphthylamine-5: 7-disulfonic Acid

6-Amino-1: 3-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)

β-Naphthylamine-disulfonic Acid II of Armstrong and Wynne

Armstrong and Wynne's Acid II



$= C_{10}H_9NO_6S_2 = 303$

STATISTICS.—Manufactured in 1919 and 1920 in undisclosed amounts

FORMATION.—By sulfonation of either 2-naphthylamine-5-sulfonic acid, or β-naphthylamine, or 2-naphthylamine-7-sulfonic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 208
Lange, Zwischenprodukte, #2598
Thorpe, Dic. Chemistry, 3, 605

USES.—For preparation of J acid (2-amino-5-naphthol-7-sulfonic acid)

2-Naphthylamine-6: 8-disulfonic Acid

See, Amino-G Acid

α-Naphthylamine-α-disulfonic Acid

See, Freund's Acid

α-Naphthylamine-β-disulfonic Acid

1-Naphthylamine-3: 7-disulfonic Acid (*not considered herein*)

α-Naphthylamine-δ-disulfonic Acid

See, 1-Naphthylamine-4: 8-disulfonic Acid

α-Naphthylamine-ε-disulfonic Acid

See, 1-Naphthylamine-3: 8-disulfonic Acid

α-Naphthylamine-disulfonic Acids D

See, 1-Naphthylamine-4: 6- *and* 4: 7-disulfonic Acids

α-Naphthylamine-disulfonic Acid S

See, 1-Naphthylamine-4: 8-disulfonic Acid

β-Naphthylamine-α-disulfonic Acid

See, Amino-R Acid

β-Naphthylamine-γ-disulfonic Acid

See, Amino-G Acid

β-Naphthylamine-δ-disulfonic Acid

2-Naphthylamine-2: 7-disulfonic Acid (*not considered herein*)

β-Naphthylamine-disulfonic Acid II of Armstrong and Wynne

See, 2-Naphthylamine-5: 7-disulfonic Acid

β-Naphthylamine-disulfonic Acid C

2-Naphthylamine-4: 8-disulfonic Acid (*not considered herein*)

β-Naphthylamine-disulfonic Acid F

2-Naphthylamine-3: 7-disulfonic Acid (*not considered herein*)

β-Naphthylamine-disulfonic Acid G

See, Amino-G Acid

β-Naphthylamine-disulfonic Acid R

See, Amino-R Acid

Naphthylamine Ether

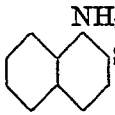
See, 1-Amino-2-naphthol Ethyl Ether

1-Naphthylamine-2-sulfonic Acid

λ Acid

o-Naphthionic Acid

1-Amino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_3S = 223$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:— ?

FORMATION.—By heating naphthionic acid and naphthalene in a pan fitted with a stirrer and reflux condenser, at the boiling point of naphthalene (217°) for few hours

LITERATURE.—Cain, Intermediate Products (2d Ed.), 189
Thorpe, Dic. Chemistry, **3**, 589
Lange, Zwischenprodukte, #2352–2355

Dye Derived from 1-Naphthylamine-2-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYE			
562	Fast Acid Blue B	I '14:— 33,251 I '20:— 6,478	Hydrol [Oxidation]	A

1-Naphthylamine-4-sulfonic Acid

See, Naphthionic Acid

1-Naphthylamine-5-sulfonic Acid

See, Laurent's Acid

1-Naphthylamine-6-sulfonic Acid [1]

α-Naphthylamine-β-sulfonic Acid

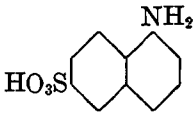
α-Naphthylamine-β-sulfonic Acid Cl

Cleve's β Acid

Cleve's Acid

Erdmann's μ Acid *or* μ Acid

5-Amino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_3S = 223$

STATISTICS.—Imported '14:—5,493 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—From napthionic acid by heating with sulfuric acid at 120–130°

LITERATURE.—Lange, Zwischenprodukte, 2363
Thorpe, Dic. Chemistry, **3**, 591
Cf. Cain, Intermediate Products (2d Ed.), 192

Dyes Derived from 1-Naphthylamine-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
406	Diazurine B		1-Naphthylamine-6-sulfonic Acid (2 mols) Dianisidine β-Naphthol (2 mols on fiber)	D
	TETRAKISAZO DYE			
492	Anthracene Acid Brown B		1-Naphthylamine-6-sulfonic Acid (2 mols) Amino-salicylic Acid (2 mols) *m*-Phenylene-diamine	M ACr

[1] See 1-Naphthylamine-6- and 7-sulfonic Acids, page 400

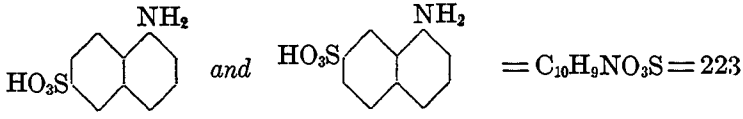
1-Naphthylamine-6- *and* **7-sulfonic Acids**

Cleve's Acids

Naphthylamine-sulfonic Acids Cleve

α-Naphthylamine-sulfonic Acids Cl

5-*and* 8-Amino-2-*n*aphthalene-sulfonic Acids (*C. A. nomen.*)



$= C_{10}H_9NO_3S = 223$

FORMATION.—Naphthalene is sulfonated hot to β-naphthalene-sulfonic acid, this latter in sulfuric acid solution is nitrated cold with mixed acid. The excess acidity is removed with ground limestone ($CaCO_3$), and the nitro-compounds reduced with iron borings and a little acetic acid to a mixture of 1-naphthylamine-6-and-7-sulfonic acids

LITERATURE.—Cain, Intermediate Products (2d Ed.), 192
Lange, Zwischenprodukte, #2363, 2364
Thorpe, Dic. Chemistry, 3, 591

Dyes Derived from 1-Naphthylamine-6- *and* **7-sulfonic Acids**

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
242	Sulfon Black G		Aniline 1:8-Dihydroxy-naphthalene-4-sulfonic Acid	A
257	Sulfoncyanine	I '14:—145,694 M '17:— ? M '18:— ? M '19:— ? I '20:— 18,325 M '20:— ?	Metanilic Acid Phenyl- *or* Tolyl-1-naphthylamine-8-sulfonic Acid	A

Dyes Derived from 1-Naphthylamine-6- *and* 7-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
258	Naphthalene Acid Black 4B	I '14:— 7,794	Metanilic Acid α-Naphthylamine	A
265	Sulfocyanine Black B	I '14:— 69,590 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Laurent's Acid Phenyl-1-naphthyl-amine-8-sulfonic Acid	A
277	Anthracene Acid Black	I '14:— 17,793	Amino-salicylic Acid, etc.	M
278	Biebrich Patent Black		α-Naphthylamine, etc.	A
	TRISAZO DYES			
436	Columbia Black FF	I '14:—402,997 M '18:— ? M '19:— ? I '20:— 23,350 M '20:— ?	*p*-Phenylene-diamine Gamma Acid *m*-Phenylene-diamine	D
458	Carbon Black		*p*-Phenylene-diamine-sulfonic Acid *from* *p*-nitro-aniline-*o*-sulfonic Acid *m*-Phenylene-(*or* Tolylene-)-diamino *or* 1:3-naphthylene-diamine-6-sulfonic Acid (2 mols)	D

1-Naphthylamine-7-sulfonic Acid

α-Naphthylamine-θ-sulfonic Acid

Cleve's θ Acid

Cleve's δ Acid

Cleve's Acid

See, 1-Naphthylamine-6- *and* 7-sulfonic Acids

1-Naphthylamine-8-sulfonic Acid

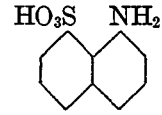
8-Amino-1-*naphthalene*-sulfonic Acid (*C. A. nomen.*)

α-Naphthylamine-sulfonic Acid S

S Acid

Peri Acid

Schoellkopf's Acid



$= C_{10}H_9NO_3S = 223$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:—562,939 lbs.

FORMATION.—Naphthalene is sulfonated at 60° to α-naphthalene-sulfonic acid and then nitrated below 40° to 1-nitro-naphthalene-8-sulfonic acid, which latter upon reduction with iron furnishes the 1-naphthylamine-8-sulfonic acid

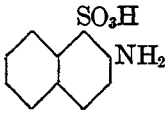
LITERATURE.—Cain, Intermediate Products (2d Ed.), 193
Lange, Zwischenprodukte, #2365
Thorpe, Dic. Chemistry, **3**, 591

USES.—For manufacture of 1-naphthylamine-4: 8-disulfonic acid

2-Naphthylamine-1-sulfonic Acid

Tobias Acid

2-Amino-1-*naphthalene*-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_3S = 223$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:— 84,260 lbs.
Manufactured '20:—325,036 lbs.

FORMATION.—Sodium 2-naphthol-1-sulfonate (from β-naphthol and sulfuric acid at 40°) is heated with ammonium hydrogen sulfite and ammonia in an autoclave at from 100° to 150°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 205
Lange, Zwischenprodukte, #2367
Thorpe, Dic. Chemistry, **3**, 601

Dyes Derived from 2-Naphthylamine-1-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
173	Lithol Red R	I '14:—281,963 M '17:— ? M '18:—353,104 M '19:—269,169 M '20:— ?	β-Naphthol	CL
179	Lake Bordeaux B		3-Hydroxy-2-naphthoic Acid	CL

2-Naphthylamine-5-sulfonic Acid

β-Naphthylamine-γ-sulfonic Acid

β-Naphthylamine-sulfonic Acid D

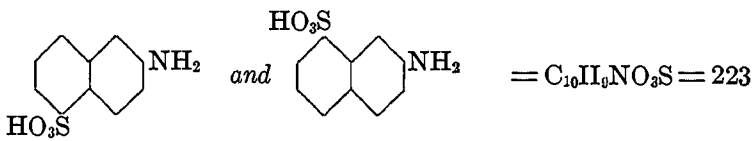
Dahl's Acid

Forsling's Acid II

See, 2-Naphthylamine-5- *and* 8-sulfonic Acids

2-Naphthylamine-5- *and* 8-sulfonic Acids [1]

6- *and* 7-Amino-1-naphthalene-sulfonic Acids (*C. A. nomen.*)



$= C_{10}H_9NO_3S = 223$

STATISTICS.—Imported '14:—23,265 lbs. for the 2-naphthylamine-8-sulfonic Acid

[1] See 2-Naphthylamine-5-sulfonic Acid and 2-Naphthylamine-8-sulfonic Acid.

FORMATION.—By sulfonation of β-naphthylamine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 205
Lange, Zwischenprodukte, #2368–2370, 2380–2383
Thorpe, Dic. Chemistry, 3, 601, 603

Dye Derived from 2-Naphthylamine-5- *and* 8-sulfonic Acids

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
175	MONOAZO DYE Ponceau for Silk	I '14:— 727	β-Naphthol	A

2-Naphthylamine-6-sulfonic Acid

See, Broenner's Acid

2-Naphthylamine-7-sulfonic Acid

β-Naphthylamine-δ-sulfonic Acid

β-Naphthylamine-sulfonic Acid F

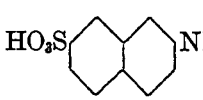
F Acid

Delta Acid

Bayer's Acid

Cassella's Acid F

7-Amino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_3S = 223$

FORMATION.—Sodium 2-naphthol-7-sulfonic acid (from caustic soda fusion of naphthalene-2: 7-disulfonic acid) is heated with ammonium acid sulfite solution and ammonia water in an autoclave at 100° to 150°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 207
Lange, Zwischenprodukte, #2377–2379
Thorpe, Dic. Chemistry, 3, 602

Dyes Derived from 2-Naphthylamine-7-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
340	Chlorazol Orange 2R		Benzidine Salicylic Acid	D
366	Diamine Red B Deltapurpurin 5B	I '14:— 21,058 M '17:— ? M '18:— ? I '20:— 1,896	Tolidine Broenner's Acid	D
367	Diamine Red 3B Deltapurpurin 7B		Tolidine 2-Naphthylamine-7-sulfonic Acid (2 mols)	D
371	Rosazurine G		Tolidine Ethyl-2-naphthylamine-7-sulfonic Acid	D

2-Naphthylamine-8-sulfonic Acid

β-Naphthylamine-α-sulfonic Acid

Badische Acid

Forsling's Acid I

See, 2-Naphthylamine-5 *and* -8-sulfonic Acids

α-Naphthylamine-β-sulfonic Acid

See, 1-Naphthylamine-6-sulfonic Acid

α-Naphthylamine-δ-sulfonic Acid

See, 1-Naphthylamine-7-sulfonic Acid

Naphthylamine-sulfonic Acid Br

See, Broenner's Acid

α-Naphthylamine-β-sulfonic Acid Cl

See, 1-Naphthylamine-6-sulfonic Acid

α-Naphthylamine-sulfonic Acids Cl

See, 1-Naphthylamine-6-*and* 7-sulfonic Acids

Naphthylamine-sulfonic Acids Cleve

See, 1-Naphthylamine-6-*and* 7-sulfonic Acids

α-Naphthylamine-sulfonic Acid L

See, Laurent's Acid

α-Naphthylamine-sulfonic Acid S

See, 1-Naphthylamine-8-sulfonic Acid

β-Naphthylamine-α-sulfonic Acid

See, 2-Naphthylamine-8-sulfonic Acid

β-Naphthylamine-β-sulfonic Acid

See, Broenner's Acid

β-Naphthylamine-γ-sulfonic Acid

See, 2-Naphthylamine-5-sulfonic Acid

β-Naphthylamine-δ-sulfonic Acid

See, 2-Naphthylamine-7-sulfonic Acid

β-Naphthylamine-sulfonic Acid D

See, 2-Naphthylamine-5-sulfonic Acid

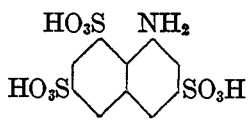
β-Naphthylamine-sulfonic Acid F

See, 2-Naphthylamine-7-sulfonic Acid

1-Naphthylamine-3: 6: 8-trisulfonic Acid

Koch's Acid

8-Amino-1: 3: 6-*n*aphthalene-trisulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_9S_3 = 383$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—1,418,560 lbs.
Manufactured '20:—3,921,950 lbs.

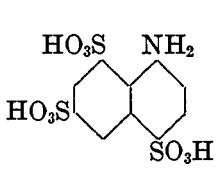
FORMATION.—Naphthalene is sulfonated to naphthalene-1: 3: 6-trisulfonic acid, using oleum; and this trisulfonic acid is nitrated cold, and then reduced with iron

LITERATURE.—Cain, Intermediate Products (2d Ed.), 202
Lange, Zwischenprodukte, #2747, 2748
Thorpe, Dic. Chemistry, **3**, 595

USES.—For preparation of H acid (1-Amino-8-naphthol-3: 6-disulfonic acid)

1-Naphthylamine-4: 6: 8-trisulfonic Acid

8-Amino-1: 3: 5-*n*aphthalene-trisulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_9S_3 = 383$

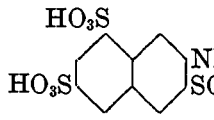
FORMATION.—Sodium naphthalene-1: 5-disulfonate is sulfonated to naphthalene-1: 3: 5-trisulfonic acid, and this is nitrated cold, and then reduced with iron

LITERATURE.—Cain, Intermediate Products (2d Ed.), 202
Lange, Zwischenprodukte, #2750
Thorpe, Dic. Chemistry, **3**, 596

USES.—For preparation of K acid (1-amino-8-naphthol-4: 6-disulfonic acid)

2-Naphthylamine-3: 6: 8-trisulfonic Acid

7-Amino-1: 3: 6-*n*aphthalene-trisulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_9S_3 = 383$

FORMATION.—By sulfonation of amino-G acid (as potassium or sodium salt of 2-naphthylamine-6: 8-disulfonic acid) with 40 per cent oleum at 80–90° and finally at 120–130°. The amino-G acid is made by amidation of G salt or by sulfonating β-naphthylamine

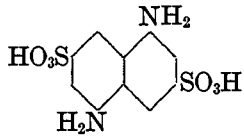
LITERATURE.—Cain, Intermediate Products (2d Ed.), 210
Lange, Zwischenprodukte, #2757
Thorpe, Dic. Chemistry, **3**, 606

USES.—For making 2R acid (2-Amino-8-naphthol-3: 6-disulfonic Acid)

4-(Naphthyl-azo)-1-naphthylamine (*C. A. nomen.*)
See, *o*-Amino-azo-naphthalene

1-Naphthyl-diphenyl-methane (*C. A. nomen.*)
See, Diphenyl-naphthyl-methane

1: 5-Naphthylene-diamine-3: 7-disulfonic Acid
4: 8-Diamino-2: 6-naphthalene-disulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{10}N_2O_6S_2 = 318$

FORMATION.—Naphthalene-2: 6-disulfonic acid (from sulfonation of naphthalene) is dissolved in sulfuric acid and nitrated at 20–30°. The resulting 1: 5-dinitro-naphthalene-3: 7-disulfonic acid is salted out and reduced

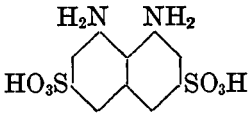
LITERATURE.—Cain, Intermediate Products (2d Ed.), 178
Lange, Zwischenprodukte, #2700
Thorpe, Dic. Chemistry, **3**, 613

Dyes Derived from 1: 5-Naphthylene-diamine-3: 7-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
431	Diamine Golden Yellow		Phenol (2 mols) [Ethylation]	D
432	Diamine Cutch Naphthylene Violet	I '14:— 300 I '20:— 49	α-Naphthylamine (2 mols)	D

1: 8-Naphthylene-diamine-3: 6-disulfonic Acid

4: 5-Diamino-2: 7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{10}N_2O_6S_2 = 318$

FORMATION.—Naphthalene-2: 7-disulfonic acid (from sulfonation of naphthalene) is dissolved in strong sulfuric acid and is then dinitrated warm with strong nitric acid and sodium nitrate. The dinitro-acid is reduced

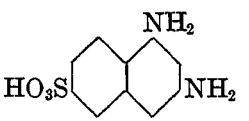
LITERATURE.—Lange, Zwischenprodukte, #2704
Cf. Cain, Intermediate Products (2d Ed.), 178
Thorpe, Dic. Chemistry, 3, 613

Dyes Derived from 1: 8-Naphthylene-diamine-3: 6-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
55	Brilliant Archil C	I '14:— 401	*p*-Nitro-aniline	A

1: 3-Naphthylene-diamine-6-sulfonic Acid

5: 7-Diamino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{10}N_2O_3S = 238$

FORMATION.—1-Naphthylamine-3: 6-disulfonic acid (by nitration and reduction of naphthalene-2: 7-disulfonic acid) is heated with ammonia in an autoclave at 160–180°

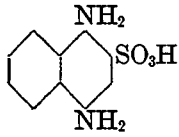
LITERATURE.—Lange, Zwischenprodukte, #2483
Thorpe, Dic. Chemistry, 3, 612
Cf. Cain, Intermediate Products (2d Ed.), 195

Dye Derived from 1: 3-Naphthylene-diamine-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
458	TRISAZO DYE Carbon Black		1: 3-Naphthylene-diamine-6-sulfonic Acid (2 mols) *p*-Nitro-aniline-*o*-sulfonic Acid 1-Naphthylamine-6- *or* 7-sulfonic Acid	D

1: 4-Naphthylene-diamine-2-sulfonic Acid

1: 4-Diamino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{10}N_2O_3S = 238$

FORMATION.—By reduction of the azo derivatives of 1-naphthylamine-2-sulfonic acid

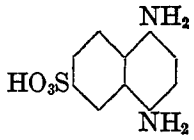
LITERATURE.—*Cf.* Thorpe, Dic. Chemistry, 3, 611, 612

Dyes Derived from 1: 4-Naphthylene-diamine-2-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
433	Coomassie Black B		R Acid β-Naphthylamine	A
434	Coomassie Navy Blue	I '20:— 42,357	R Acid β-Naphthol	A
	TRISAZO DYE			
461	Coomassie Union Black		Gamma Acid *m*-Phenylene- (*or* Tolylene-)diamine *or* Resorcinol (2 mols)	D

1: 4-Naphthylene-diamine-6-sulfonic Acid

5: 8-Diamino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)
(*Acetyl-compound used*)



$= C_{10}H_{10}N_2O_3S = 238$

FORMATION.—A mixture of 1-naphthylamine-6-(*and* 7-)sulfonic acids (Cleve's Acids) is acetylated with glacial acetic acid, the excess of acetic acid distilled off, and the acetylated acids dissolved in 5 parts of sulfuric acid. These acids are nitrated with mixed acid containing 43 per cent nitric acid, cooled, diluted with ice and water, and salted out with about 2 parts of salt. The sodium 1-acetamido-4-nitro-6-(and 7-)sulfonates are now reduced hot with iron and some acetic acid. The acetyl-compound is isolated and used as such, the acetyl-group being split off after coupling

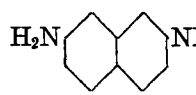
LITERATURE.—Cain, Intermediate Products (2d Ed.), 210
Lange, Zwischenprodukte, #2486
Thorpe, Dic. Chemistry, **3**, 612

Dyes Derived from 1: 4-Naphthylene-diamine-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
273	Diaminogen Blue BB	I '14:— 8,308 M '17:— ? I '20:— 5,936	α-Naphthylamine Schaeffer's Acid	D
274	Diaminogen B	I '14:—313,629 I '20:— 18,120	α-Naphthylamine Gamma Acid	D

2: 7-Naphthylene-diamine-sulfonic Acid

2: 7-Diamino-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{10}N_2O_3S = 238$

FORMATION.—Probably by first sulfonating the 2: 7-dihydroxy-naphthalene and then by action of ammonia on the 2: 7-dihydroxy-naphthalene-sulfonic acid

LITERATURE.—Ger. Pat. 79780, 80070; Frdl. **4**, 948, 949
Cf. Thorpe, Dic. Chemistry, **3**, 610, 611, 650

Dye Derived from 2: 7-Naphthylene-diamine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
330	DISAZO DYE Zambesi Brown G	I '14:— 4,028 I '20:— 1,104	Benzidine Gamma acid	D

o-Naphthylene-diamine-β-sulfonic Acid

1: 2-Naphthylene-diamine-6-sulfonic Acid (*not considered herein*)

o-Napthylene-diamine-γ-sulfonic Acid

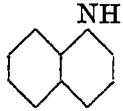
1: 2-Naphthylene-diamine-5-sulfonic Acid (*not considered herein*)

o-Naphthylene-diamine-δ-sulfonic Acid

1: 2-Naphthylene-diamine-7-sulfonic Acid (*not considered herein*)

α-Naphthyl-glycine

N-(1-Naphthyl)-*g*lycine (*C. A. nomen.*)



$= C_{12}H_{11}NO_2 = 201$

FORMATION.—From α-naphthylamine by reaction with chloro-acetic acid

LITERATURE.—Lange, Zwischenprodukte, #2264
Ger. Pat. 79861 of 1893

Dyes Derived from α-Naphthyl-glycine

Schultz Numbe for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
309	Glycine Red		Benzidine Naphthionic Acid	D
310	Glycine Corinth		Benzidene α-Naphthyl-glycine (2 mols)	D

β-Naphthyl-sulfuric Acid

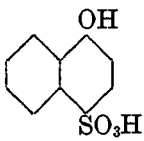
See, 2-Naphthol-1-sulfonic Acid

Nevile-Winther's Acid

1-Naphthol-4-sulfonic Acid (*C. A. nomen.*)

NW Acid

α-Naphthol-sulfonic Acid NW



$= C_{10}H_8O_4S = 224$

STATISTICS.—Manufactured '18:—340,074 lbs.
Manufactured '19:—344,449 lbs.
Manufactured '20:—561,929 lbs.

FORMATION.—From the sodium salt of naphthionic acid by hydrolyzing the amino group

LITERATURE.—Cain, Intermediate Products (2d Ed.), 217
Thorpe, Dic. Chemistry, **3**, 617
Lange, Zwischenprodukte, #2415–2421

Dyes Derived from Nevile-Winther's Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
77	Azo Coccine 2R		Xylidine	A
94	Azo Eosine	I '14:— 1,001 M '18:— ? M '19:— ?	*o*-Anisidine	A
104	Benzoyl Pink		Benzoyl-*o*-tolidine	D
163	Azo Rubine	I '14:—230,763 M '17:—197,621 M '18:— 79,779 M '19:—187,264 I '20:— 1,102 M '20:—470,949	Naphthionic Acid	A
176	Double Scarlet S Scarlet 2R	I '14:— 10,182 M '17:— ? I '20:— 1,653	Broenner's Acid	A
194	Rosophenine 10B Thiazine Red R	I' 14:— 3,077 M '19:— ? M '20:— ?	Dehydrothio-*p*-toluidine-sulfonic Acid	D
195	Rosophenine SG	M '18:— ? M '19:— ? M '20:— 19,639	Primuline	D
	DISAZO DYES			
224	Cloth Red G	I '14:— 401 M '19:— ? M '20:— ?	Amino-azo-benzene	A
233	Cloth Red B	I '14:— 1,962 M '18:— ? M '19:— ? M '20:— ?	Amino-azo-toluene	M
253	Orseilline BB		Amino-azo-toluene-sulfonic Acid	A

Dyes Derived from Nevile Winther's Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
275	Diamond Black F	I '14:—462,306 M '17:— ? M '18:— ? M '19:—222,938 I '20:— 2,226 M '20:— ?	α-Naphthylamine Amino-salicylic Acid	ACr
290	Violet Black		α-Naphthylamine *p*-Phenylene-diamine *or* Amino-acet-anilide	D
291	Azo Alizarin Bordeaux W		Salicylic Acid *p*-Phenylene-diamine	M
312	Congo Corinth	I '14:— 44,157 M '17:— ? M '18:— ? M '19:—137,704 M '20:—242,503	Benzidine Naphthionic Acid	D
355	Anthracene Red	I '14:— 3,873 M '19:— ? I '20:— 104 M '20:— ?	*o*-Nitro-benzidine Salicylic Acid	ACr
375	Congo Corinth B	I '14:— 2,196 M '19:— ?	Tolidine Naphthionic Acid	D
377	Azo Blue	I '14:— 498 M '19:— ? M '20:— ?	Tolidine Nevile-Winther's Acid (2 mols)	D
379	Dianil Blue 2R Benzo New Blue 2B	I '14:— 14,434	Tolidine Chromotropic Acid	D
385	Oxamine Blue 4R	I '14:— 573 M '20:— ?	Tolidine J Acid	D

Dyes Derived from Nevile-Winther's Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
386	Diamine Blue BX Benzo Blue BX	I '14:— 1,740 M '17:— ? M '18:— ? M '19:— 92,214 I '20:— 4,520 M '20:— 90,147	Tolidine H Acid	D
396	Indazurine RM		Tolidine 1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid	D
397	Direct Blue R	M '17:— ?	Tolidine 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid	D
401	Diamine Blue 3R		Ethoxy-benzidine Nevile-Winther's Acid (2 mols)	D
407	Azo Violet		Dianisidine Naphthionic Acid	D
410	Benzoazurine G	I '14:— 78,699 M '18:— ? M '19:—150,589 I '20:— 287 M '20:—237,328	Dianisidine Nevile-Winther's Acid (2 mols)	D
412	Congo Blue 2B		Dianisidine R Acid	D
421	Oxamine Blue B	I '14:— 35,891 I '20:— 13	Dianisidine 1-Amino-5-naphthol-7-sulfonic Acid	D
427	Indazurine GM		Dianisidine 1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid	D
428	Direct Blue B	I '14:— 21,421 M '17:— 14,823 M '18:— ? I '20:— 7,055	Dianisidine 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid	D

Dyes Derived from Nevile-Winther's Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES			
447	Benzo Gray S	I '14:— 802	Benzidine Salicylic Acid α-Naphthylamine	D
450	Benzo Black Blue R		Tolidine α-Naphthylamine Nevile-Winther's Acid (2 mols)	D
459	Benzo Black Blue G		Benzidine-disulfonic Acid α-Naphthylamine Nevile-Winther's Acid (2 mols)	D
483	St. Denis Red Rosophenine 4B	I '14:— 1,496 I '20:— 550	Diamino-azoxy-toluene Nevile-Winther's Acid (2 mols)	D
484	Milling Scarlet B		Diamino-azoxy-toluene R Acid	A

Nigrotic Acid

See, 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid

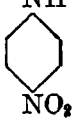
Nigrotinic Acid

See, 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid

Nitro-1:2:4 Acid

See, 1-Amino-8-nitro-2-naphthol-4-sulfonic Acid

***p*-Nitro-acetanilide**



$= C_8H_8N_2O_3 = 180$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:—541,552 lbs.
Manufactured '19:—669,658 lbs.
Manufactured '20:—569,728 lbs.

FORMATION.—Aniline is acetylated to acetanilide, which is dissolved in sulfuric acid and then nitrated with mixed acid in the cold

LITERATURE.—Cain, Intermediate Products (2d Ed.), 53

USES.—For the manufacture of *p*-nitro-aniline and acetyl-*p*-phenylene-diamine (*p*-amino-acetanilide)

Nitro-alizarin, *crude*

$C_{14}H_7NO_6 = 285$

FORMATION.—Alizarin is dissolved in sulfuric acid and nitrated

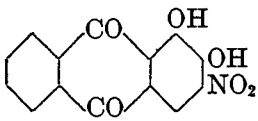
Dye Derived from Nitro-alizarin, *crude*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
798	Alizarin Maroon W	I '20:— 2,014	[Reduction]	M

3-Nitro-*a*lizarin (*C. A. nomen.*)

β-Nitro-alizarin

1:2-Dihydroxy-3-nitro-anthraquinone



$= C_{14}H_7NO_6 = 285$ ·

STATISTICS.—Refer to the dye, Alizarin Orange, which is 3-nitro-alizarin

FORMATION.—From alizarin by nitration of its boric ester

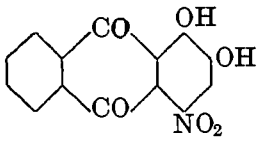
LITERATURE.—Schultz, Farbstofftabellen (1914), #779
Lange, Zwischenprodukte, #3341
Georgievics and Grandmougin, Dye Chemistry, 268

Dyes Derived from 3-Nitro-alizarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
779	Alizarin Orange	I '14:— 14,239 M '19:— ? I '20:— 500 M '20:— ?	[This is 3-nitro-alizarin]	M
803	Alizarin Blue WX	I '14:—319,394 M '19:— ? I '20:— 5,585	3-Amino-alizarin [Glycerol]	M
804	Alizarin Blue S	I '14:—117,850 I '20:— 43,679	3-Amino-alizarin [Glycerol]	M
808	Alizarin Green X	I '14:—135,191 I '20:— 4,254	3-Amino-alizarin [Glycerol; Oxidation]	M
809	Alizarin Indigo Blue S		3-Amino-alizarin [Glycerol; Oxidation]	M

4-Nitro-*a*lizarin (*C. A. nomen.*)

α-Nitro-alizarin



$= C_{14}H_7NO_6 = 285$

FORMATION.—This compound is made by nitration of alizarin in weak oleum solution, or by nitration of the methyl, benzoyl, or arsenic ester of alizarin

LITERATURE.—Georgievics and Grandmougin, Dye Chemistry, 268
Schultz, Farbstofftabellen (1914), #779

Dyes Derived from 4-Nitro-alizarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
797	Alizarin Garnet R	I '14:— 720	[Reduction]	M
805	Alizarin Green S	I '14:— 15,885	Nitro-benzene [Reduction; Glycerol]	M

α-Nitro-alizarin

See, 4-Nitro-alizarin

β-Nitro-alizarin

See, 3-Nitro-alizarin

6-Nitro-*m*-amino-benzene-sulfonic Acid

See, 6-Nitro-metanilic Acid (*C. A. nomen.*)

***o*-Nitro-*o*-amino-*p*-cresol**

See, 2-Amino-6-nitro-*p*-cresol (*C. A. nomen. OH = 1*)

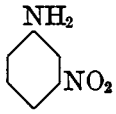
2-Nitro-6-amino-1-phenol-4-sulfonic Acid

See, 2-Amino-6-nitro-1-phenol-4-sulfonic Acid

6-Nitro-2-amino-1-phenol-4-sulfonic Acid

See, 2-Amino-6-nitro-1-phenol-4-sulfonic Acid

***m*-Nitro-aniline**



$= C_6H_6N_2O_2 = 138$

STATISTICS.—Imported '14:— 3,527 lbs.
Manufactured '17:—228,279 lbs.
Manufactured '18:—630,802 lbs.
Manufactured '19:— 68,600 lbs.
Manufactured '20:— ?

FORMATION.—Benzene is nitrated with mixed acid to dinitro-benzene, and this body is reduced with sodium sulfide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 51
Lange, Zwischenprodukte, #537, 542

Dyes Derived from *m*-Nitro-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
46	*m*-Nitraniline Orange		β-Naphthol	MF
47	Orange III	M '18:— ?	R Acid	A
48	Alizarin Yellow GG	I '14:—144,761 M '17:— 1,452,622 M '18:— 2,233,208 M '19:—163,170 M '20:—211,580	Salicylic Acid	M
49	Prague Alizarin Yellow G		β-Resorcylic Acid	M
	DISAZO DYES			
222	Janus Yellow G	I '14:— 2,250 I '20:— 758	Resorcinol *m*-Amino-phenyl-trimethyl-ammonium Chloride	B
408	Azophor Black S		*m*-Nitro-aniline (? mols) Dianisidine	D

***p*-Nitro-aniline**

$= C_6H_6N_2O_2 = 138$

STATISTICS.—Imported '14:— 771,682 lbs.
Manufactured '17:—1,724,008 lbs.
Manufactured '18:—1,320,064 lbs.
Manufactured '19:—1,310,658 lbs.
Manufactured '20:—2,138,492 lbs.

FORMATION.—(1) Aniline is acetylated to acetanilide, which is then nitrated with mixed acid to *p*-nitro-acetanilide. The latter compound is hydrolyzed by boiling with caustic soda to *p*-nitro-aniline. (2) *p*-Chloro-nitro-benzene is heated with ammonia under pressure

LITERATURE.—Cain, Intermediate Products (2d Ed.), 51
Lange, Zwischenprodukte, #533, 538–541

Dyes Derived from *p*-Nitro-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
50	Azo Cardinal G	M '18:— ?	Ethyl-sulfobenzyl-aniline	A
51	Nitrophenine Thiazol Yellow R	I '14:— 423 M '20:— ?	Dehydrothio-toluidine-sulfonic Acid	D
52	Archil Substitute V		Naphthionic Acid	A
53	Archil Substitute 3VN		Laurent's Acid	A
54	Apollo Red B	I '14:— 904	1-Naphthylamine-4: 6- *and* -4: 7-disulfonic Acids	A
55	Brilliant Archil C	I '14:— 401 I '20:— 100	1: 8-Naphthylene-diamine-3: 6-disulfonic Acid	A
56	Paranitraniline Red	I '14:— 49,847 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	β-Naphthol	MF

Dyes Derived from *p*-Nitro-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*D; Ap; cat; Cl*
	MONOAZO DYES (*continued*)			
57	Chromotrope 2B	I '14:— 7,970 M '18:— ? M '19:— ? M '20:— ?	Chromotropic Acid	A(
58	Alizarin Yellow R	I '14:— 97,059 M '17:—215,468 M '18:—385,910 M '19:—130,424 I '20:— 860 M '20:— 83,334	Salicylic Acid	M
61	Victoria Violet	I '14:— 52,365 M '17:— ? M '18:— ? M '19:—105,086 I '20:— 2,182 M '20:— ?	Chromotropic Acid [Reduction]	A
63	Azo Acid Blue B	I '14:— 45,098 I '20:— 4,485	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid [Methylation]	A
	DISAZO DYES			
215	Blue Black N	I '14:— 2,653	Aniline 1-Amino-8-naphthol-4: 6-disulfonic Acid	A
216	Domingo Blue Black B		Aniline 1-Amino-8-naphthol-3: 5-disulfonic Acid	A
217	Naphthol Blue Black Agalma Black 10B	I '14:—431,027 M '17:—620,218 M '18:— 1,158,309 M '19:— 1,877,860 I '20:— 840 M '20:— 2,608,864	Aniline H Acid	A

Dyes Derived from *p*-Nitro-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
218	Nigrophor B A S F		2: 5-Dichloro-aniline 1-Amino-8-naphthol-5-sulfonic Acid	MF
221	Anthracene Acid Brown G	M '17:— ? M '18:— ? I '20:— 225	Sulfanilic Acid Salicylic Acid	ACr
245	Nyanza Black B		α-Naphthylamine Gamma Acid [*p*-Nitro-aniline reduced after coupling]	D
408	Azophor Blue D Azophor Black S		Dianisidine	D
	TRISAZO DYES			
473	Diamine Black HW	I '20:— 342	Benzidine Gamma Acid H Acid	D
474	Diamine Green B Oxamine Green B	I '14:— 77,100 M '17:— ? M '18:—295,147 M '19:—305,854 I '20:— 2,460 M '20:—420,138	Benzidine Phenol H Acid	D
475	Diamine Green G Oxamine Green G	I '14:— 7,329 M '17:— ? M '18:— 29,118 M '19:—136,638 I '20:— 1,332 M '20:— 53,292	Benzidine Salicylic Acid H Acid	D
	SULFUR DYE			
719	Thional Black	I '14:— 16,865	*o*-Nitro-phenol [Na_2S plus S] *or* *o*-Nitro-phenol (2 mols) Aniline [Na_2S plus S]	S

2-Nitro-aniline-4-sulfonic Acid ($NH_2=1$)

See, 4-Amino-3-nitro-benzene-sulfonic Acid (*C. A. nomen.*)

4-Nitro-aniline-2-sulfonic Acid ($NH_2=1$)

See, 2-Amino-5-nitro-benzene-sulfonic Acid (*C. A. nomen.* $SO_3H=1$)

4-Nitro-aniline-3-sulfonic Acid

See, 6-Nitro-metanilic Acid (*C. A. nomen.*)

***o*-Nitro-aniline-*p*-sulfonic Acid ($NH_2=1$)**

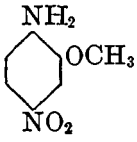
See, 4-Amino-3-nitro-benzene-sulfonic Acid (*C. A. nomen.*)

***p*-Nitro-aniline-*o*-sulfonic Acid ($NH_2=1$)**

See, 2-Amino-5-nitro-benzene-sulfonic Acid (*C. A. nomen* $SO_3H=1$)

4-Nitro-*o*-anisidine (*C. A. nomen.* $NH_2=1$)

p-Nitro-*o*-anisidine ($NH_2=1$)



$=C_7H_8N_2O_3=168$

FORMATION.—*o*-Anisidine is acetylated, then nitrated, and saponified by heating with 70 per cent sulfuric acid. The resulting mixture of 4- *and* 5-nitro-*o*-anisidines, is separated by crystallization from 40 per cent sulfuric acid

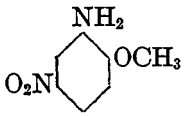
LITERATURE.—Lange, Zwischenprodukte, #911

Dye Derived from 4-Nitro-*o*-anisidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
98	Naphthol Pink Nitrosamine Pink BX	I '14:— 99	β-Naphthol	MF

5-Nitro-*o*-anisidine (*C. A. nomen. $NH_2=1$*)

m-Nitro-*o*-anisidine (*$NH_2=1$*)



$=C_7H_8N_2O_3=168$

FORMATION.—*o*-Anisidine is acetylated, then nitrated, and saponified by heating with 70 per cent sulfuric acid. The resulting mixture of 4- and 5-nitro-*o*-anisidines is separated by crystallization from 40 per cent sulfuric acid

LITERATURE.—Lange, Zwischenprodukte, #911

Dye Derived from 5-Nitro-*o*-anisidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
99	MONOAZO DYE Tuscaline Orange G		β-Naphthol	CL MF

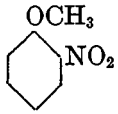
m-Nitro-*o*-anisidine (*$NH_2=1$*)

See, 5-Nitro-*o*-anisidine (*C. A. nomen. $NH_2=1$*)

***p*-Nitro-*o*-anisidine** (*$NH_2=1$*)

See, 4-Nitro-*o*-anisidine (*C. A. nomen. $NH_2=1$*)

***o*-Nitro-anisole**



$=C_7H_7NO_3=153$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:—273,327 lbs.

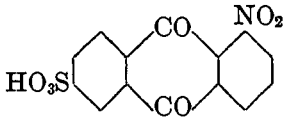
FORMATION.—(1) From *o*-nitro-phenol by methylation. (2) From *o*-chloro-nitro-benzene by action of methanol (methyl alcohol) and caustic soda

LITERATURE.—Cain, Intermediate Products (2d Ed.), 96
Cf. Lange, Zwischenprodukte, #578

USES.—For preparation of dianisidine

1-Nitro-anthraquinone-6-sulfonic Acid

5-Nitro-2-*a*nthraquinone-sulfonic Acid (*C. A. nomen.*)



$= C_{14}H_7NO_7S = 333$

FORMATION.—When anthraquinone-2-sulfonate of sodium is nitrated with a mixture of equal parts of "fuming" nitric acid and sulfuric acid (66°) there arises a mixture of the α-nitro and β-nitro-anthraquinone-sulfonic acid which can be separated by dilution, whereupon the α-acid is precipitated. The α-acid is undoubtedly 1-nitro-anthraquinone-6-sulfonic acid

LITERATURE.—Claus, Ber. **15**, 1515 (1882)
Cf. Lange, Zwischenprodukte, #3160, 3263

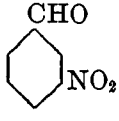
Dye Derived from 1-Nitro-anthraquinone-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
864	Anthraquinone Green GX	I '14:— 1,709 I '20:— 2,531	Aniline [Halogenation] *p*-Toluidine	ACr

5-Nitro-2-anthraquinone-sulfonic Acid (*C. A. nomen.*)

See, 1-Nitro-anthraquinone-6-sulfonic Acid

***m*-Nitro-*b*enzaldehyde**



$= C_7H_5NO_3 = 151$

STATISTICS.—Imported '14:—very small
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '20:— ?

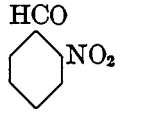
FORMATION.—From benzaldehyde by nitration at not above 30–35
(Twenty per cent *o*-nitro-derivative also formed)

LITERATURE.—Cain, Intermediate Products (2d Ed.), 144
Lange, Zwischenprodukte, #296

Dyes Derived from *m*-Nitro-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
510	Azo Green		Dimethyl-aniline (2 mols) Salicylic Acid [Oxidation]	M
523	Fast Green	I '14:— 14,347 I '20:— 10,461	Dimethyl-aniline (2 mols) Benzyl Chloride (2 mols) [Sulfonation, Oxidation]	A
543	Patent Blue V	I '14:—196,228 M '17:— ? M '18:— ? I '20:— 36,420	Diethyl-aniline (2 mols) [Sulfonation, Oxidation]	A
544	Cyanine B	I '14:— 8,398 I '20:— 24	Diethyl-aniline (2 mols) [Sulfonation, Oxidation]	A
545	Patent Blue A	I '14:— 63,744 M '18:— ? I '20:— 44,801	Benzyl-ethyl-aniline (2 mols) [Sulfonation, Oxidation]	A

***o*-Nitro-benzaldehyde**



$= C_7H_5NO_3 = 151$

STATISTICS.—Manufactured '18:— ?

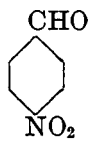
FORMATION.—When benzaldehyde is nitrated, there results about 20 per cent of the *o*-nitro- and about 80 per cent of the *m*-nitro-derivative. The nitration product is poured into water, and the oily *o*-derivative is separated from the solid *m*-compound by pressing

LITERATURE.—Cain, Intermediate Products (2d Ed.), 143
Lange, Zwischenprodukte, 22, 37, 38, 40, 181, 254, 275, 278, 289–302

Dye Derived from *o*-Nitro-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYE			
875	Indigo Salt T		[Acetone; NaOH]	Printing

***p*-Nitro-benzaldehyde**



$= C_7H_5NO_3 = 151$

STATISTICS.—Imported '14:—very small

FORMATION.—From *p*-nitro-toluene by oxidation

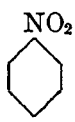
LITERATURE.—Lange, Zwischenprodukte, #275, 303–312

Dye Derived from *p*-Nitro-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
511	Parafuchsine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	Aniline (Sulfate) (2 mols) [Zinc chloride; ferrous chloride]	B

Nitro-benzene

Myrbane Oil



$= C_6H_5NO_2 = 123$

STATISTICS.—Imported '14:— 1,502,205 lbs.
Manufactured '17:—42,975,655 lbs.
Manufactured '18:—38,250,332 lbs.
Manufactured '19:—42,544,017 lbs.
Manufactured '20:—53,244,008 lbs.

FORMATION.—From benzene by nitration with mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 20
Lange, Zwischenprodukte, #264–268

Dyes Derived from Nitro-benzene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
511	Parafuchsine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	Aniline (2 mols) *p*-Toluidine *or* *p*:*p*′-Diamino-diphenyl-methane *or* Anhydro-formalde-hyde-aniline Aniline and aniline hydrochloride [Ferric chloride]	B
512	Magenta Fuchsine	I '14:— 87,102 M '17:— 17,739 M '18:— 71,675 M '19:—155,830 I '20:— 189 M '20:—284,285	Aniline *o*-Toluidine *p*-Toluidine [Iron and zinc chloride]	B

Dyes Derived from Nitro-benzene (*continued*)

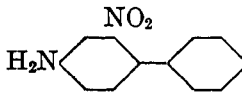
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
698	Nigrosine, Spirit Soluble	I '14:—186,595 M '17:—302,706 M '18:—314,151 M '19:—346,167 M '20:—919,242	Aniline (excess) [Iron]	ss
700	Nigrosine, Water Soluble	I '14:—398,112 M '17:— 1,968,458 M '18:— 1,191,343 M '19:— 1,660,149 I '20:— 501 M '20:— 2,743,021	Aniline (excess) [Iron, Sulfonation]	A
	SULFUR DYE			
718	St. Denis Black		*p*-Phenylene-diamine Phenol [S_2Cl_2, S, Na_2S]	S
	ANTHRAQUINONE AND ALLIED DYES			
805	Alizarin Green S	I '14:— 15,885	4-Amino-alizarin [Reduction; glycerol]	M

3-Nitro-benzidine (*C. A. nomen. $NH_2=1$*)

See, *o*-Nitro-*b*enzidine

o-Nitro-benzidine

3-Nitro-*b*enzidine (*C. A. nomen. $NH_2=1$*)



$= C_{12}H_{11}N_3O_2 = 229$

STATISTICS.—Manufactured '19:— ?

FORMATION.—By nitration of benzidine in sulfuric acid solution

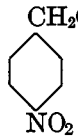
LITERATURE.—Green, Organic Coloring Matters (1908), 41
Eng. Pat. 13475 of 1892
Lange, Zwischenprodukte, #1220

Dye Derived from *o*-Nitro-benzidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*
355	DISAZO DYE Anthracene Red	I '14:— 3,873 M '19:— ? I '20:— 104 M '20:— ?	Salicylic Acid Nevile-Winther's Acid

_p_-Nitro-benzyl Chloride

α-Chloro-*p*-nitro-*t*oluene (*C. A. nomen.*)



$= C_7H_6ClNO_2 = 171.5$

FORMATION.—(1) By passing chlorine into *p*-nitro-toluene heated 185–190°. (2) By dropping benzyl chloride into fuming nitric acid cooled to −15° C.

LITERATURE.—Ann. **185**, 271
Ber. **6**, 1056
Cf. Lange, Zwischenprodukte, #250

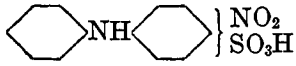
Dye Derived from *p*-Nitro-benzyl Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*
734	SULFUR DYE Pyrogene Yellow	I '14:— 18,515 I '20:— 2,701	*p*-Amino-phenol [S+Na_2S]

o- and p-Nitro-chloro-benzenes

See, o- and *p*-Chloro-nitro-benzenes (*C. A. nomen.*)

Nitro-diphenylamine-sulfonic Acid



$= C_{12}H_{10}N_2O_5S = 294$ (?)

FORMATION.—Diphenylamine in sulfuric acid solution is heated with 20 per cent oleum at 80–100°, and is then nitrated with nitric acid at 50–80°, resulting in formation of "nitrated diphenylamine-sulfonic acid"

LITERATURE.—Lange, Die Schwefel-farbstoffe, 145

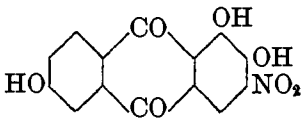
Dye Derived from Nitro-diphenylamine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
737	SULFUR DYE Cotton Brown Sulfine Brown	I '14:— 2,206	[S+Na_2S]	S

3-Nitro-flavopurpurin (*C. A. nomen.*)

β-Nitro-flavopurpurin

3-Nitro-1:2:6-trihydroxy-anthraquinone



$= C_{14}H_7NO_7 = 301$

FORMATION.—By nitration of flavopurpurin

LITERATURE.—Ger. Pat. 54,624, Frdl. 2, 122

Dyes Derived from 3-Nitro-flavopurpurin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
806	Alizarin Black P	I '14:—229,500	[Glycerol]	M
807	Alizarin Black S	I '14:—259,991	[Glycerol]	M

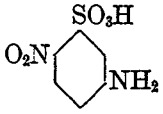
β-Nitro-flavopurpurin

See, 3-Nitro-flavopurpurin

6-Nitro-*m*etanilic Acid (*C. A. nomen.*)

4-Nitro-aniline-3-sulfonic Acid

6-Nitro-*m*-amino-benzene-sulfonic Acid



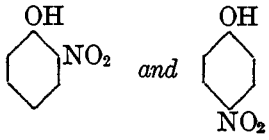
$= C_6H_6N_2O_3S = 218$

FORMATION.—Sodium metanilate is acetylated, dissolved in sulfuric acid and nitrated with mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 56

USES.—For preparation of nitro-*m*-phenylene-diamine

Nitro-phenol *crude*



$= C_6H_5NO_3 = 139$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:— ?

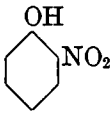
FORMATION.—From phenol by nitration with nitric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 111

Dyes Derived from Nitro-phenol *crude*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
698	Nigrosine, Spirit Soluble	I '14:—186,595 M '17:—362,706 M '18:—314,151 M '19:—346,167 M '20:—919,242	Aniline (excess)	ss
700	Nigrosine, Water Soluble	I '14:—398,112 M '17:—1,968,458 M '18:—1,191,343 M '19:—1,660,149 I '20:— 501 M '20:—2,743,021	Aniline (excess) [Sulfonation]	A

o-Nitro-*p*henol



$= C_6H_5NO_3 = 139$

STATISTICS.—Imported '14:—very small
Manufactured '17:— 58,128 lbs.
Manufactured '18:—143,277 lbs.
Manufactured '19:— 18,373 lbs.
Manufactured '20:— ?

FORMATION.—(1) Phenol is nitrated with nitric acid, resulting in an oily mixture of *o*- and *p*-nitro-phenol. The *o*-derivative is separated by distillation and purified by steam distillation. (2) *o*-Chloro-nitro-benzene is hydrolyzed to the *o*-nitro-phenol by boiling with caustic soda

LITERATURE.—Cain, Intermediate Products (2d Ed.), 111
Lange, Zwischenprodukte, #574–577

Dye Derived from *o*-Nitro-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
719	SULFUR DYE Thional Black	I '14:— 16,865	*p*-(*o*- *or m*-)Nitro-aniline [Na_2S+S] *or* *p*-(*o*- *or m*-)Nitro-aniline Aniline *o*-Nitro-phenol (2 mols) [Na_2S+S]	S

p*-Nitro-*phenol

$= C_6H_5NO_3 = 139$

STATISTICS.—Imported '14:— 4,780 lbs.
Manufactured '17:—413,216 lbs.
Manufactured '18:—192,259 lbs.
Manufactured '19:— 76,191 lbs.
Manufactured '20:—125,693 lbs.

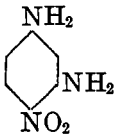
FORMATION.—(1) Phenol is nitrated with nitric acid to an oily mixture of *o*- and *p*-nitro phenol, from which the *o*-isomer is removed by distillation. The residue upon being extracted with hot water yields the *p*-isomer, which crystallizes out from the aqueous extract upon cooling. (2) *p*-Chloro-nitro-benzene is hydrolyzed to the *p*-nitro-phenol by boiling with caustic soda

LITERATURE.—Cain, Intermediate Products (2d Ed.), 111
Lange, Zwischenprodukte, #574–576

Dye Derived from *p*-Nitro-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
709	Italian Green		[Sulfur, etc.]	S

4-Nitro-*m*-phenylene-diamine



$= C_6H_7N_3O_2 = 153$

FORMATION.—5-Amino-2-nitro-benzene-sulfonic Acid (4-nitro-aniline-3-sulfonic acid) is heated in an autoclave with 25 per cent ammonia water for three hours at 170–180°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 86

Dyes Derived from 4-Nitro-*m*-phenylene-diamine

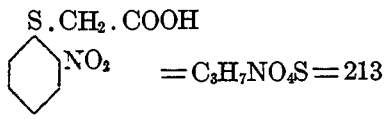
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
191	Pyramine Yellow R	I '14:— 5,727 I '20:— 100	Primuline-sulfonic Acid	D
	DISAZO DYES			
286	Toluylene Yellow	I '14:— 5,485	3:5-Diamino-*p*-toluene-sulfonic Acid Nitro-*m*-phenylene-diamine (2 mols)	D
306	Pyramine Orange 3G	I '14:— 7,863 I '20:— 396	Benzidine *m*-Phenylene-diamine-disulfonic Acid	D
314	Pyramine Orange 2R	I '14:— 2,789	Benzidine Amino-R Acid	D
360	Pyramine Orange R	I '14:— 21,329 I '20:— 7,821	Benzidine-disulfonic Acid Nitro-*m*-phenylene-diamine (2 mols)	D

(*o*-Nitro-phenyl-mercapto)-*a*cetic Acid (*C. A. nomen.*)

See, *o*-Nitro-phenyl-thioglycolic Acid

o-Nitro-phenyl-thioglycolic Acid

(*o*-Nitro-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)



$= C_3H_7NO_4S = 213$

FORMATION.—*o*-Chloro-nitro-benzene in hot alcoholic solution is treated with thioglycolic acid and caustic soda solution, and then boiled for two hours under a reflux condenser

LITERATURE.—Lange, Zwischenprodukte, #611

Dye Derived from *o*-Nitro-phenyl-thioglycolic Acid

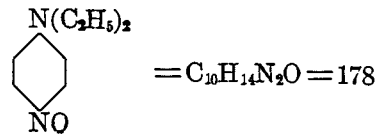
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
921	Helindone Gray 2B		*o*-Nitro-phenyl-thioglycolic Acid (2 mols) [Chloro-sulfonic Acid; Reduction]	V

Nitroso-diethyl-*m*-amino-phenol

See, 5-Diethylamino-2-nitroso-phenol (*C. A. nomen.*)

***p*-Nitroso-diethyl-aniline**

N:*N*-Diethyl-*p*-nitroso-aniline (*C. A. nomen.*)



$= C_{10}H_{14}N_2O = 178$

STATISTICS.—Imported '14:—very small

FORMATION.—From diethyl-aniline by action of nitrous acid

LITERATURE.—Lange, Zwischenprodukte, #531

Dyes Derived from *p*-Nitroso-diethyl-aniline

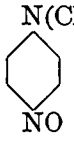
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES			
639	Gallanilic Violet R, B	I '20:— 100	Gallanilide	M
641	Coreine RR	I '14:— 1,320	Gallamide	M
	Coelestine Blue B	I '20:— 44		
646	Coreine AR		Gallamide Aniline [Sulfonation] *or* [Coreine RR, Aniline, Sulfonation]	M

Nitroso-dimethyl-*m*-amino-*p*-cresol

See, 5-Dimethylamino-2-nitroso-*p*-cresol (*C. A. nomen.*)

***p*-Nitroso-dimethyl-aniline**

N: *N*-Dimethyl-*p*-nitroso-aniline (*C. A. nomen.*)



$= C_8H_{10}N_2O = 150$

STATISTICS.—Manufactured '17:— 96,166 lbs.
Manufactured '18:—851,821 lbs.
Manufactured '19:—592,663 lbs.
Manufactured '20:—155,986 lbs.

FORMATION.—From dimethyl-aniline by action of nitrous acid upon a cold solution of the hydrochloride

LITERATURE.—Lange, Zwischenprodukte, #531

Dyes Derived from *p*-Nitroso-dimethyl-aniline

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	INDOPHENOL			
619	Indophenol	M '17:— ? M '18:— ? M '19:—126,611 M '20:— ?	α-Naphthol	V
	OXAZINE AND THIAZINE DYES			
620	Capri Blue G O N	I '14:— 128	3-Diethylamino-*p*-cresol (*OH* = *1*)	B
622	Delphine Blue B	M '17:— ? M '18:— ? M '19.— 43,827 M '20:— 76,719 I '20:— 29,643	Gallic Acid Aniline [Sulfonation] *or* [Aniline on Gallocyanine, Sulfonation]	M
623	Pyrogallol-Cyanine-Sulfonic Acids		Pyrogallol-5-sulfonic Acid	M
624	Modern Violet N	I '20:— 5,688	Gallic Acid [CO_2 removed by heat] *or* [Gallocyanine heated]	M
626	Gallocyanine	I '14:— 78,253 M '17:— ? M '18:—435,460 M '19:—365,243 I '20:— 12,414 M '20:— 70,169	Gallic Acid	M
627	Modern Cyanine		Gallamide Dimethyl-*p*-phenylene-diamine [Reduction] *or* [Gallocyanine; Dimethyl-*p*-phenylene-diamine; Reduction]	M

Dyes Derived from *p*-Nitroso-dimethyl-aniline *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediate Used and Notes*	*Dye Application Class*
	OXAZINE AND THIAZINE DYES *(continued)*			
628	Gallocyanine MS		Gallic Acid [Sulfonation] *or* [Leuco-gallocyanine sulfonated; oxidized]	M
629	Gallogreen DH Modern Blue		Gallic Acid [Formaldehyde] *or* [Formaldehyde on Gallocyanine]	M
630	Cyanazurine		Gallamide Aniline [Reduction]	M
631	Chromocyanine V	M '18:— ? M '19:— ? I '20:— 1,289 M '20:— ?	Gallic Acid [Sulfonation] *or* [Sulfite on Gallocyanine]	M
632	Ultraviolet LGP	I '14:— 4,368	Gallic Acid (2 mols) Nitroso-dimethyl-aniline (2 mols)	M
633	Indalizarine R	I '20:— 551	Gallic Acid [Sulfonation]	M
634	Indalizarine Green		Gallic Acid [Sulfonation; Nitration] *or* [Nitration of Indalizarine]	M
635	Blue 1900 TC Modern Violet	I '20:— 1,933	Gallic Acid [Reduction]	M
636	Prune	I '14:— 3,197 I '20:— 4,418	Gallic Acid Methyl Ester	M

Dyes Derived from *p*-Nitroso-dimethyl-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE AND THIAZINE DYES (*continued*)			
637	Gallamine Blue	I '14:— 2,756 I '20:— 16,446	Gallamide	M
638	Amido Gallamine Blue		Gallamide [Ammonia; Reduction]	M
639	Gallanilic Violet R, B	I '2 :— 100	Gallanilide	M
640	Modern Azurine DH		Gallic Acid Methyl Ester Aniline	M
642	Phenocyanine TC	I '20:— 4,740	Gallic Acid Resorcinol	M
643	Phenocyanine TV	M '17:— ? I '20:— 1,543	Gallic Acid Resorcinol [Sulfonation] *or* [Phenocyanine sulfonated]	M
644	Ultracyanine B		Gallic Acid Resorcinol *or* [Gallocyanine; Resorcinol]	M
645	Gallazine A		Gallic Acid Schaeffer's Acid [Oxidation] *or* [Gallocyanine, Schaeffer's, Oxidation]	M
647	Nitroso Blue MR Resorcine Blue		Resorcinol	MF

Dyes Derived from *p*-Nitroso-dimethyl-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE AND THIAZINE DYES (*continued*)			
649	New Blue R Meldola's Blue Cotton Blue	I '14:— 32,509 M '17:— ? M '18:— 22,613 M '19:— ? I '20:— 5,240 M '20:— ?	β-Naphthol	B
650	New Blue B		β-Naphthol Nitroso-dimethyl-aniline (2 mols)	B
651	New Methylene Blue GG		β-Naphthol [Dimethyl-amine, Oxidation] *or* [Meldola's Blue, Dimethyl-amine, Oxidation]	B
652	New Fast Blue F	I '14:— 2,502	β-Naphthol Hydrol *or* [Meldola's Blue, Hydrol]	B
655	Muscarine		2: 7-Dihydroxy-naphthalene	B
658	Fast Black	I '14:— 1,960 I '20:— 2,883	*m*-Hydroxy-diphenyl-amine	B
659	Methylene Blue	I '14:—185,958 M '17:—268,435 M '18:—312,572 M '19:—465,992 I '20:— 2,053 M '20:—577,264	Dimethyl-aniline [$Na_2S_2O_3$, etc.]	B
660	Methylene Green O	I '14:— 30,812 M '18:— ? M '19:— 2,435 I '20:— 1,047	Dimethyl-aniline [$Na_2S_2O_3$ etc.; Nitration] *or* [Methylene Blue nitrated]	B

Dyes Derived from *p*-Nitroso-dimethyl-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE AND THIAZINE DYES (*continued*)			
661	Thionine Blue GO	I '14:— 18,618 I '20:— 2,030	Ethyl-methyl-aniline [$Na_2S_2O_3$, etc.]	B
	AZINE DYES			
670	Neutral Red	M '18:— ?	*m*-Tolylene-diamine [Oxidation]	B
676	Neutral Blue	I '14:— 615	*N*-Phenyl-β-naphthyl-amine	B
677	Basle Blue R		*N*: *N'*-Ditolyl-2: 7-naphthylene-diamine	B
678	Fast Neutral Violet B	M '17:— ?	*N*: *N'*-Diethyl-*m*-phenylene-diamine	B
681	Methylene Gray O New Fast Gray	I '14:— 29,507 M '17:— ? M '18:— 16,746 M '19:— 28,458 I '20:— 9 M '20:— 31,620	[Boiling with alcohol]	B
682	Nigramine		Aniline	B
684	Rhoduline Violet	I '14:— 2,751 I '20:— 35	N^1-Phenyl-4-*m*-tolylene-diamine *or* N^3-Benzyl-N^1-phenyl-4-*m*-tolylene-diamine	B
685	Tannin Heliotrope	I '14:— 1,398 I '20:— 249	Xylidine	B
689	Indazine M		Nitroso-dimethyl-aniline (1 and 2 mols) Diphenyl-*m*-phenylene-diamine	B

Dyes Derived from *p*-Nitroso-dimethyl-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES (*continued*)			
691	Metaphenylene Blue B	I '14:— 50	*N*:*N'*-Di-*o*-tolyl-*m*-phenylene-diamine	B
692	Naphthazine Blue	I '14:— 6,261 I '20:— 2,249	*N*:*N'*-Di-2-naphthyl-*m*-phenylene-diamine [Sulfonation]	A
703	Rubramine		*o*-Toluidine *p*-Toluidine	B
704	Indamine 3R		*o*-Toluidine	B
705	Indamine 6R	I '14:— 66,170 I '20:— 9,681	*o*-Toluidine *p*-Toluidine	B

p-Nitroso-ethyl-aniline

N-Ethyl-*p*-nitroso-aniline (*C. A. nomen.*)

$= C_8H_{10}N_2O = 150$

FORMATION.—From ethyl-aniline by action of nitrous acid on the solution in strong alcoholic hydrochloric acid

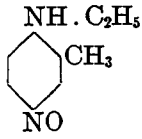
LITERATURE.—*Cf.* Lange, Zwischenprodukte, #529

Dye Derived from *p*-Nitroso-ethyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYE			
684	Rhoduline Red B		N^1-Phenyl-4-*m*-tolylene-diamine *or* N^3-Benzyl-N^1-phenyl-4-*m*-tolylene-diamine	B

p-Nitroso-ethyl-o-toluidine

N-Ethyl-4-nitroso-*o*-toluidine (*C. A. nomen. NHR = 1*)



$= C_9H_{12}N_2O = 164$

FORMATION.—From ethyl-*o*-toluidine in an alcoholic solution of hydrochloric acid, by action of $NaNO_2$ solution in the cold

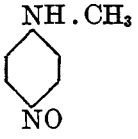
LITERATURE.—Beilstein, Organische Chemie (3d aufl.), II, spl., 248
Cf. Lange, Zwischenprodukte, #529

Dyes Derived from Nitroso-ethyl-o-toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
684	Rhoduline Red G		N^1-Phenyl-4-*m*-tolylene-diamine *or* N^3-Benzyl-N^1-phenyl-4-*m*-tolylene-diamine	B
684	Brilliant Rhoduline Red		N^3-Ethyl-N^1-phenyl-4-*m*-tolylene-diamine	B

p-Nitroso-methyl-aniline

N-Methyl-*p*-nitroso-aniline (*C. A. nomen.*)



$= C_7H_8N_2O = 136$

FORMATION.—From methyl-aniline by action of nitrous acid on the solution in strong alcoholic hydrochloric acid

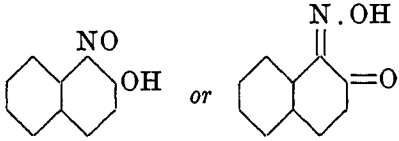
LITERATURE.—Lange, Zwischenprodukte, #529

Dye Derived from *p*-Nitroso-methyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYE			
625	Chrome Heliotrope		Gallic Acid [Reduction]	M

1-Nitroso-2-naphthol (*C. A. nomen.*)

α-Nitroso-β-naphthol



$= C_{10}H_7NO_2 = 173$

STATISTICS.—Manufactured in 1918 and 1919, but in undisclosed quantities

FORMATION.—From β-naphthol by action of nitrous acid

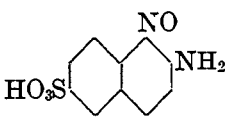
LITERATURE.—Cain, Intermediate Products (2d Ed.), 216
Lange, Zwischenprodukte, #2330

Dyes Derived from 1-Nitroso-2-naphthol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	NITROSO DYE			
2	Gambine Y		[This is 1-Nitroso-2-naphthol]	M
	MONOAZO DYES			
107	Sulfamine Brown A	I '14:— 132 M '18:— ? M '19:— ? I '20:— 2,630 M '20:— ?	α-Naphthylamine	M
116	Sulfamine Brown B		β-Naphthylamine	M
	DISAZO DYES			
331	Alkali Dark Brown GV		Benzidine Gamma Acid	D

1-Nitroso-2-naphthylamine-6-sulfonic Acid

6-Amino-5-nitroso-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_8N_2O_4S = 252$

FORMATION.—One part of 1-nitroso-2-naphthol-6-sulfonic acid (nitroso-Schaeffer's Acid) is heated with one part of 25 per cent ammonia for three hours at 60°

LITERATURE.—Lange, Zwischenprodukte, #2479

Dye Derived from 1-Nitroso-2-naphthylamine-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYE			
675	Rosinduline G		Aniline (2 mols)	A

p-Nitroso-*p*henol

$= C_6H_5NO_2 = 123$

STATISTICS.—Imported '14:—very small amount
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—155,273
Manufactured '20:—167,855

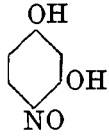
FORMATION.—From phenol by action of nitrous acid in the cold

LITERATURE.—Cain, Intermediate Products (2d Ed.), 111
Lange, Zwischenprodukte, 573

Dye Derived from *p*-Nitroso-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
748	Hydron Blue	I '14 —296,723 I '20.— 19,210 M '20:— ?	Carbazole [S+Na_2S]	V

4-Nitroso-resorcinol



$= C_6H_5NO_3 = 139$

FORMATION.—Resorcinol is dissolved in alcohol, one molecule of caustic soda added, and then gradually one molecule of isoamyl nitrite is introduced with cooling

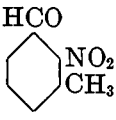
LITERATURE.—Beilstein, Organische Chemie (3d Ed.), II, 923

Dye Derived from 4-Nitroso-resorcinol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYE			
648	Iris Blue		Resorcinol [Bromination]	A

2-Nitro-*m*-tolualdehyde (*C. A. nomen.*)

o-Nitro-tolylaldehyde



$= C_8H_7NO_3 = 165$

FORMATION.—*m*-Tolylaldehyde is nitrated, and then the two isomeric nitro-compounds separated by distillation under reduced pressure

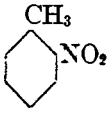
LITERATURE.—Lange, Zwischenprodukte, #758, 759
Ger. Pat. 113,604 Frdl. 6, 128

Dye Derived from 2-Nitro-*m*-tolualdehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYE			
SSS	Indigo MLB/T	I '14:— 10,730 I '20:— 827	2-Nitro-*m*-tolualdehyde (2 mols) [Acetone, NaOH]	V

o-Nitro-toluene (*C. A. nomen.*)

o-Nitro-toluol



$=C_7H_7NO_2=137$

STATISTICS.—Imported '14:— 42,482 lbs.
Manufactured '17:—1,002,822 lbs.
Manufactured '18:—1,240,499 lbs.
Manufactured '19:—1,366,599 lbs.
Manufactured '20:—2,173,279 lbs.

FORMATION.—Toluene is nitrated with mixed nitric and sulfuric acids to a mixture of *o- and p*-nitro-toluenes. The separation is effected by means of fractional distillation and freezing—the *o*-isomer being distilled off and the *p*-body separated as a solid by cooling the still residue

LITERATURE.—Cain, Intermediate Products (2d Ed.), 32
Lange, Zwischenprodukte, #230–233

Dyes Derived from *o*-Nitro-toluene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
513	New Fuchsine O	I '14:— 300 M '18:— ? M '19:— ? M '20:— ?	Anhydro-formaldehyde-*o*-toluidine *or* Diamino-*o*-di-tolyl-methane *o*-Toluidine	B

***p*-Nitro-*t*oluene** (*C. A. nomen.*)

p-Nitro-toluol

$= C_7H_7NO_2 = 137$

STATISTICS.—Imported '14:—very small
Manufactured '17:—567,314 lbs.
Manufactured '18:—670,645 lbs.
Manufactured '19:—1,263,056 lbs.
Manufactured '20:—2,004,089 lbs.

FORMATION.—Toluene is nitrated with mixed nitric and sulfuric acids to a mixture of *o- and p*-nitro-toluene. The separation is effected by means of fractional distillation and freezing,—the *o*-isomer being distilled off and the *p*-body separated as a solid by cooling the still residue

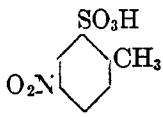
LITERATURE.—Cain, Intermediate Products (2d Ed.), 32
Lange, Zwischenprodukte, #230–233

Dye Derived from *p*-Nitro-toluene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
498	Turquoise Blue	I '14:— 1,541 I '20:— 1,407	Hydrol *or* 4: 4′-Tetraethyl-diamino-benzohydrol	B

5-Nitro-*o*-toluene-sulfonic Acid (*C. A. nomen. $SO_3H = 1$*)

p-Nitro-toluene-*o*-sulfonic Acid (*$CH_3 = 1$*)



$= C_7H_7NO_5S = 217$

STATISTICS.—Manufactured '20:— ?

FORMATION.—From *p*-nitro-toluene by sulfonation with oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 34
Lange, Zwischenprodukte, #837

Dyes Derived from 5-Nitro-*o*-toluene-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	STILBENE DYES			
9	Sun Yellow Direct Yellow R	I '14:—232,688 M '17:—420,685 M '18:—307,702 M '19:—440,924 I '20:— 1,404 M '20:—348,849	*p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) [Alkalies]	D
10	Mikado Yellow Stilbene Yellow	I '14:— 85,795 M '18:— ? M '19:— ?	*p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) [Alkalies; Oxidation]	D

Dyes Derived from 5-Nitro-*o*-toluene-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	STILBENE DYES (*continued*)			
11	Mikado Orange Chloramine Orange G	I '14:— 26,010 M '17:— ? M '18:— ? M '19:— ? M '20:— 38,287	*p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) [Alkalies; Oxidation]	D
12	Diphenyl Citronine G		*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) Aniline (2 mols)	D
13	Polychromine B Diphenyl Orange RR	I '14:— 16,113 M '18:— ?	*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) *p*-Phenylene-diamine (2 mols)	D
14	Diphenyl Chrysoine	I '14:— 9,898	*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) *p*-Amino-phenol (2 mols) [Ethylation]	D
15	Chicago Orange G		Benzidine	D
16	Curcuphenine		*p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) Dehydro-thio-*p*-toluidine-sulfonic Acid (2 mols)	D
17	Chlorophenine		*p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) Dehydro-thio-*p*-toluidine-sulfonic Acid (2 mols) [Reduction]	D

Dyes Derived from 5-Nitro-*o*-toluene-sulfonic Acid (*continued*)

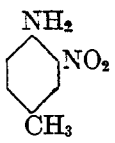
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dyes			
205	Diphenyl Chrysoine RR		*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) *p*-Phenylene-diamine (2 mols) Phenol [Ethylation]	D
206	Diphenyl Catechine G	I '14:— 8,642	*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) *p*-Phenylene-diamine (2 mols) Dimethyl-gamma Acid	D
207	Diphenyl Fast Brown G	I '14:— 992	*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) *p*-Phenylene-diamine (2 mols) Phenyl-gamma Acid	D

_p_-Nitro-toluene-o-sulfonic Acid (*$CH_3=1$*)

See, 5-Nitro-*o*-toluene-sulfonic Acid (*C. A. nomen. $SO_3H=1$*)

2-Nitro-_p_-toluidine (*C. A. nomen. $NH_2=1$*)

m-Nitro-*p*-toluidine ($CH_3=1$)



$=C_7H_8N_2O_2=152$

Statistics.—Imported '14:—10,513 lbs.
Manufactured '17:— ?
Manufactured '18:—24,415 lbs.
Manufactured '19:—58,454 lbs.
Manufactured '20:—71,197 lbs.

FORMATION.—From acetyl-*p*-toluidine by nitration

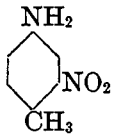
LITERATURE.—Cain, Intermediate Products (2d Ed.), 58
Lange, Zwischenprodukte, #790

Dye Derived from 2-Nitro-*p*-toluidine (*N H₂ = 1*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
73	Pigment Fast Red HL Lithol Fast Red RL Lithol Fast Scarlet	I '14:— 49,708 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,001 M '20:— ?	β-Naphthol	CL

3-Nitro-*p*-toluidine (*C. A. nomen. N H₂ = 1*)

o-Nitro-*p*-toluidine (*CH₃ = 1*)



$= C_7H_8N_2O_2 = 152$

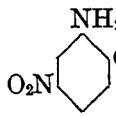
STATISTICS.—20,737 lbs. imported in fiscal year 1914

FORMATION.—From dinitro-toluene by partial reduction, using iron and sulfur dioxide

LITERATURE.—Lange, Zwischenprodukte, #536, 539, 790, 791

5-Nitro-*o*-toluidine (*C. A. nomen. N H₂ = 1*)

p-Nitro-*o*-toluidine ($CH_3 = 1$)



$= C_7H_8N_2O_2 = 152$

STATISTICS.—Imported '14:—30,642 lbs.
Manufactured '20:— ?

FORMATION.—From *o*-toluidine by nitration

LITERATURE.—Cain, Intermediate Products (2d Ed.), 58
Lange, Zwischenprodukte, 790

Dyes Derived from 5-Nitro-*o*-toluidine ($NH_2=1$)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	NITRO DYE			
8	Pigment Chlorine	M '19:— ? M '20:— ?	5-Nitro *o*-toluidine (2 mols)	CL
	MONOAZO DYE			
72	Pigment Orange R		β-Naphthol	CL MF

***m*-Nitro-*p*-toluidine** ($CH_3=1$)

See, 2-Nitro-*p*-toluidine (*C. A. nomen.* $NH_2=1$)

***o*-Nitro-*p*-toluidine** ($CH_3=1$)

See, 3-Nitro-*p*-toluidine (*C. A. nomen.* $NH_2=1$)

***p*-Nitro-*o*-toluidine** ($CH_3=1$)

See, 5-Nitro-*o*-toluidine (*C. A. nomen.* $NH_2=1$)

***o*-Nitro-toluol**

See, *o*-Nitro-toluene (*C. A. nomen.*)

***p*-Nitro-toluol**

See, *p*-Nitro-toluene (*C. A. nomen.*)

o-Nitro-tolylaldehyde

See, 2-Nitro-*m*-tolualdehyde (*C. A. nomen.*)

3-Nitro-1:2:6-trihydroxy-anthraquinone

See, 3-Nitro-flavopurpurin (*C. A. nomen.*)

NW Acid

See, Nevile-Winther's Acid

Ortho = o

Note.—This is not considered in the alphabetical arrangement, e.g., ortho-Toluidine is indexed as o-Toluidine under "T." However, o-Toluidine precedes p-Toluidine

Oxy-compounds

See, Hydroxy-compounds

Oxy-juglone

See, Naphthazarin

α-Oxy-naphthoic Acid

See, 1-Hydroxy-2-naphthoic Acid

β-Oxy-naphthoic Acid

See, 3-Hydroxy-2-naphthoic Acid

α-Oxy-naphthoic-sulfonic Acid

1-Hydroxy-2-naphthoic-4-sulfonic Acid (*not considered herein*)

β-Oxy-naphthoic-sulfonic Acid L

2-Hydroxy-3-naphthoic-6-sulfonic Acid (*not considered herein*)

β-Oxy-naphthoic-sulfonic Acid S

2-Hydroxy-3-naphthoic-8-sulfonic Acid (*not considered herein*)

Para = *p*

Note.—This is not considered in the alphabetical arrangement, e.g., para-Nitro-aniline is indexed as p-Nitro-aniline under "N." However, p-Nitro-aniline follows m-Nitro-aniline

Peri Acid

See, 1-Naphthylamine-8-sulfonic Acid

Peri-naphthylene-diamine

1: 8-Naphthylene-diamine (*not considered herein*)

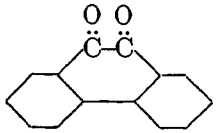
Phenanthraquinone

See, *Phenanthrene-quinone*

Phenanthrene-quinone (*C. A. nomen.*)

9: 10-Dihydro-9: 10-diketo-phenanthrene

Phenanthraquinone



$=C_{14}H_8O_2=208$

FORMATION.—From phenanthrene by oxidation with sodium bichromate and sulfuric acid

LITERATURE.—Lange, Zwischenprodukte, 648
Green, Organic Coloring Matters (1908), 65

Dye Derived from Phenanthrene-quinone

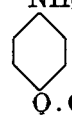
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYE			
668	Flavinduline O	I '14:— 660	*o*-Amino-diphenylamine	B

Phenanthroquinolinone (*C. A. nomen.*)

See, Benzanthrone-quinoline

***p*-Phenetidine** (*C. A. nomen.*)

p-Amino-phenol Ethyl Ether



$=C_8H_{11}NO=137$

STATISTICS.—Imported '14:—125,524 lbs.
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:— ?

FORMATION.—From *p*-amino-phenol by ethylation of the hydroxyl. Before ethylation the amino group is protected; for example, by forming the benzylidine compound by treatment of the *p*-amino-phenol with benzaldehyde

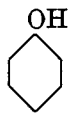
LITERATURE.—Lange, Zwischenprodukte, #590

Dye Derived from *p*-Phenetidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
584	XANTHONE DYE Fast Acid Blue R	I '14:— 4,022 I '20:— 130	*p*-Phenetidine (2 mols) 3:6-Dichloro-phthalic Anhydride Resorcinol (2 mols) [PCl_5; Sulfonation]	A

Phenol (*C. A. nomen.*)

Carbolic Acid



$=C_6H_6O=94$

STATISTICS.—Imported '14:— 10,108,781 lbs.
Manufactured '17:— 64,146 499 lbs.
Manufactured '18:—106,794,277 lbs.
Manufactured '19:— 1,543,659 lbs.
Manufactured '20:— ?

FORMATION.—(1) By distillation from coal tar. (2) By synthesis from benzene, in which case the benzene is sulfonated to benzene-sulfonic acid, which is then fused with caustic soda

LITERATURE.—Cain, Intermediate Products, 104
Lange, Zwischenprodukte, #142–145

Dyes Derived from Phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	NITRO DYE			
5	Picric Acid	M '19:— ? M '20:— ?		B
	MONOAZO DYES			
125	Diazine Black	I '14:— 2,630 I '20:— 701	*p*-Tolylene-diamine *o*-Toluidine Aniline *or* *o*-Toluidine *or* [Safranine]	B
205	Diphenyl Chrysoine RR		*p*-Nitro-toluene-*o*-sulfonic Acid *p*-Phenylene-diamine	D
	DISAZO DYES			
303	Brilliant Yellow	I '14:—278,000	Diamino-stilbene-disulfonic Acid	D
	Paper Yellow	M '17:— ? M '18:— 1,664 M '19:— 48,723 I '20:— 126 M '20:— 91,218	Phenol (2 mols)	A
304	Chrysophenine G	I '14:—157,799 M '17:— ? M '18:— 41,663 M '19:— 86,795 I '20:— 3,661 M '20:—247,202	Diamino-stilbene-disulfonic Acid Phenol (2 mols) [Ethylation]	D
315	Congo Orange G	I '14:— 1,623 I '20:— 75	Benzidine Amino-R Acid [Ethylation]	D
319	Diamine Scarlet B	I '14:— 41,175 I '20:— 10,565	Benzidine G Acid	D
373	Congo Orange R	I '14:— 7,027 I '20:— 254	Tolidine Amino-R Acid [Ethylation]	D

Dyes Derived from Phenol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
404	Diamine Yellow N	M '17:— ? I '20:— 313	Ethoxy-benzidine Salicylic Acid [Ethylation]	D
431	Diamine Golden Yellow		1: 5-Naphthylene-diamine-3: 7-disulfonic Acid Phenol (2 mols) [Ethylation]	D
	TRISAZO DYES			
464	Erie Direct Green ET	M '17:— ? M '18:— ? M '19:— 69,700 M '20:— ?	Benzidine H Acid Aniline	D
467	Diphenyl Green G	I '20:— 2,205	Benzidine H Acid *o*-Chloro-*p*-nitro-aniline	D
470	Chloramine Green B	I '14:— 1,675 M '19:— ? M '20:— ?	Benzidine H Acid 2: 5-Dichloro-aniline	D
474	Diamine Green B Oxamine Green B	I '14:— 77,100 M '17:— ? M '18:—295,147 M '19:—305,854 I '20:— 2,460 M '20:—420,138	Benzidine H Acid *p*-Nitro-aniline	D
	TRIPHENYL-METHANE DYES			
515	Methyl Violet	I '14:—255,063 M '17:—375,107 M '18:—632,196 M '19:—574,436 I '20:— 3,312 M '20:—600,873	Dimethyl-aniline (3 mols)	B

Dyes Derived from Phenol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
517	Methyl Violet 5B Benzyl Violet	I '14:— 22,387 M '17:— ? I '20:— 3,313	[Benzylation of Methyl Violet] *or* Dimethyl-aniline (3 mols) Benzyl Chloride	B
519	Methyl Green		[Methyl Chloride of Methyl Violet] *or* Dimethyl-aniline (3 mols) [Methyl Chloride]	B
555	Aurine	I '14:— 784 M '18:— ? I '20:— 336	Phenol (3 mols) [Heated with oxalic and sulfuric acids]	ss CL
556	Red Coralline		[Aurine treated with ammonia] *or* Phenol (3 mols) [Heated with oxalic and sulfuric acid; treated with ammonia]	CL
	AZINE DYE			
693	Milling Blue	I '14:— 3,082	Aniline (2 mols) Phenyl-α-naphthyl-amine (2 mols) [Sulfonation]	M
	SULFUR DYES			
718	St. Denis Black B		*p*-Phenylene-diamine Nitro-benzene [S_2Cl_2, S, Na_2S]	S

Dyes Derived from Phenol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES (*continued*)			
732	Autogene Black	I '14:— 7,495	4-Amino-4′-hydroxy-diphenylamine *or* 2:4-Diamino-4′-hydroxy-diphenylamine [S_2Cl_2; S+Na_2S]	S
	ANTHRAQUINONE AND ALLIED DYES			
775	Alizarin Dark Green W		Naphthazarin *or* Dinitro-naphthalene	M

Phenyl-*p*-amino-benzyl-*o*-toluidine (CH_3=1)

See, N^3-Benzyl-N^1-phenyl-4-*m*-tolylene-diamine (NH_2=*1*)

Phenyl-*p*-amino-ethyl-*o*-toluidine (CH_3=1)

See, N^3-Ethyl-N^1-phenyl-4-*m*-tolylene-diamine (NH_2=*1*)

4-Phenylamino-4′-hydroxy-diphenylamine

p-(*p*-Anilino-anilino)-*p*henol (C. A. nomen.)

$=C_{18}H_{16}N_2O=276$

FORMATION.—(1) From *p*-amino-diphenylamine and phenol by oxidation in acid solution and then reduction of the indophenol. (2) From diphenylamine and *p*-amino-phenol (*p*-nitroso-phenol) by oxidation and then reduction of the indophenol

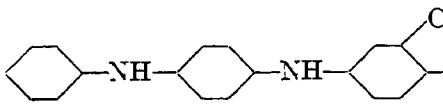
LITERATURE.—Cain, Intermediate Products (2d Ed.), 76
Lange, Zwischenprodukte, #1721
Lange, Schwefelfarbstoffe, 161

Dye Derived from 4-Phenylamino-4′-hydroxy-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
735	SULFUR DYE Pyrogene Indigo	I '14:— 22,661	[S+Na_2S]	S

4-Phenylamino-4′-hydroxy-(phenyl-3′-tolylamine)

4-(*p*-Anilino-anilino)-*o*-cresol (*C. A. nomen. OH = 1*)



$= C_{19}H_{18}N_2O = 290$

FORMATION.—From *p*-amino-diphenylamine and *o*-cresol by oxidation and subsequent reduction of the indophenol formed

LITERATURE.—Lange, Zwischenprodukte, #1721

Dye Derived from 4-Phenylamino-4′-hydroxy-(phenyl-3′-tolylamine)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
735	SULFUR DYE Pyrogene Indigo	I '14:— 22,661	[S+Na_2S]	S

2-Phenylamino-8-naphthol-6-sulfonic Acid

See, Phenyl-gamma Acid

Phenyl-*m*-amino-phenol

See, *m*-Hydroxy-diphenylamine

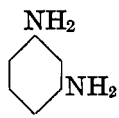
Phenyl-*p*-amino-*o*-toluidine

See, N^1-Phenyl-4-*m*-tolylene-diamine

Phenyl-azo-aniline (*C. A. nomen.*)

See, Amino-azo-benzene

***m*-Phenylene-diamine**



$= C_6H_8N_2 = 108$

STATISTICS.—Manufactured '17:—220,956 lbs.
Manufactured '18:—641,299 lbs.
Manufactured '19:—609,789 lbs.
Manufactured '20:—658,313 lbs.

FORMATION.—From *m*-dinitro-benzene by reduction with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 85
Lange, Zwischenprodukte, #550

Dyes Derived from *m*-Phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
33	Chrysoidine Y	I '14:— 63,303 M'17:—195,756 M'18:—376,495 M'19:—314,581 M'20:—585,648	Aniline	B
88	Acid Anthracene Brown R	I '14:— 33,053 M'17:— ? M'19:— ? I' 20:— 1,400 M'20:— ?	Picramic Acid [Substituted phenylene-diamine-sulfonic Acids]	ACr
89	Metachrome Brown B	I '14:— 1,001 M'17:— ? M'18:—349,961 M'19:— ? M'20:—192,914	Picramic Acid	M

Dyes Derived from *m*-Phenylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
154	Acid Alizarine Brown B Palatine Chrome Brown W	I '14:— 18,264 M '17:— ? M '18:— ? M '19:— ? I '20:— 845 M '20:— ?	*o*-Amino-phenol-*p*-sulfonic Acid	M
190	Alkali Brown Benzo Brown 5R	M '19:— ? M '20:— 2,987	Dehydro-thio-*p*-toluidine-sulfonic Acid *or* Primuline	D
	DISAZO DYES			
208	Leather Brown	I '14:— 500 M '19:— ? M '20:— ?	*p*-Phenylene-diamine (2 mols)	B
209	Terracotta FC	I '14:— 551	Primuline *or* Dehydro-thio-*p*-toluidine-sulfonic Acid Naphthionic Acid	D
239	Azotol C		*p*-Amino-acetanilide β-Naphthol	MF
283	Bismarck Brown	I '14:— 35,020 M '17:—309,857 M '18:—378,208 M '19:—412,574 M '20:—514,218	*m*-Phenylene-diamine (3 mols)	B
285	Toluylene Brown G		3:5-Diamino-*p*-toluene-sulfonic Acid	D
329	Diamine Brown V	M '19:— ?	Benzidine Gamma Acid	D

Dyes Derived from *m*-Phenylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES			
435	Janus Brown B		Trimethyl-*m*-amino-phenyl-ammonium Chloride *or* *p*-Amino-benzyl-diethylamine α-Naphthylamine *or* *m*-Toluidine Aniline	B
436	Columbia Black FF	I '14:—402,997 M '18:— ? M '19:— ? I '20:— 23,350 M '20:— ?	1-Naphthylamine-6-*and* 7-sulfonic Acids *p*-Phenylene-diamine Gamma Acid	D
437	Isodiphenyl Black R		*p*-Phenylene-diamine Gamma Acid Resorcinol	D
448	Diamine Bronze G	I '14:— 4,449	Benzidine Salicylic Acid H Acid	D
449	Trisulfon Brown B	I '14:— 16,781 I '20:— 38,616	Benzidine Salicylic Acid 2R Acid	D
454	Trisulfon Brown G	I '14:— 1,323	Tolidine Salicylic Acid 2R Acid	D
457	Trisulfon Brown GG	I '14 — 7,562 I '20:— 38,411	Dianisidine Salicylic Acid 2R Acid	D

Dyes Derived from *m*-Phenylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
458	Carbon Black		*p*-Phenylene-diamine-sulfonic Acid (from *p*-nitro-aniline-*o*-sulfonic Acid) 1-Naphthylamine-6(7)-sulfonic Acid *m*-Phenylene-diamine (2 mols)	D
461	Coomassie Union Black		1:4-Naphthylene-diamine-2-sulfonic Acid Gamma Acid *m*-Phenylene-diamine (2 mols)	D
462	Erie Direct Black GX Direct Deep Black EW	I '14:— 1,246,536 M '17:— ? M '18:— ? M '19:— 7,250,007 M '20:— 7,736,994	Benzidine Aniline H Acid	D
469	Chloramine Black N	I '14:— 39,600 M '19:— ? I '20:— 1,763 M '20:— ?	Benzidine H Acid 2:5-Dichloro-aniline	D
476	Benzamine Brown 3GO	I '14:— 16,988 M '17:— ? M '18:— ? M '19:— ? M '20:—623,757	Benzidine Sulfanilic Acid Salicylic Acid	D
479	Dianil Black R		Benzidine Naphthionic Acid Chromotropic Acid	D

Dyes Derived from *m*-Phenylene-diamine (*continued*)

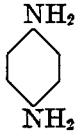
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TETRAKISAZO DYES			
485	Benzo Brown G	I '14:— 41,905 M'17:— ? M'18:— ? M'19:— 83,506 I '20:— 2,286 M'20:—109,648	Sulfanilic Acid (2 mols) *m*-Phenylene-diamine (3 mols)	D
486	Direct Brown J	I '14:— 3,640	*m*-Amino-benzoic Acid (2 mols) *m*-Phenylene-diamine (3 mols)	D
487	Benzo Brown B	I '14:— 438 M'20:— ?	Naphthionic Acid (2 mols) *m*-Phenylene-diamine (3 mols)	D
488	Toluylene Brown R	I '14:— 201	Naphthionic Acid (2 mols) 3:5-Diamino-*p*-toluene-sulfonic Acid *m*-Phenylene-diamine (2 mols)	D
490	Cotton Brown A	I '14:— 29,074	Benzidine Naphthionic Acid (2 mols) *m*-Phenylene-diamine (2 mols)	D
491	Dianil Black PR		Benzidine-sulfonic Acid Gamma Acid (2 mols) *m*-Phenylene-diamine (2 mols)	D
492	Anthracene Acid Brown B		Amino-salicylic Acid (2 mols) 1-Naphthylamine-6-sulfonic Acid (2 mols)	M ACr

Dyes Derived from *m*-Phenylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ACRIDINE DYE			
607	Rheonine	I '14:— 19,704	Ketone	B
	AZINE DYE			
669	Neutral Violet		Dimethyl-*p*-phenylene-diamine (2 mols) [Oxidation]	

p-Phenylene-diamine

Note.—In a number of cases where p-phenylene-diamine was apparently used, actually its acetyl-derivative p-amino-acetanilide, or even p-nitro-aniline, was employed; and after the first coupling, the second amino group was then freed and diazotized. Here both compounds are generally indexed.



$= C_6H_8N_2 = 108$

STATISTICS.—Imported '14:— 11,088 lbs.
Manufactured '17:—272,056 lbs.
Manufactured '18:—215,148 lbs.
Manufactured '19:—234,332 lbs.
Manufactured '20:— ?

FORMATION.—(1) From amino-azo-benzene by reduction. (2) From *p*-nitro-aniline by reduction

LITERATURE.—Cain, Intermediate Products (2d Ed.), 87
Lange, Zwischenprodukte, ₰552–555

Dyes Derived from *p*-Phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	STILBENE DYE			
13	Polychromine B Diphenyl Orange RR	I '14:— 16,113 M '18:— ?	*p*-Phenylene-diamine (2 mols) *p*-Nitro-toluene-*o*-sulfonic Acid (2 mols)	D
	MONOAZO DYES			
61	Victoria Violet	I '14:— 52,365 M '17:— ? M '18:— ? M '19:—105,086 I '20:— 2,182 M '20:— ?	Chromotropic Acid [The *p*-Phenylene-diamine from *p*-Nitro-aniline *or* *p*-Amino-acetanilide]	A
205	Diphenyl Chrysoine RR		*p*-Phenylene-diamine (2 mols) *p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) Phenol [Ethylation]	D
206	Diphenyl Catechine G	I '14:— 8,642	*p*-Phenylene-diamine (2 mols) *p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) Dimethyl-gamma Acid	D
207	Diphenyl Fast Brown G	I '14:— 992	*p*-Phenylene-diamine (2 mols) *p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) Phenyl-gamma Acid	D
	DISAZO DYES			
208	Leather Brown	I '14:— 500 M '19:— ? M '20:— ?	*p*-Phenylene-diamine (2 mols) *m*-Phenylene-diamine	B
290	Violet Black		Nevile-Winther's Acid α-Naphthylamine	D
291	Azo Alizarin Bordeaux W		Salicylic Acid Nevile-Winther's Acid	M

Dyes Derived from *p*-Phenylene-diamine (*continued*)

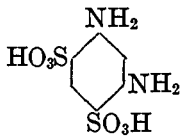
Schultz Number or Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
292	Azo Alizarin Black I		Salicylic Acid Chromotropic Acid	M
	TRISAZO DYES			
436	Columbia Black FF	I '14:—402,997 M '18:— ? M '19:— ? I '20:— 23,350 M '20:— ?	1-Naphthylamine-6-*and*-7-sulfonic Acids Gamma Acid *m*-Phenylene-diamine	D
437	Isodiphenyl Black R		Gamma Acid Resorcinol *m*-Phenylene-diamine	D
	OXAZINE DYE			
621	Cresyl Blue 2BS		5-Dimethylamino-2-nitroso-*p*-cresol	B
	AZINE DYES			
695	Paraphenylene Violet	I '20:— 337	α-Amino-azo-naphthalene	B
701	Paraphenylene Blue R		Amino-azo-benzene	B
702	Para Blue		Aniline (3–4 mols) *o*-Toluidine *p*-Toluidine *or* [Spirit Blue]	B
	SULFUR DYES			
713	Thiophor Bronze 5G	M '19:— ?	[*p*-Amino-acet-black] [Sulfur]	S
714	Thiophor Yellow Bronze C		*p*-Amino-acetanilide Benzidine [Sulfur]	S
718	St. Denis Black B		Phenol Nitro-benzene [S_2Cl_2, S, Na_2S]	S

Dyes Derived from *p*-Phenylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
727	Auronal Black B		1-Chloro-2: 4-dinitro-benzene [Glycerol; S+Na_2S]	S
	ANILINE BLACK GROUP			
923	Ursol D, DB		[Oxidation on hair]	Fur

m-Phenylene-diamine-disulfonic Acid

4: 6-Diamino-*m*-benzene-disulfonic Acid (*C. A. nomen.* $SO_3H = 1$)



$= C_6H_8N_2O_6S_2 = 268$

FORMATION.—From *m*-phenylene-diamine hydrochloride by treating it with five parts of 40 per cent oleum, heating at 100° for several hours, then at 120° for 6–10 hours

LITERATURE.—Lange, Zwischenprodukte, #1146, 1147
Green, Organic Coloring Matters (1908), 36

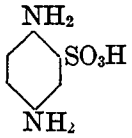
Dyes Derived from *m*-Phenylene-diamine-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
192	Cotton Orange G	I '14:— 1,877	Primuline	D
	DISAZO DYES			
210	Cotton Orange R	I '14:— 16,459 I '20:— 51	Primuline-sulfonic Acid Metanilic Acid	D
306	Pyramine Orange 3G	I '14:— 7,863 I '20·— 396	Benzidine Nitro-*m*-phenylene-diamine	D

p-Phenylene-diamine-sulfonic Acid

2: 5-Diamino-benzene-sulfonic Acid (*C. A. nomen.*)

Note.—As a rule this compound is not used as such, being formed as the azo derivative in the dye molecule from the reduction of the azo derivative of p-nitro-aniline-o-sulfonic acid



$= C_6H_8N_2O_3S = 188$

FORMATION.—From *p*-nitro-aniline-*o*-sulfonic acid by reduction

LITERATURE.—Lange, Zwischenprodukte, #920–924

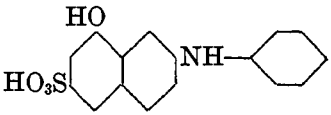
Dye Derived from *p*-Phenylene-diamine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
458	TRISAZO DYE Carbon Black		1-Naphthylamine-6(7)-sulfonic Acid *m*-Phenylene-(Tolylene-)diamine *or* 1: 3-Naphthylene-diamine-6-sulfonic Acid (2 mols)	D

Phenyl-gamma Acid

2-Phenylamino-8-naphthol-6-sulfonic Acid

7-Anilino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)



$= C_{16}H_{13}NO_4S = 315$

FORMATION.—From gamma acid (2-amino-8-naphthol-6-sulfonic acid) by heating with aniline and aniline hydrochloride at 160°

LITERATURE.—Lange, Zwischenprodukte, #2846–2847

Dyes Derived from Phenyl-gamma Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
207	Diphenyl Fast Brown G	I '14:— 992	*p*-Nitro-toluene-*o*-sulfonic Acid *p*-Phenylene-diamine	D
	DISAZO DYES			
349	Diamine Brown B	I '20:— 24	Benzidine Salicylic Acid	D
	TRISAZO DYE			
445	Crumpsall Direct Fast Brown O		Benzidine Salicylic Acid Aniline	D

Phenyl-glycine

N-Phenyl-glycine (*C. A. nomen.*)

$= C_8H_9NO_2 = 151$

STATISTICS.—Manufactured '17:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By action of chloro-acetic acid on aniline

LITERATURE.—Cain, Intermediate Products (2d Ed.), 153
Lange, Zwischenprodukte, #96–109, 111

Dyes Derived from Phenyl-glycine

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	INDIGO GROUP DYES			
874	Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 I '20:—520,347 M '20:— 18,178,231	Phenyl-glycine (2 mols) [Sodamide]	V
876	Indigo MLB Indigo White		Phenyl-glycine (2 mols) [Sodamide, Reduction] *or* [Indigo, Reduction]	V
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 I '20:— 5,512 M '20:— 1,395,000	Phenyl-glycine (2 mols), etc. *or* [Indigo, Sulfonation]	A
878	Indigotine P		Phenyl-glycine (2 mols), etc. *or* [Indigo, Sulfonation]	A
879	Brom Indigo Rathjen Indigo MLB. RR	I '14:— 53,640 M '20:— ?	Phenyl-glycine (2 mols), etc. *or* [Indigo, Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	Phenyl-glycine (2 mols), etc. *or* [Indigo, Bromination]	V

Dyes Derived from Phenyl-glycine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Phenyl-glycine (2 mols), etc. *or* [Indigo, Bromination]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	Phenyl-glycine (2 mols), etc. *or* [Indigo, Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Phenyl-glycine (2 mols), etc. *or* [Indigo, Bromination]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Phenyl-glycine (2 mols), etc. *or* [Indigo, Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,117 I '20:— 3,503	Phenyl-glycine (2 mols), etc. *or* [Indigo, Chlorination]	V
886	Brilliant Indigo BASF/G	I '14:— 12,057	Phenyl-glycine (2 mols), etc. *or* [Indigo, Chlorination, Bromination]	V
889	Indigo Yellow 3G		Phenyl-glycine (2 mols), etc. Benzoyl chloride *or* [Indigo, Benzoyl chloride]	V

Dyes Derived from Phenyl-glycine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYE (*continued*)			
890	Ciba Yellow G	I '14:— 48	Phenyl-glycine (2 mols), etc. Benzoyl chloride *or* [Indigo, Benzoyl chloride, Bromination]	V

Phenyl-glycine-*o*-carboxylic Acid

N-(Carboxy-methyl)-anthranilic Acid (*C. A. nomen.*)

$= C_9H_9NO_4 = 195$

FORMATION.—Phthalic anhydride is converted through phthalimide into anthranilic acid. This latter by reaction with chloro-acetic acid forms the phenyl-glycine-*o*-carboxy acid

LITERATURE.—Lange, Zwischenprodukte, #379, 383-393

Dyes Derived from Phenyl-glycine-*o*-carboxylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
874	Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 I '20:—520,347 M '20:— 18,178,231	Phenyl-glycine-*o*-carboxylic Acid (2 mols) [Sodamide]	V

Dyes Derived from Phenyl-glycine-*o*-carboxylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dy. Application Class*
	INDIGO GROUP DYES (*continued*)			
876	Indigo MLB Indigo White		Phenyl-glycine-*o*-carboxylic Acid (2 mols) [Sodamide, Reduction] *or* [Indigo, Reduction]	V
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 I '20:— 5,512 M '20:— 1,395,000	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Sulfonation]	A
878	Indigotine P		Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Sulfonation]	A
879	Bromo Indigo Rathjen Indigo MLB/RR	I '14:— 53,610 M '20:— ?	Phenyl-glycine-*o*-carboxylic Acid (2 mols) etc. *or* [Indigo, Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Bromination]	V
881	**Dian**threne Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Bromination]	V

Dyes Derived from Phenyl-glycine-*o*-carboxylic Acid (*continued*)

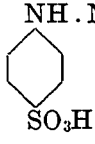
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
882	Indigo MLB/5B Ciba Blue G	I '14:— 4,356 I '20:— 1,002	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Bromination]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Chlorination]	V
886	Brilliant Indigo BASF/G	I '14:— 12,057	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Bromination, Chlorination]	V
889	Indigo Yellow 3G		Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. Benzoyl chloride *or* [Indigo, Benzoyl chloride]	V

Dyes Derived from Phenyl-glycine-*o*-carboxylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
890	Ciba Yellow G	I' 14:— 48	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. Benzoyl chloride [Bromination] *or* [Indigo Yellow 3G, Bromination]	V

Phenyl-hydrazine-*p*-sulfonic Acid

p-Hydrazino-benzene-sulfonic Acid (*C. A. nomen.*)



$= C_6H_8N_2O_3S = 188$

STATISTICS.—Manufactured '20:—441,117 lbs.

FORMATION.—(1) Sulfanilic acid is diazotized and then reduced with sodium bisulfite. (2) Aniline is diazotized and reduced with sodium bisulfite, forming phenyl-hydrazine, which is then sulfonated with 66° sulfuric acid at 100°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 49
Lange, Zwischenprodukte, #629

Dyes Derived from Phenyl-hydrazine-*p*-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYES			
19	Flavazine L Fast Light Yellow	I '14:— 38,908 I '20:— 9,327	Aniline [Ethyl Aceto-acetate]	A
20	Flavazine S	I '14:— 81,375 I '20:— 1,500	Aniline [Ethyl Oxal-acetate]	A

Dyes Derived from Phenyl-hydrazine-*p*-sulfonic Acid (*continued*)

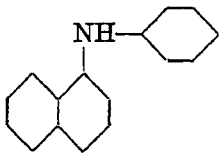
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYES (*continued*)			
23	Tartrazine	I '14:—272,477 M '17:— ? M '18:— ? M '19:— ? I '20:— 47,877 M '20:—701,722	Phenyl-hydrazine-*p*-sulfonic Acid (2 mols) Dihydroxy-tartaric Acid *or* Sulfanilic Acid [Ethyl Oxal-acetate]	A
27	Dianil Yellow 2R		Primuline-sulfonic Acid [Ethyl Aceto-acetate]	D

1-Phenyl-3-methyl-5-pyrazolone

See, 3-Methyl-1-phenyl-5-pyrazolone

Phenyl-α-naphthylamine

N-Phenyl-1-naphthylamine (*C. A. nomen.*)



$= C_{16}H_{13}N = 219$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—From α-naphthylamine hydrochloride and aniline by heating together

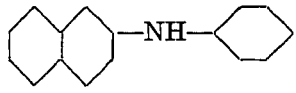
LITERATURE.—Cain, Intermediate Products (2d Ed.), 187
Cf. Lange, Zwischenprodukte, #2827
Thorpe, Dic. Chemistry, **3**, 587

Dyes Derived from Phenyl-α-naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
263	Jet Black R		Aniline-2:4-disulfonic Acid α-Naphthylamine	A
361	Sulfonazurine	I '14:— 300	Benzidine-sulfon-disulfonic Acid Phenyl-α-naphthylamine (2 mols)	D
	DIPHENYL-NAPHTHYLMETHANE DYE			
559	Victoria Blue B	I '14:—127,769 M '17:— ? M '18:— ? M '19:— ? I '20:— 11,782 M '20:— ?	Ketone *or* Hydrol	B
	AZINE DYE			
693	Milling Blue	I '14:— 3,082	Aniline (2 mols) Phenyl-α-naphthylamine (2 mols) Phenol [Sulfonation]	M

Phenyl-β-naphthylamine

N-Phenyl-2-naphthylamine (*C. A. nomen.*)



$= C_{16}H_{13}N = 219$

FORMATION.—From β-naphthol and aniline (or hydrochloride) by heating together in an open vessel to around 200°

LITERATURE.—Lange, Zwischenprodukte, #2827
Thorpe, Dic. Chemistry, **3**, 599

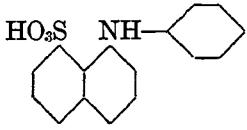
Dye Derived from Phenyl-β-naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYE			
676	Neutral Blue	I '14:— 615	Nitroso-dimethyl-aniline	B

Phenyl-1-naphthylamine-8-sulfonic Acid

8-Anilino-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

Phenyl-peri Acid



$= C_{16}H_{13}NO_3S = 299$

STATISTICS.—Imported '14:—9,139 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—1-Naphthylamine-8-sulfonic acid, aniline, and aniline hydrochloride are heated together in an autoclave

LITERATURE.—Cain, Intermediate Products (2d Ed.), 194

Dyes Derived from Phenyl-1-naphthylamine-8-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
85	Omega Chrome Black PV		2-Amino-6-nitro-*p*-cresol	ACr
188	Tolyl Blue SR Sulfon Acid Blue R	I '14:— 45,038 M '17:— ? M '18:— ? M '19:— ? M '20:—454,185	H Acid	A

Dyes Derived from Phenyl-1-naphthylamine-8-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
256	Sulfon Black 3B		Metanilic Acid α-Naphthylamine	A
257	Sulfoncyanine	I '14:—145,649 M '17:— ? M '18:— ? M '19:— ? I '20:— 18,327 M '20:— ?	Metanilic Acid α-Naphthylamine	A
265	Sulfoncyanine Black B	I '14:— 69,590 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Laurent's Acid α-Naphthylamine *or* 1-Naphthylamine-6-*and* 7-sulfonic Acids	A

N-Phenyl-*o*-phenylene-diamine (*C. A. nomen.*)

See, *o*-Amino-diphenylamine

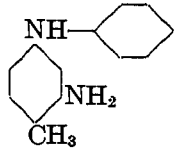
N-Phenyl-*p*-phenylene-diamine (*C. A. nomen.*)

See, *p*-Amino-diphenylamine

N¹-Phenyl-4-*m*-tolylene-diamine (*C. A. nomen. $NH_2=1$*)

Phenyl-*p*-amino-*o*-toluidine (*$CH_3=1$*)

3-Amino-4-methyl-diphenylamine



$=C_{13}H_{14}N_2=198$

FORMATION.—From *m*-tolylene-diamine hydrochloride by melting with aniline at 220–270°

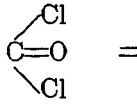
LITERATURE.—Lange, Zwischenprodukte, #1621, 1622

Dyes Derived from N^1-Phenyl-4-*m*-tolylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
684	Rhoduline Violet	I '14:— 2,751 I '20:— 35	Nitroso-dimethyl-aniline	B
684	Rhoduline Red B		Nitroso-ethyl-aniline	B
684	Rhoduline Red G		Nitroso-ethyl-*o*-toluidine	B

Phosgene (*C. A. nomen.*)

Carbonyl Chloride



$=CCl_2O=99$

STATISTICS.—Imported '14:—very small
Manufactured in recent years in undisclosed quantities

FORMATION.—From chlorine and carbon monoxide, in presence of a catalyst, for example, a suitable charcoal

LITERATURE.—Ullmann, Enzy. tech. Chemie, **3**, 498

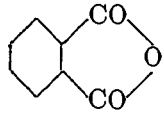
Dyes Derived from Phosgene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
279	Benzo Fast Scarlet	I '14:— 36,674 M '19:— ? I '20:— 24,153	J Acid (2 mols) Aniline Amino-azo-benzene	D
296	Cotton Yellow G	I '14:— 31,472 I '20:— 4,651	Acetyl-*p*-phenylene-diamine (2 mols) Salicylic Acid (2 mols)	D

Dyes Derived from Phosgene (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
516	Crystal Violet	I '14:— 51,872 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,919 M '20:— ?	Dimethyl-aniline (3 mols)	B
518	Ethyl Violet Ethyl Purple	I '14:— 51,933	Diethyl-aniline (3 mols)	B
	ANTHRAQUINONE AND ALLIED DYES			
810	Helidone Yellow 3GN	I '14:— 20,744 I '20:— 2,515	2-Amino-anthraquinone (2 mols)	V

Phthalic Anhydride



$= C_8H_4O_3 = 148$

STATISTICS.—Imported '14:— 63,574 lbs.
Manufactured '17:—138,857 lbs.
Manufactured '18:—227,414 lbs.
Manufactured '19:—290,677 lbs.
Manufactured '20:—796,210 lbs.

FORMATION.—(1) Naphthalene is oxidized with air in presence of a catalyst. (2) Naphthalene is oxidized by means of sulfur trioxide in presence of mercury.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 162

Dyes Derived from Phthalic Anhydride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
571	Rhodamine 6G	I '14:— 37,515 I '20:— 8,574	Ethyl-*m*-amino-phenol (2 mols) [Ethylation]	B
572	Rhodamine G	I '14:— 2,648 I '20:— 217	Diethyl-*m*-amino-phenol (2 mols) Aniline [removes one C_2H_5 group] *or* [Heating of Rhodamine B with aniline salt]	B
573	Rhodamine B	I '14:— 59,354 M '17:— ? M '18:— ? M '19:— ? I '20:— 24,709 M '20:— ?	Diethyl-*m*-amino-phenol (2 mols) *or* Resorcinol (2 mols) [PCl_5; diethyl-amine]	B
574	Rhodamine 3B		Diethyl-*m*-amino-phenol (2 mols) [Ethyl esterification] *or* [Ethyl ester of Rhodamine B]	B
580	Fast Acid Violet B	I '14:— 20,688 I '20:— 2,907 M '19:— ?	Resorcinol (2 mols) Aniline *or* *p*-Toluidine (2 mols) [PCl_5; sulfonation] *or* [Dichloro-fluoresceine *and* Aniline *or* *p*-Toluidine; sulfonation]	A

Dyes Derived from Phthalic Anhydride (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES (*continued*)			
581	Fast Acid Eosine G Fast Acid Phloxine A	I '14:— 650 I '20:— 5,234	Diethyl-*m*-amino-phenol (2 mols) [Sulfonation] *or* [Rhodamine B, sulfonated]	A
582	Fast Acid Violet A2R	I '14:— 875 I '20:— 2,679 M '20:— ?	Resorcinol (2 mols) *o*-Toluidine (2 mols) [PCl_5, Sulfonation] *or* [Dichloro-fluoresceine *and* *o*-toluidine, Sulfonation]	A
583	Acid Rosamine A	I '14:— 50 I '20:— 141	Resorcinol (2 mols) Mesidine (2 mols) [PCl_5, Sulfonation] *or* [Dichloro-fluoresceine *and* mesidine, sulfonation]	A
585	Uranine Fluoresceine	I '14:— 2,273 M '17:— ? M '19:— ? I '20:— 10	Resorcinol (2 mols)	A
586	Chrysoline	I '20:— 1,402	Resorcinol (2 mols) Benzyl Chloride	A
587	Eosine	I '14:— 94,528 M '17:— 68,496 M '18:—161,153 M '19:—121,303 I '20:— 296 M '20:— 85,489	Resorcinol (2 mols) [Bromine] *or* [Tetrabromo-fluoresceine]	A

Dyes Derived from Phthalic Anhydride (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES (*continued*)			
588	Eosine Spirit Solubl. Methyl Eosine		Resorcinol (2 mols) [Bromine; Methyl esterification] *or* Eosine methyl ester]	ss
589	Eosine S	I '14:— 2,315 M '20:— ? M '20:— ?	Resorcinol (2 mols) [Bromine; Ethyl esterification] *or* [Eosine ethyl ester]	ss
590	Eosine BN Acid Eosine	I '14:— 20,143 I '20:— 1,132 M '20:— ?	Resorcinol (2 mols) [Bromination, Nitration] *or* [Dibromo-fluoresceine nitrated]	A
591	Erythrosine G	I '14:— 99	Resorcinol (2 mols) [Iodation] *or* [Diiodo-fluoresceine]	A
592	Erythrosine B	I '14:— 4,350 M '17:— 505 M '18:— 1,636 M '19:— ? I '20:— 9 M '20:— 6,874	Resorcinol (2 mols) [Iodation] *or* [Tetraiodo-fluoresceine]	A
599	Galleine	I '14:— 15,404 M '19:— ? I '20:— 7,469 M '20.— ?	Gallic Acid (2 mols) *or* Pyrogallol (2 mols)	M

Dyes Derived from Phthalic Anhydride (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES (*continued*)			
600	Coeruleine B	M '19:— ? M '20:— ?	Resorcinol (2 mols) [Dehydration] *or* [Fluoresceine dehydrated]	M
601	Coeruleine S	I '14:— 3,404 M '19:— ? I '20:— 9,392	Gallic Acid (2 mols) *or* Pyrogallol (2 mols) [Dehydration] *or* [Galleine dehydrated]	M
	QUINOLINE DYES			
612	Quinoline Yellow Spirit Soluble	I '14:— 79,553 I '20:— 205	Quinaldine	ss
613	Quinoline Yellow Water Soluble	I '14:— 15,354 I '20:— 34,440	Quinaldine [Sulfonation]	A
	ANTHRAQUINONE AND ALLIED DYES			
758	Sirius Yellow G		Naphthalene	CL
782	Anthracene Brown Alizarin Brown	I '14:—115,586 M '17:— ? M '18:— ? M '19:— 40,426 I '20:— 2,728 M '20:— 42,840	Gallic Acid	M
	INDIGO GROUP DYES			
874	Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 M '20:— 18,178,231 I '20:—520,347	Phthalic Anhydride (2 mols)	V

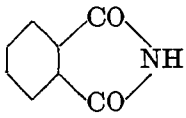
Dyes Derived from Phthalic Anhydride (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
876	Indigo MLB Indigo White		Phthalic Anhydride (2 mols) [Reduction]	V
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 M '20:— 1,395,000 I '20:— 5,512	Phthalic Anhydride (2 mols) [Sulfonation]	A
878	Indigotine P		Phthalic Anhydride (2 mols) [Sulfonation]	A
879	Brom Indigo Rathjen	I '14:— 53,610 M '20:— ?	Phthalic Anhydride (2 mols) [Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	Phthalic Anhydride (2 mols) [Bromination]	V
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Phthalic Anhydride (2 mols) [Bromination]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	Phthalic Anhydride (2 mols) [Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Phthalic Anhydride (2 mols) [Bromination]	V

Dyes Derived from Phthalic Anhydride (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Phthalic Anhydride (2 mols) [Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	Phthalic Anhydride (2 mols) [Chlorination]	V
886	Brilliant Indigo BASF/G	I '14:— 12,057	Phthalic Anhydride (2 mols) [Chlorination, Bromination]	V
889	Indigo Yellow 3G		Phthalic Anhydride (2 mols) Benzoyl Chloride	V
890	Ciba Yellow G	I '14:— 48	Phthalic Anhydride (2 mols) Benzoyl Chloride [Bromination]	V

Phthalimide



$= C_8H_5NO_2 = 147$

STATISTICS.—Manufactured in 1920 in undisclosed amount

FORMATION.—By treatment of molten phthalic anhydride with gaseous ammonia

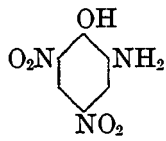
LITERATURE.—Cain, Intermediate Products (2d Ed.), 147

USES.—For preparation of anthranilic acid

Piria's Acid

See, Naphthionic Acid

Picramic Acid



$= C_6H_5N_3O_5 = 199$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:—235,652 lbs.
Manufactured '19:—150,458 lbs.
Manufactured '20:—138,350 lbs.

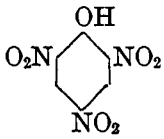
FORMATION.—From picric acid by reduction, using sodium hydrogen sulfide or sodium sulfide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 117

Dyes Derived from Picramic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application-Class*
	MONOAZO DYES			
88	Acid Anthracene Brown R	I '14:— 33,053 M '17:— ? M '19:— ? I '20:— 1,400 M '20:— ?	*m*-Phenylene-diamine-[sulfonic Acids]	ACr
89	Metachrome Brown B	I '14:— 1,001 M '17:— ? M '18:—349,961 M '19:— ? M '20:—192,914	*m*-Phenylene-diamine *or* *m*-Tolylene-diamine *or* Chloro-*m*-phenylene-diamine	M
90	Chrome Brown P		*m*-Amino-phenol	M
91	Anthracyl Chrome Green D	I '14:— 4,596 M '18:— ? I '20:— 3,316	Naphthionic Acid	ACr
92	Metachrome Bordeaux R		3-Amino-4-methyl-phenyl-*p*-tolyl-sulfamide	M
	DISAZO DYE			
219	Chrome Patent Green N		Aniline K Acid	ACr

Picric Acid



$= C_6H_3N_3O_7 = 229$

STATISTICS.—Manufactured in 1919 and 1920 in an indeterminate amount for dyeing purposes. Prior to 1919 it was made in very large quantities for explosive uses

FORMATION.—Phenol is sulfonated and then trinitrated

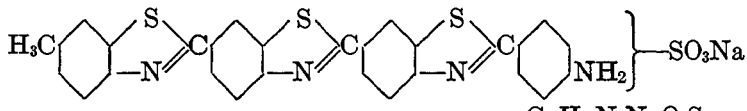
LITERATURE.—Cain, Intermediate Products (2d Ed.), 114
Lange, Zwischenprodukte, #1116–1121
Schultz, Farbstofftabellen (1914), #5

USES.—For the manufacture of picramic acid. It is also a dye, Schultz #5

Primuline-sulfonic Acid (Sodium Salt)

(*This is the "Primuline" of commerce*)

(*Primuline "base" is the unsulfonated product*)



$= C_{28}H_{17}N_4NaO_3S_4 = 608$

STATISTICS.—See #616 in following table

FORMATION.—*p*-Toluidine and sulfur are heated together, resulting in a mixture of primuline base and *p*-dehydro-thio-*p*-toluidine, known as primuline "melt." This can be separated by vacuum distillation. However it is generally sulfonated, using 23 per cent oleum, and then separated by the greater solubility of the ammonium salt of the primuline-sulfonic acid

LITERATURE.—Schultz, Farbstofftabellen, #616
Wahl, Organic Dyestuffs, 299
Thorpe, Dic. Chemistry, **4**, 386

Dyes Derived from Primuline-sulfonic Acid

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	STILBENE DYE			
18	Diphenyl Fast Yellow	I '14:— 10,229 I '20:— 1,102	Primuline-sulfonic Acid (2 mols) Dinitro-dibenzyl-disulfonic Acid *or* Dinitro-stilbene-disulfonic Acid	D
	PYRAZOLONE DYES			
25	Dianil Yellow 3G		[Ethyl aceto-acetate]	D
26	Dianil Yellow R		3-Methyl-1-phenyl-5-pyrazolone	D
27	Dianil Yellow 2R		3-Methyl-1-*p*-sulfo-phenyl-5-pyrazolone *or* Phenyl-hydrazine-*p*-sulfonic Acid [Ethyl aceto-acetate]	D
	MONOAZO DYES			
190	Alkali Brown Benzo Brown 5R	M '19:— ? M '20:— 2,987	*m*-Phenylene-diamine	D
191	Pyramine Yellow R	I '14:— 5,727 I '20:— 100	Nitro-*m*-phenylene-diamine	D
192	Cotton Orange G	I '14:— 1,877	*m*-Phenylene-diamine-disulfonic Acid	D
195	Rosophenine SG	M '18:— ? M '19:— ? M '20:— 19,639	Nevile-Winther's Acid	D
197	Thiazine Red G	I '14:— 4,861 M '18:— ? M '19:— 11,886 M '20:— 13,988	Schaeffer's Acid	D

Dyes Derived from Primuline-sulfonic Acid (*continued*)

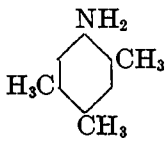
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
198	Clayton Yellow Thiazol Yellow	I '14:— 29,879 M '18:— ? M '19:— ? M '20:— ? I '20:— 11,182	Dehydrothio-*p*-toluidine-sulfonic Acid (2 mols) *or* Primuline (2 mols)	D
199	Oriol Yellow Cotton Yellow R	I '14:— 13,416 M '20:— ? I '20:— 125	Salicylic Acid	D
	DISAZO DYES			
209	Terra Cotta FC	I '14:— 551	*m*-Phenylene-diamine Naphthionic Acid	D
210	Cotton Orange R	I '14:— 16,459 I '20:— 51	*m*-Phenylene-diamine-disulfonic Acid Metanilic Acid	D
	THIOBENZENYL DYES			
615	Thioflavine S	I '14:— 4,948 M '19:— ? M '20:— ? I '20:— 675	[Methylation]	D
616	Primuline	I '14:— 67,976 M '17:— 72,461 M '18:— 72,788 M '19:—271,338 M '20:—183,179 I '20:— 441		D

Pseudocumidine (*C. A. nomen.*)

ψ-Cumidine

2: 4: 5-Trimethyl-aniline

1: 2: 4-Trimethyl-5-amino-benzene



$= C_9H_{13}N = 135$

STATISTICS.—Imported '14:— 6,617 lbs.
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:—28,405 lbs.

FORMATION.—Xylidine hydrochloride is digested with methanol (CH_3OH) in an autoclave at 280–300° and the product converted to nitrates and crystallized. The sparingly soluble nitrates are separated and washed, and treated with alkali to convert to bases, which are a mixture of xylidines and cumidines. The bases are then fractionally distilled, and that fraction coming over at 225–245° is allowed to crystallize and is pressed to remove oily products. It consists largely of pseudocumidine

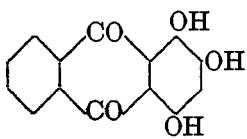
LITERATURE.—Thorpe, Dic. Chemistry, **2**, 177 (1912 Ed.); *or* **2**, 434 (1921 Ed.)
Lange, Zwischenprodukte, #1061

Dye Derived from Pseudocumidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
83	Ponceau 4R	I '14:— 3,557 M '17:— ? M '18:— ? M '19:— 24,152 M '20:— ?	R Acid	A

Purpurin (*C. A. nomen.*)

1: 2: 4-Trihydroxy-anthraquinone



$= C_{14}H_8O_5 = 256$

FORMATION.—From alizarin by oxidation with manganese dioxide and sulfuric acid

LITERATURE.—Lange, Zwischenprodukte, #3129, 3271
Barnett, Anthracene and Anthraquinone

Dyes Derived from Purpurin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
783	Purpurin			M
862	Alizarin Blue Black B	I '14:— 54,706 I '20:— 28,802	Aniline [Sulfonation]	M

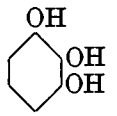
Pyrogallic Acid

See, Pyrogallol

Pyrogallol (*C. A. nomen.*)

1:2:3-Trihydroxy-benzene

Pyrogallic Acid



$= C_6H_6O_3 = 126$

STATISTICS.—Imported '14:—24,964 lbs.
Manufactured regularly, but amounts not disclosed

FORMATION.—From gallic acid by heating in an autoclave in presence of water

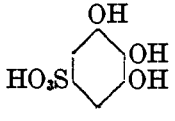
LITERATURE.—Lange, Zwischenprodukte, #958
Green, Organic Coloring Matters (1908), 45

Dyes Derived from Pyrogallol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
62	Azo Galleine		Dimethyl-*p*-phenylene-diamine	M
84	Azo Chromine		*p*-Amino-phenol	M
158	Chrome Brown RR	I '14:— 7,241 M '17:— ? I '20:— 2,183	4-Amino-1-phenol-2: 6-disulfonic Acid	M
	XANTHONE DYES			
599	Galleine	I '14:— 15,404 M '19:— ? I '20:— 5,075 M '20:— ?	Phthalic Anhydride Pyrogallol (2 mols)	M
601	Coeruleine S	I '14:— 3,404 M '19:— ? I '20:— 9,392	Phthalic Anhydride Pyrogallol (2 mols) [Dehydration] *or* [Galleine dehydrated]	M
	ANTHRAQUINONE AND ALLIED DYES			
769	Alizarin Yellow C		[Acetic Acid]	M
770	Alizarin Yellow A		Benzoic Acid *or* Benzo trichloride	M
773	Anthracene Yellow	I '14:— 4,046	[Aceto-acetic Ethyl Ester; Bromination]	M

Pyrogallol-5-sulfonic Acid

3: 4: 5-Trihydroxy-benzene-sulfonic Acid (*C. A. nomen.*)



$= C_6H_6O_6S = 206$

FORMATION.—1: 3-Dichloro-2-hydroxy-benzene-5-sulfonic acid (as potassium salt) is fused with concentrated caustic potash solution at 150–160°

LITERATURE.—Lange, Zwischenprodukte, #959
Ger. Pat., 203,145; Frdl. **9**, 247

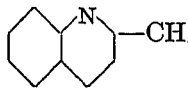
Dyes Derived from Pyrogallol-5-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
623	OXAZINE DYE Pyrogallol-cyanine-sulfonic Acid		Nitroso-dimethyl-aniline	M

Quinaldine (*C. A. nomen.*)

2-Methyl-quinoline

α-Methyl-quinoline



$= C_{10}H_9N = 143$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By condensing aniline and paracetaldehyde either cold, or hot,—in the latter case using hydrochloric acid and aluminum or zinc chloride to catalyze the reaction

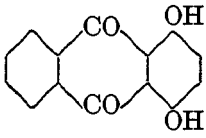
LITERATURE.—Cain, Intermediate Products (2d Ed.), 84
Lange, Zwischenprodukte, #2000–2002

Dyes Derived from Quinaldine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	QUINOLINE DYES			
610	Quinoline Red		Benzo-trichloride Isoquinoline	B
612	Quinoline Yellow Spirit Soluble	I '14:— 79,553 I '20:— 205	Phthalic Anhydride	ss
613	Quinoline Yellow Water Soluble	I '14:— 15,354 I '20:— 34,440	Phthalic Anhydride [Sulfonation]	A

Quinizarin (*C. A. nomen.*)

1: 4-Dihydroxy-anthraquinone



$= C_{14}H_8O_4 = 240$

FORMATION.—From anthraquinone by oxidation with sulfuric acid in presence of boric acid

LITERATURE.—Lange, Zwischenprodukte, #3233, 3260, 3268, 3270, 3274, 3276, 3314, 3351
Cain, Intermediate Products (2d Ed.), 255

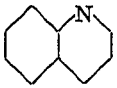
Dyes Derived from Quinizarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
852	Alizarin Irisol D		*p*-Toluidine [Sulfonation]	A
852	Alizarin Direct Violet R		4-Toluidine-3-sulfonic Acid	A

Dyes Derived from Quinizarin (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
865	Alizarin Cyanine Green E		*p*-Toluidine (2 mols) [Sulfonation]	ACr
865	Alizarin Direct Green G	I '14:— 2,000 I '20:— 31,851 M '20:— ?	4-Toluidine-3-sulfonic Acid (2 mols)	ACr

Quinoline



$= C_9H_7N = 129$

STATISTICS.—Imported '14:—very small
Manufactured '19:— ?

FORMATION.—(1) By extraction from coal-tar. (2) By synthesis through the heating together of aniline, nitro-benzene, glycerol and sulfuric acid for some time, first at 125° and then at 180°

LITERATURE.—Lange, Zwischenprodukte, #1995
Thorpe, Dic. Chemistry, **4**, 468

Dye Derived from Quinoline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	QUINOLINE DYE			
611	Quinoline Blue		Lepidine [Amyl iodide]	Photography

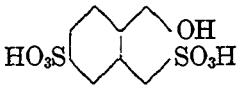
R Acid

2-Naphthol-3: 6-disulfonic Acid (*C. A. nomen.*)

β-Naphthol-disulfonic Acid R

β-Naphthol-α-disulfonic Acid

Note.—R Acid is occasionally applied to other naphthalene derivatives, e.g., 2-amino-8-naphthol-6-sulfonic acid, 2-naphthylamine-3: 6-disulfonic acid, 2: 8-dihydroxy-naphthalene-6-sulfonic Acid



$= C_{10}H_8O_7S_2 = 304$

STATISTICS.—Imported '14:— 46,267 lbs.
Manufactured '18:— 712,033 lbs.
Manufactured '19:—1,008,007 lbs.
Manufactured '20:—1,250,674 lbs.

FORMATION.—From β-naphthol by disulfonation, and separation from the G acid simultaneously formed

LITERATURE.—Cain, Intermediate Products (2d Ed.), 226
Lange, Zwischenprodukte, #2651, 2652
Thorpe, Dic. Chemistry, **3**, 626

Dyes Derived from R Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*		*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES				
39	Ponceau G	M '17:—	?	Aniline	A
		M '19:—	?		
47	Orange III	M '18:—	?	β-Naphthol	A
65	Azo Coralline L	M '17:—	?	*p*-Amino-acetanilide	A
		M '18:—	?		
		M '19:—	?		
		I '20:—	249		
		M '20:—	?		

Dyes Derived from R Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
82	Ponceau R, 2R Scarlet R, 2R	I '14:— 35,259 M '17:—633,429 M '18:— 1,189,054 M '19:—552,680 M '20:— 1,286,002	Xylidine	A
83	Ponceau 4R	I '14:— 3,557 M '17:— ? M '18:— ? M '19:— 24,152 M '20:— ?	Pseudocumidine	A
101	Coccinine B		*m*-Amino-*p*-cresol Methyl Ether	A
112	Fast Red B Bordeaux B	I '14:— 25,821 M '17:—120,595 M '18:—200,415 M '19:—161,862 I '20:— 7,882 M '20:—217,406	α-Naphthylamine	A
168	Amaranth	I '14:— 86,067 M '17:— 66,069 M '18:— 73,539 M '19:—294,416 I '20:— 110 M '20:—204,958	Naphthionic Acid	A
202	Acid Alizarin Red B Palatine Chrome Red B	I '14:— 7,374 M '18:— ? M '19:— 28,081 I '20:— 1,342 M '20:— 67,817	Anthranilic Acid	ACr CL
	DISAZO DYES			
236	Cloth Red B Wool Red B	I '14:— 14,293 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	*o*-Amino-azo-toluene	A

Dyes Derived from R Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
238	Union Fast Claret		Amino-azo-xylene	A
244	Coomassie Wool Black S	M '18:— ? M '19:— ?	Acetyl-*p*-phenylene-diamine α-Naphthylamine	A
269	Naphthol Black 6B	I '14:—120,512 I '20:— 1,500 M '20:— ?	1-Naphthylamine-4: 6-*and* -4: 7-disulfonic Acids α-Naphthylamine	A
270	Brilliant Croceine 9B		Amino-G Acid Aniline G Acid *or* R Acid	A
272	Naphthol Black B Brilliant Black B	I '14:—103,598 M '19:— ? I '20:— 50	Amino-G Acid α-Naphthylamine	A
298	Milling Red R		Diamino-diphenyl-methane R Acid (2 mols)	A
299	Cinnabar Scarlet BF		Diamino-dixylyl-methane R Acid (2 mols)	CL
300	Cinnabar Scarlet G Cotton Ponceau		Diamino-dixylyl-phenyl-methane R Acid (2 mols)	CL
341	Crumpsall Direct Fast Red R	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine Salicylic Acid	D
412	Congo Blue 2B		Dianisidine Nevile-Winther's Acid	D

Dyes Derived from R Acid (*continued*)

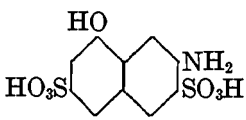
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
414	Indazurine B		Dianisidine 1:7-Dihydroxy-naphthalene-4-sulfonic Acid	D
429	Indazurine BB		Dianisidine 1:7-Dihydroxy-2-naphthoic-4 sulfonic Acid	D
433	Coomassie Black B		1:4-Naphthylene-diamine-2-sulfonic Acid β-Naphthylamine	A
434	Coomassie Navy Blue	I '20:— 42,357	1:4-Naphthylene-diamine-2-sulfonic Acid β-Naphthol	A
	TRISAZO DYE			
484	Milling Scarlet B		Diamino-azoxy-toluene Nevile-Winther's Acid	A

2R Acid

2-Amino-8-naphthol-3:6-disulfonic Acid

Amino-naphthol-disulfonic Acid RR *or* 2R

7-Amino-1-naphthol-3:6-disulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_7S_2 = 319$

FORMATION.—From sodium 2-naphthylamine-3:6:8-trisulfonate by fusion with caustic soda at 220–260°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 239
Lange, Zwischenprodukte, #2734

Dyes Derived from 2R Acid

Schultz Number or Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	MONOAZO DYE			
44	Azo Archil R		Aniline	A
	TRISAZO DYES			
442	Direct Black V	I '14:—145,738	Benzidine α-Naphthylamine Gamma Acid	D
443	Direct Indone Blue R		Benzidine α-Naphthylamine H Acid	D
449	Trisulfon Brown B	I '14:— 16,781 I '20:— 38,616	Benzidine Salicylic Acid *m*-Phenylene-diamine	D
453	Columbia Black R	I '14:— 1,307	Tolidine *m*-Tolylene-diamine (2 mols)	D
454	Trisulfon Brown G	I '14:— 1,323	Tolidine Salicylic Acid *m*-Phenylene-diamine	D
455	Columbia Black B	I '14:—165,727	Dianisidine *m*-Tolylene-diamine (2 mols)	D
457	Trisulfon Brown GG	I '14:— 7,562 I '20:— 38,411	Dianisidine Salicylic Acid *m*-Phenylene-diamine	D

Red Acid

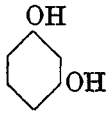
1: 5-Dihydroxy-naphthalene-3: 7-disulfonic Acid (*not considered herein*)

Resorcine

See, Resorcinol (*C. A. nomen.*)

Resorcinol (*C. A. nomen.*)

Resorcine



$= C_6H_6O_2 = 110$

STATISTICS.—Imported '14:— 61,624 lbs.
Manufactured '17:— ?
Manufactured '18:— 2,087 lbs.
Manufactured '19:— 96,397 lbs.
Manufactured '20:—139,315 lbs.

FORMATION.—Benzene is disulfonated with oleum, and the resulting benzene-*m*-disulfonic acid is fused with a large excess of caustic soda

LITERATURE.—Cain, Intermediate Products (2d Ed.), 130

Dyes Derived from Resorcinol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	NITROSO DYE			
1	Solid Green O		[Dinitroso Derivative]	M
	STILBENE DYE			
11	Mikado Orange Chloramine Orange G	I '14:— 26,010 M '17:— ? M '18:— ? M '19:— ? M '20:— 38,287	*p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) [Resorcinol as reducing agent]	D
	MONOAZO DYES			
35	Sudan G	I '14:— 798	Aniline	ss
60	Azo Phosphine GO	I '14:— 50	*m*-Amino-phenyl-trimethyl-ammonium Chloride	B
75	New Phosphine G	I '14:— 500	Amino-benzyl-dimethyl-amine	B

Dyes Derived from Resorcinol (*continued*)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture		Other Intermediates Used and Notes	Dye Application Class
	MONOAZO DYES (*continued*)				
143	Chrysoine Tropaeoline	I '14:— M '17:— M '18:— M '19:— M '20:—	6,252 ? ? ? ?	Sulfanilic Acid	A
155	Acid Alizarin Garnet R	I '20:— M '20:—	201 ?	*o*-Amino-phenol-*p*-sulfonic Acid	M
	DISAZO DYES				
211	Resorcine Brown	I '14:— M '17:— M '18:— M '19:— I '20:— M '20:—	13,189 ? ? ? 2,484 ?	*m*-Xylidine Sulfanilic Acid	A
213	Fast Brown	I '14:— M '17:— M '18:— M '19:— M '20:—	3,206 ? ? ? ?	Naphthionic Acid (2 mols)	A
222	Janus Yellow G	I '14:— I '20:—	2,250 758	*m*-Nitro-aniline *m*-Amino-phenyl-trimethyl-ammonium Chloride	B
317	Pyramidol Brown BG			Benzidine Resorcinol (2 mols)	D
374	Congo 4R Congo Red 4R	M '18:—	?	Tolidine Naphthionic Acid	D
376	Pyramidol Brown T			Tolidine Resorcinol (2 mols)	D
	TRISAZO DYES				
435	Janus Brown B			*p*-Amino-benzyl-diethyl-amine α-Naphthylamine	B

Dyes Derived from Resorcinol *(continued)*

Ordinary Name and Class of Dye	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
TRISAZO DYES *(continued)*			
Isodiphenyl Black R		*p*-Phenylene-diamine (2 mols) Gamma Acid	D
Coomassie Union Blacks		1: 4-Naphthylene-diamine-2-sulfonic Acid Gamma Acid Resorcinol (2 mols)	D
Congo Brown G Naphthamine Brown 4G	I '14:— 52,141 M '17:— ? M '18:— ? M '19:— ? I '20:— 443 M '20:—229,489	Benzidine Sulfanilic Acid Salicylic Acid	D
Congo Brown R	I '14:— 3,045	Benzidine Laurent's Acid Salicylic Acid	D
Azo Corinth		Tolidine Naphthionic Acid 3-Amino-phenol-4-sulfonic Acid	D
TETRAKISAZO DYE			
Hessian Brown BBN		Benzidine Sulfanilic Acid (2 mols) Resorcinol (2 mols)	D
XANTHONE DYES			
Rhodamine B	I '14:— 59,354 M '17:— ? M '18:— ? M '19:— ? I '20:— 24,709 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) [Phosphorus pentachloride; diethylamine]	B
Rhodamine 12 GF		Dimethylamino-hydroxy-benzoyl-benzoic Acid [Formaldehyde; esterification]	B

Dyes Derived from Resorcinol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES (*continued*)			
580	Fast Acid Violet B	I '14:— 20,688 M '19:— ? I '20:— 2,907	Phthalic Anhydride Resorcinol (2 mols) Aniline *or* *p*-toluidine (2 mols) [PCl_5; sulfonation]	A
582	Fast Acid Violet A2R	I '14:— 875 I '20:— 2,679 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) *o*-Toluidine (2 mols) [PCl_5; sulfonation]	A
583	Acid Rosamine A	I '14:— 50 I '20:— 141	Phthalic Anhydride Resorcinol (2 mols) Mesidine (2 mols) [PCl_5; Sulfonation]	A
584	Fast Acid Blue R	I '14:— 4,022 I '20:— 130	3:6-Dichloro-phthalic Acid Resorcinol (2 mols) *p*-Phenetidine (2 mols) [PCl_5; Sulfonation]	A
585	Uranine Fluoresceine	I '14:— 2,273 M '17:— ? M '19:— ? I '20:— 10	Phthalic Anhydride Resorcinol (2 mols)	A
586	Chrysoline	I '20:— 1,402	Phthalic Anhydride Resorcinol (2 mols) Benzyl Chloride	A
587	Eosine	I '14:— 94,528 M '17:— 68,496 M '18:—161,153 M '19:—121,303 I '20:— 296 M '20:— 85,489	Phthalic Anhydride Resorcinol (2 mols) [Bromination] *or* [Fluoresceine brominated]	A

Dyes Derived from Resorcinol *(continued)*

*ltz ber Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES *(continued)*			
8	Eosine Spirit Soluble Methyl Eosine		Phthalic anhydride Resorcinol (2 mols) [Bromination, methylation] *or* [Eosine methyl ester]	ss
0	Eosine SP	I '14:— 2,315 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) [Bromination, ethylation] *or* [Eosine ethyl ester]	ss
0	Eosine BN Acid Eosine	I '14:— 20,143 I '20:— 1,132 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) [Bromination, nitration] *or* [Dibromo-fluorescein dinitrated]	A
1	Erythrosine G	I '14:— 99	Phthalic Anhydride Resorcinol (2 mols) [Iodation] *or* [Fluorescein iodated]	A
2	Erythrosine B	I '14:— 4,350 M '17:— 505 M '18:— 1,636 M '19:— ? I '20:— 9 M '20:— 6,874	Phthalic Anhydride Resorcinol (2 mols) [Iodation] *or* [Fluorescein iodated]	A
3	Phloxine P	I '14:— 2,244 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	3: 6-Dichloro-phthalic Acid Resorcinol (2 mols) [Bromination]	

Dyes Derived from Resorcinol *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES *(continued)*			
594	Cyanosine Spirit Soluble		3: 6-Dichloro-phthalic Acid Resorcinol (2 mols) [Bromination, methylation] *or* [Phloxine methyl ester]	A
595	Rose Bengal	I '14:— 2,277 M '20:— ?	3: 6-Dichloro-phthalic Acid Resorcinol (2 mols) [Iodation]	A
596	Phloxine	I '14:— 1,020	Tetrachloro-phthalic Acid Resorcinol (2 mols) [Bromination]	A
597	Rose Bengal B	I '14:— 1,354 M '17:— ? M '18:— ? M '19:— ?	Tetrachloro-phthalic Acid Resorcinol (2 mols) [Iodation]	A
598	Cyanosine B		Tetrachloro-phthalic Acid Resorcinol (2 mols) [Ethylation] *or* [Phloxine ethylated]	ss
600	Coeruleine B	M '19:— ? M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) [Dehydration] [Fluoresceine dehydrated]	M
	OXAZINE DYES			
642	Phenocyanine TC	I '20:— 4,740	Nitroso-dimethyl-aniline Gallic Acid *or* [Gallocyanine]	M

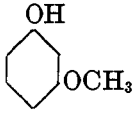
Dyes Derived from Resorcinol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES (*continued*)			
643	Phenocyanine T V	M '17 – I '20:— 1,543	Nitroso-dimethyl-aniline Gallic Acid [Sulfonation] *or* [Gallocyanine; Sulfonation]	M
644	Ultracyanine B		Nitroso-dimethyl-aniline Gallic Acid [Alkaline Condensation] *or* [Gallocyanine alkaline condensation with resorcinol]	M
647	Nitroso Blue MR Resorcine Blue		Nitroso-dimethyl-aniline	MF
648	Iris Blue		Nitroso-resorcinol [Bromination]	A

Resorcinol Methyl Ether

Methyl-resorcinol

m-Methoxy-phenol (*C. A. nomen.*)



$= C_7H_8O_2 = 124$

FORMATION.—From resorcinol by methylation

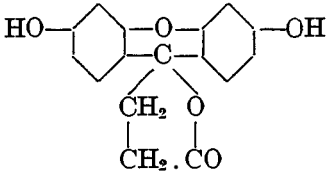
LITERATURE.—Ullmann, Enzy. tech. Chemie, **9**, 490

Dye Derived from Resorcinol Methyl Ether

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
575	XANTHONE DYE Rhodine 12 GM		Dimethylamino-hydroxy-benzoyl-benzoic Acid [Ethyl esterification]	B

Resorcinol-succinein

3:6-Dihydroxy-9-*x*anthene-propionic Acid; γ-Lactone (*C. A. nomen.*)



$= C_{16}H_{12}O_5 = 284$

FORMATION.—From resorcinol and succinic acid (or its anhydride) by heating together at about 200° C.

LITERATURE.—Cohen, Theoretical Organic Chemistry (1918 Ed.), 461

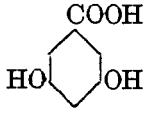
Dye Derived from Resorcinol-succinein

Schultz[1] Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
570	XANTHONE DYE Rhodamine S	I '14:— 600 I '20:— 273	[Dimethyl-amine 2 mols]	A

α-Resorcylic Acid (*C. A. nomen.*)

3:5-Dihydroxy-benzoic Acid

m-Dihydroxy-benzoic Acid



$= C_7H_6O_4 = 154$

FORMATION.—From 3: 5-disulfo-benzoic acid by caustic soda fusion

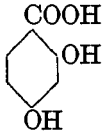
LITERATURE.—Lange, Zwischenprodukte, #881
Ullmann, Enzy. tech. Chemie, **2**, 345

Dye Derived from α-Resorcylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
771	ANTHRAQUINONE AND ALLIED DYES Resoflavine W		α-Resorcylic Acid (2 mols) [Oxidation]	M

β-Resorcylic Acid (*C. A. nomen.*)

2: 4-Dihydroxy-benzoic Acid



$=C_7H_6O_4=154$

FORMATION.—By heating resorcinol with a solution of potassium bicarbonate under reflux

LITERATURE.—Ullmann, Enzy. tech. Chemie, **2**, 345
Bistrzycki and Kostanecki, Ber. **18**, 1984 (1885)

Dye Derived from β-Resorcylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
49	MONOAZO DYE Prague Alizarin Yellow G		*m*-Nitro-aniline	M

RG Acid

See, 1-Naphthol-3: 6-disulfonic Acid

Rho Acid

See, Anthraquinone-1: 5-disulfonic Acid

Rumpff Acid

See, Crocein Acid

S Acid

See, 1-Amino-8-naphthol-4-sulfonic Acid

See, 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid

See, 1-Naphthylamine-8-sulfonic Acid

See, 1-Naphthylamine-4: 8-disulfonic Acid

1-Naphthol-8-sulfonic Acid (*not considered herein*)

1: 8-Dihydroxy-naphthalene-2: 4-disulfonic Acid (*not considered herein*)

1: 7-Dihydroxy-naphthalene-6-carboxylic Acid (*not considered herein*)

Note.—The use of S as a trivial name is very confusing and should be avoided

2S Acid

See, 1-Amino-8-naphthol-2: 4-disulfonic Acid

Salicylic Acid

o-Hydroxy-benzoic Acid

$= C_7H_6O_3 = 138$

	Technical lbs.	*U. S. P.* lbs.
STATISTICS.—Manufactured '17:—	960,339	2,495,285
Manufactured '18:—	1,395,630	3,270,462
Manufactured '19:—	3,467,055	2,619,726
Manufactured '20:—	3,914,163	2,663,494

FORMATION.—Phenol is treated with caustic soda, dried and powdered; and then subjected to action of carbon dioxide under pressure and at 100–145°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 149
Lange, Zwischenprodukte, #145, 471–475, 479

Dyes Derived from Salicylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
48	Alizarin Yellow GG	I '14:—144,761 M '17:— 1,452,622 M '18:— 2,233,208 M '19:—163,170 M '20:—211,580	*m*-Nitro-aniline	M
58	Alizarin Yellow R	I '14:— 97,059 M '17:—215,468 M '18:—385,910 M '19:—130,424 I '20:— 860 M '20:— 83,334	*p*-Nitro-aniline *or* Aniline [with nitration after coupling]	M
96	Chrome Fast Yellow GG	I '14:— 150 I '20:— 500	*o*-Anisidine *or* *m*-Amino-*p*-cresol Methyl Ether	M
102	Diamond Flavine G	I '14:— 23,089 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine	M
103	Dutch Yellow		Benzidine [Sodium sulfite]	M
133	Eriochrome Phosphine R	I '14:— 1,433	*p*-Nitro-aniline-*o*-sulfonic Acid	ACr
177	Chrome Yellow D Mordant Yellow O	I '14:—129,651 M '17:— ? M '18:— 32,011 M '19:— ? I '20:— 1,389 M '20:— ?	Broenner's Acid	M

Dyes Derived from Salicylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
178	Crumpsall Yellow		Amino-G Acid	A
199	Oriol Yellow Cotton Yellow R	I '14:— 13,416 I '20:— 125 M '20:— ?	Dehydrothio-*p*-toluidine-sulfonic Acid *or* Primuline	D
204	Diamond Yellow G		*m- or p*-Amino-benzoic Acid	M
	DISAZO DYES			
221	Anthracene Acid Brown G	M '17:— ? M '18:— ? I '20:— 225	Sulfanilic Acid *p*-Nitro-aniline	ACr
250	Milling Orange	I '14:— 4,370	Amino-azo-benzene-sulfonic Acid	M
291	Azo Alizarin Bordeaux W		*p*-Phenylene-diamine Nevile-Winther's Acid	M
292	Azo Alizarin Black I		*p*-Phenylene-diamine Chromotropic Acid	M
294	Anthracene Yellow C Fast Mordant Yellow	I '14:— 3,678 I '20:— 887	Thio-aniline Salicylic Acid (2 mols)	A ACr
296	Cotton Yellow G	I '14:— 31,472 I '20:— 4,651	*p*-Amino-acetanilide (2 mols) Salicylic Acid (2 mols) Phosgene	D
305	Hessian Yellow		Diamino-stilbene-disulfonic Acid Salicylic Acid (2 mols)	D
339	Brilliant Orange G	I '14:— 6,321 M '17:— ?	Benzidine 3-Amino-phenol-4-sulfonic Acid	D

Dyes Derived from Salicylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
340	Benzo Orange R	I '14:— 1,073 M '17:— ? M '18:— 50,422 M '19:— 42,807 I '20:— 220 M '20:— 86,210	Benzidine Naphthionic Acid	D
340	Chlorazol Orange 2R		Benzidine 2-Naphthylamine-7-sulfonic Acid	D
341	Crumpsall Direct Fast Red R	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine R Salt	D
342	Chrysamine G	I '14:— 608 M '17:— 26,061 M '18:— 28,846 M '19:— 54,279 I '20:— 9,810 M '20:— 49,342	Benzidine Salicylic Acid (2 mols)	D
343	Diamine Fast Red F	I '14:— 50,479 M '19:— 56,864 I '20:— 4,040 M '20:—115,865	Benzidine Gamma Acid [Acid coupling]	D
344	Diamine Brown M	I '14:— 65,396 M '18:— ? M '19:— 15,959 M '20:—257,872	Benzidine Gamma Acid [Alkaline coupling]	D
345	Oxamine Maroon		Benzidine 1-Amino-5-naphthol-7-sulfonic Acid	D
346	Oxamine Red	I '14:— 11,636 I '20:— 848	Benzidine J Acid	D

Dyes Derived from Salicylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
347	Diphenyl Brown RN		Benzidine Methyl-gamma Acid	D
348	Diphenyl Brown BN	I '14:— 13,471	Benzidine Dimethyl-gamma Acid	D
349	Diamine Brown B	I '20:— 24	Benzidine Phenyl-gamma Acid	D
350	Alkali Yellow R		Benzidine Dehydrothio-*p*-toluidine-sulfonic Acid	D
355	Anthracene Red	I '14:— 3,873 M '19:— ? I '20:— 104 M '20:— ?	*o*-Nitro-benzidine Nevile-Winther's Acid	ACr
393	Diphenyl Brown 3GN	M '20:— ?	Tolidine Dimethyl-gamma Acid	D
394	Chrysamine R	I '14:— 6,261 M '20:— ?	Tolidine Salicylic Acid (2 mols)	D
404	Diamine Yellow N	M '17:— ? I '20:— 313	Ethoxy-benzidine Phenol [Ethylation]	D
	TRISAZO DYES			
444	Crumpsall Direct Fast Brown B		Benzidine Aniline Gamma Acid	D
445	Crumpsall Direct Fast Brown O		Benzidine Aniline Phenyl-gamma Acid	D
446	Benzo Olive	I '14:— 1,149	Benzidine α-Naphthylamine H Acid	D

Dyes Derived from Salicylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
447	Benzo Gray S	I '14:— 802	Benzidine α-Naphthylamine Nevile-Winther's Acid	D
448	Diamine Bronze G	I '14:— 4,495	Benzidine *m*-Phenylene-diamine H Acid	D
449	Trisulfon Brown B	I '14:— 16,781 I '20:— 38,616	Benzidine *m*-Phenylene-diamine 2R Acid	D
454	Trisulfon Brown G	I '14:— 1,323	Tolidine *m*-Phenylene-diamine 2R Acid	D
457	Trisulfon Brown GG	I '14:— 7,562 I '20:— 38,411	Dianisidine *m*-Phenylene-diamine 2R Acid	D
465	Columbia Black Green D		Benzidine 1-Amino-8-naphthol-4-sulfonic Acid Aniline	D
466	Eboli Green		Benzidine Sulfanilic Acid 1-Amino-8-naphthol-3:5-disulfonic Acid	D
468	Diphenyl Green 3G		Benzidine H Acid *o*-Chloro-*p*-nitro-aniline	D
475	Diamine Green G Oxamine Green G	I '14:— 7,329 M '17:— ? M '18:— 29,118 M '19:—136,638 I '20:— 1,332 M '20:— 52,292	Benzidine H Acid *p*-Nitro-aniline	D

Dyes Derived from Salicylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
476	Benzamine Brown 3GO	I '14:— 16,988 M '17:— ? M '18:— ? M '19:— ? M '20:—623,757	Benzidine Sulfanilic Acid *m*-Phenylene-diamine	D
477	Congo Brown G Naphthamine Brown 4G	I '14:— 52,141 M '17:— ? M '18:— ? M '19:— ? I '20:— 443 M '20:—229,489	Benzidine Sulfanilic Acid Resorcinol	D
478	Columbia Green	I '14:— 45,162 M '18:— ? I '20:— 7,555	Benzidine Sulfanilic Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
480	Congo Brown R	I '14:— 3,045	Benzidine Laurent's Acid Resorcinol	D
482	Alizarin Yellow FS		Aniline *and* *o*-Toluidine *p*-Toluidine Salicylic Acid (3 mols) *or* [Fuchsine *and* Salicylic Acid]	M
	TRIPHENYL-METHANE DYES			
510	Azo Green		*m*-Amino-tetramethyl-*p*:*p*'-diamino-triphenyl-methane *or from* *m*-Nitro-benzaldehyde *and* dimethyl-aniline (2 mols) [Oxidation]	M

Dyes Derived from Salicylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
549	Chrome Violet	I '14:— 51	Hydrol [Oxidation]	M
557	Chrome Violet	I '14:— 220 M '18:— ?	Salicylic Acid (3 mols) [Formaldehyde *and* sulfuric Acid]	M

Schaeffer's α Acid

1-Naphthol-2-sulfonic Acid (*not considered herein*)

Schaeffer's Acid[1]

Schaeffer's β Acid

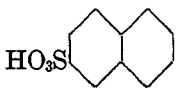
2-Naphthol-6-sulfonic Acid (*C. A. nomen.*)

β-Naphthol-sulfonic Acid S

β-Naphthol-sulfonic Acid Schaeffer

β-Naphthol-α-sulfonic Acid *of Armstrong and Schultz*

β-Naphthol-β-sulfonic Acid



$= C_{10}H_8O_4S = 224$

STATISTICS.—Manufactured '17:—1,108,049 lbs.[2]
Manufactured '18:— 169,383 lbs.
Manufactured '19:— 146,111 lbs.
Manufactured '20:— 475,243 lbs.

FORMATION.—By sulfonation of β-naphthol, and separation from the Croceine acid formed simultaneously

[1] Schaeffer's Acid is very occasionally used when referring to 1-Naphthol-2-sulfonic acid, but this is more properly known as Schaeffer's α acid.

[2] Includes Croceine Acid.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 223
Lange, Zwischenprodukte, #2430–2432
Thorpe, Dic. Chemistry, **3**, 624

Dyes Derived from Schaeffer's Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
4	Naphthol Green	I '14:— 19,146 M '17:— 75,850 M '18:— 22,465 M '19:— 34,646 I '20:— 100 M '20:— ?	[Nitroso-Derivative]	A
37	Ponceau 4GB Croceine Orange	I '14:— 13,046 M '17:— ? M '18:— 30,824 M '19:— 17,274 M '20:— 96,573	Aniline	A
70	Brilliant Orange O	I '14:— 21,480 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Toluidine	A
79	Brilliant Orange R Xylidine Orange RR	I '14:— 4,204 M '17:— ? M '18:— 18,909 M '19:— ? M '20:— ?	Xylidine	A
111	Fast Red BT	M '17:— ? M '18:— ? M '19:— ?	α-Naphthylamine	A
123	Emine Red		Isodehydro-thio-*m*-xylidine	A
166	Fast Red E	I '14:— 2,473 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Naphthionic Acid	A

Dyes Derived from Schaeffer's Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
196	Titian Red	I '14:— 886 M '19:— ? M '20:— ?	Dehydro-thio-*p*-toluidine-sulfonic Acid	D
197	Thiazine Red G	I '14:— 4,861 M '18:— ? M '19:— 11,886 M '20:— 13,988	Primuline	D
201	Pigment Scarlet G	M '17:— ? M '18:— ? M '19:— ?	Anthranilic Acid	CL
	DISAZO DYES			
234	Cloth Red G	I '14:— 554	*o*-Amino-azo-toluene	M
237	Bordeaux BX		Amino-azo-xylene	A
243	Coomassie Wool Black R		Acetyl-*p*-phenylene-diamine α-Naphthylamine	A
248	Fast Scarlet B	I '14:— 1,755	Amino-azo-benzene-sulfonic Acid	A
254	Bordeaux G		Amino-azo-toluene-sulfonic Acid	A
273	Diaminogene Blue BB	I '14:— 8,308 M '17:— ? I '20:— 5,936	Acetyl-1: 4-naphthylene-diamine-6-sulfonic Acid α-Naphthylamine	D
289	Acid Alizarin Black SN Palatine Chrome Black S	M '17:— ? M '18:— ? M '19:— ?	2: 6-Diamino-1-phenol-4-sulfonic Acid β-Naphthol	ACr
293	Milling Red G	I '14:— 699 I '20:— 200	Thioaniline Schaeffer's Acid (2 mols)	A

Dyes Derived from Schaeffer's Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYE			
645	Gallazine A		Nitroso-dimethyl-aniline Gallic Acid [Oxidation]	M

Schoellkopf's Acid

See, 1-Naphthol-4: 8-disulfonic Acid

1-Naphthylamine-4: 8-disulfonic Acid

1-Naphthylamine-8-sulfonic Acid

Also used for 1-Naphthol-8-sulfonic Acid, *which is not here indexed, but the intermediate generally referred to is that one listed first above*

Semi-naphthalidam

1: 5-Diamino-naphthalene (*not considered herein*)

Siver Salt (*Sodium derivative*)

See, Anthraquinone-2-sulfonic Acid

SS Acid *or* **2S Acid**

See, 1-Amino-8-naphthol-2: 4-disulfonic Acid

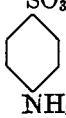
***m*-Sulfanilic Acid**

See, Metanilic Acid

Sulfanilic Acid (*C. A. nomen. $SO_3H = 1$*)

p-Amino-benzene-sulfonic acid

Aniline-*p*-sulfonic acid



$= C_6H_7NO_3S = 173$

STATISTICS.—Imported '14:— 4,477 lbs.
Manufactured '17:—1,184,412 lbs.
Manufactured '18:—1,247,478 lbs.
Manufactured '19:—1,023,861 lbs.
Manufactured '20:—1,796,838 lbs.

FORMATION.—From aniline by heating with sulfuric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 47
Lange, Zwischenprodukte, #615–620

Dyes Derived from Sulfanilic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYES			
22	Xylene Yellow 3G	I '14:— 23,074 I '20:— 77,782	1-(2: 5-Dichloro-4-sulfophenyl)-3-methyl-5-pyrazolone	A
23	Tartrazine	I '14:—272,477 M '17:— ? M '18:— ? M '19:— ? I '20:— 47,877 M '20:—701,722	*p*-Phenyl-hydrazine-sulfonic Acid	A
	MONOAZO DYES			
138	Helianthine Methyl Orange	I '14:— 500 M '18:— ? M '19:— ? M '20:— ?	Dimethyl-aniline	A
139	Orange IV	I '14:— 19,020 M '19:— ? I '20:— 608	Diphenylamine	A
140	Azoflavine RS Curcumeine	I '14:— 39,869 I '20:— 5,225	Diphenylamine [Nitration]	A
141	Azo Yellow 3G	I '14:—114,689 M '17:— ? M '18:— ? M '19:— ? I '20:— 4,818 M '20:— ?	Diphenylamine [Strong nitration]	A

Dyes Derived from Sulfanilic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
142	Brilliant Yellow S Curcumine	I '14:— 9,934	Diphenylamine [Sulfonation]	A
143	Chrysoine Tropoeoline	I '14:— 6,252 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Resorcinol	A
144	Orange I	I '14:— 8,305 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,323 M '20:— 14,684	α-Naphthol	A
145	Orange II	I' 14:—128,877 M '17:—712,586 M '18:—916,890 M '19:— 1,133,925 I '20:— 2,265 M '20:— 1,850,341	β-Naphthol	A
146	Azo Fuchsine G	I '14:— 17,819 I '20:— 3,694	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	A
147	Azo Fuchsine 6B	I '14:— 13,206 M '17:— ? M '18:— ?	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid [? Classification]	A
	DISAZO DYES			
211	Resorcine Brown	I '14:— 13,189 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,484 M '20:— ?	*m*-Xylidine Resorcinol	A

Dyes Derived from Sulfanilic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
212	Fast Brown G Acid Brown G	I '14:— 17,407 I '20:— 485	α-Naphthol Sulfanilic Acid (2 mols)	A
220	Palatine Black A Buffalo Black PY	I '14:—299,274 I '20:— 200	1-Amino-8-naphthol-4-sulfonic Acid α-Naphthylamine	A
221	Anthracene Acid Brown G	M'17:— ? M'18:— ? I '20:— 225	*p*-Nitro-aniline Salicylic Acid	ACr
259	Ponceau 10 RB	I '14:— 201	*o*-Anisidine Croceine Acid	A
260	Eriochrome Verdone A	I '14:— 882	*m*-Amino-*p*-cresol β-Naphthol	ACr
261	Buffalo Black 10B	M'17:— ? M'18:— ? M'19:— ? M'20:— ?	α-Naphthylamine H Acid	A
262	Victoria Black B	I '14:— 557	α-Naphthylamine 1:8-Dihydroxy-naphthalene-4-sulfonic Acid	A
	TRISAZO DYES			
466	Eboli Green		Benzidine Salicylic Acid 1-Amino-8-naphthol-3:5-disulfonic Acid	D
476	Benzamine Brown 3 GO	I '14:— 16,988 M'17:— ? M'18:— ? M'19:— ? M'20:—623,757	Benzidine *m*-Phenylene-diamine Salicylic Acid	D

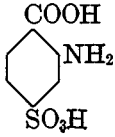
Dyes Derived from Sulfanilic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
477	Congo Brown G Naphthamine Brown 4G	I '14:— 52,141 M '17:— ? M '18:— ? M '19:— ? I '20:— 443 M '20:—229,489	Benzidine Resorcinol Salicylic Acid	D
478	Columbia Green	I '14:— 45,162 M '18:— ? I '20:— 7,555	Benzidine Salicylic Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
	TETRAKISAZO DYES			
485	Benzo Brown G	I '14:— 41,905 M '17:— ? M '18:— ? M '19:— 83,506 I '20:— 2,286 M '20:—109,648	*m*-Phenylene-diamine (3 mols) Sulfanilic Acid (2 mols)	D
489	Hessian Brown BBN		Benzidine Resorcinol (2 mols) Sulfanilic Acid (2 mols)	D
	SULFUR DYE			
738	Cotton Black		1-Chloro-2: 4-dinitro-benzene [S plus Na_2S]	S

***p*-Sulfo-anthranilic Acid** (*C. A. nomen.*)

2-Amino-4-sulfo-benzoic Acid

o-Amino-*p*-sulfo-benzoic Acid



$= C_7H_7NO_5S = 217$

FORMATION.—*o*-Nitro-toluene is sulphonated with oleum. The resulting *o*-nitro-toluene-*p*-sulfonic acid is converted into the sodium salt and heated with a 40 per cent caustic soda solution at 90–95°

LITERATURE.—Lange, Zwischenprodukte, #855

Dye Derived from *p*-Sulfo-anthranilic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
28	PYRAZOLONE DYE Pigment Fast Yellow G	M '19:— ? I '20:— 170	3-Methyl-1-phenyl-5-pyrazolone	CL

Sulfo-naphthalic Acid

Naphthalene-1-sulfonic Acid (*not considered herein*)

β-Sulfonic Acid

See, Anthraquinone-2-sulfonic Acid

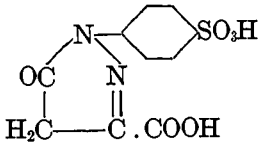
1-(*p*-Sulfo-phenyl)-3-methyl-5-pyrazolone

See, 3-Methyl-1-(*p*-sulfo-phenyl)-5-pyrazolone

1-(*p*-Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid

Tartrazinogen-sulfonic Acid

5-Keto-1-(*p*-sulfo-phenyl)-3-Δ^2-pyrazoline-carboxylic Acid (*C. A. nomen.*)



$= C_{10}H_8N_2O_6S = 284$

FORMATION.—By condensation of phenyl-hydrazine-*p*-sulfonic acid and ethyl oxalacetate

LITERATURE.—Cain, Intermediate Products (2d Ed.),168
Lange, Zwischenprodukte, #138

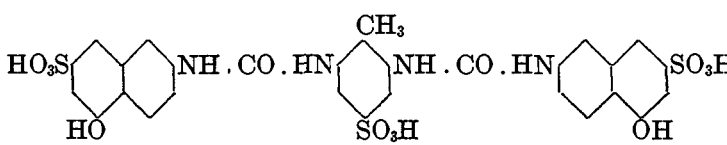
Dye Derived from 1-(*p*-Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
20	PYRAZOLONE DYE Flavazine S	I '14:— 81,375 I '20:— 1,500	Aniline	A

Sulfo-*m*-tolylene-diamine-bis-(carbonyl-amino-naphthol-sulfonic Acid)

Sulfo-*m*-tolylene-diamine-dicarbonyl-dihydroxy-dinaphthylamine-disulfonic Acid

3: 5-Bis[β-(5-hydroxy-7-sulfo-2-naphthyl)-carbamido]-*p*-toluene-sulfonic Acid (*C. A. nomen.*)



$= C_{29}H_{24}N_4O_{13}S_3 = 732$

FORMATION.—By condensation of tolylene-diamine-sulfonic acid (CH_3: NH_2: NH_2: SO_3H = 1: 2: 6: 4) with two molecules of J acid (2-amino-5-naphthol-7-sulfonic acid), by means of phosgene ($COCl_2$)

LITERATURE.—Ger. Pat. 236,594, Frdl. **10**, 904
Lange, Zwischenprodukte, #2912

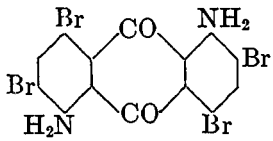
Dyes Derived from Sulfo-*m*-tolylene-diamine-bis-(carbonyl-amino-naphthol-sulfonic Acid)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
280	Azidine Fast Scarlet GGS		*o*-Toluidine (2 mols)	D
281	Azidine Fast Scarlet 4BS		*o*-Toluidine β-Naphthylamine	D
282	Azidine Fast Scarlet 7BS		β-Naphthylamine (2 mols)	D

Tartrazinogen-sulfonic Acid

See, 1-(*p*-Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid

2:4:6:8-Tetrabromo-1:5-diamino-anthraquinone



$= C_{14}H_6Br_4N_2O_2 = 554$

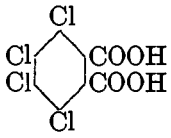
FORMATION.—By bromination of 1:5-diamino-anthraquinone

LITERATURE.—Scholl and Berblinger, Ber. **37**, 4180 (1904)
Barnett, Anthracene and Anthraquinone, 229
Cf. Lange, Zwischenprodukte, #3231, 3404, 3405

Dye Derived from 2:4:6:8-Tetrabromo-1:5-diamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
861	Anthraquinone Blue SR	I '20:— 917	Aniline (2 mols) [Sulfonation]	ACr

Tetrachloro-phthalic Acid



$= C_8H_2Cl_4O_4 = 302$

STATISTICS.—Imported '14:—1,102 lbs.

FORMATION.—Phthalic anhydride is warmed for some hours at 200° with 6 parts of antimony pentachloride, and chlorine is conducted through the molten mass for from 8 to 12 hours

LITERATURE.—Lange, Zwischenprodukte, #1184

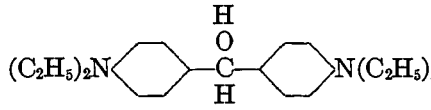
Dyes Derived from Tetrachloro-phthalic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
596	Phloxine	I '14:— 1,020	Resorcinol (2 mols) [Bromination]	A
597	Rose Bengal B	I '14:— 1,354 M '17:— ? M '18:— ? M '19:— ?	Resorcinol (2 mols) [Iodation]	A
598	Cyanosine B		Resorcinol (2 mols) [Bromination; Ethylation] *or* [Phloxine ethylated]	ss

***p*: *p'*-Tetraethyl-diamino-benzohydrol**

p: *p'*-Tetraethyl-diamino-diphenyl-carbinol

p: *p'*-Bis(diethylamino)-benzohydrol (*C. A. nomen.*)



$= C_{21}H_{30}N_2O = 326$

FORMATION.—Diethyl-aniline is condensed with formaldehyde in the presence of hydrochloric acid to tetraethyl-diamino-diphenyl-methane. This body is now oxidized to the hydrol with lead peroxide

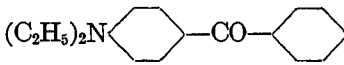
LITERATURE.—Lange, Zwischenprodukte, #1354

Dye Derived from *p*: *p'*-Tetraethyl-diamino-benzohydrol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
498	Turquoise Blue	I '14:— 1,541 I '20:— 1,407	*p*-Nitro-toluene [Oxidation]	B

***p*: *p'*-Tetraethyl-diamino-benzophenone**

p: *p'*-Bis(diethylamino)-benzophenone (*C. A. nomen.*)



$= C_{21}H_{28}N_2O = 324$

FORMATION.—By condensation of diethyl-aniline (2 mols) and phosgene (carbonyl chloride)

LITERATURE.—Lange, Zwischenprodukte, #1382

Dyes Derived from *p*: *p'*-Tetraethyl-diamino-benzophenone

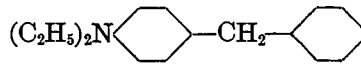
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
518	Ethyl Violet Ethyl Purple	I '14:— 51,933	Diethyl-aniline	B
532	Alkali Violet 6B	I '14:— 3,020	Methyl-diphenyl-amine [Sulfonation]	A
	DIPHENYL-NAPHTHYL-METHANE DYE			
560	Night Blue	I '14:— 361 M '19:— ? I '20:— 11	*p*-Tolyl-α-naphthyl-amine	B

p: p'-Tetraethyl-diamino-diphenyl-carbinol

See, p: p'-Tetraethyl-diamino-benzohydrol

p: p'-Tetraethyl-diamino-diphenyl-methane

p: p'-Methylene-bis-[N: N-diethyl-*a*niline] (*C. A. nomen.*)



$= C_{21}H_{30}N_2 = 310$

FORMATION.—By condensation of diethyl-aniline with formaldehyde in the presence of hydrochloric acid

LITERATURE.—*Cf.* Cain, Intermediate Products (2d Ed.), 102
Cf. Lange, Zwischenprodukte, #1301

Dye Derived from p: p'-Tetraethyl-diamino-diphenyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
518	Ethyl Violet Ethyl Purple	I '14:— 51,933	Diethyl-aniline	B

1: 3: 5: 7-Tetrahydroxy-anthraquinone

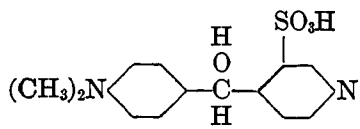
See, Anthrachrysone

Tetramethyl-diamino-benzohydrol

See, Hydrol

p: p'-Tetramethyl-diamino-benzohydrol-sulfonic Acid

5-Dimethylamino-*a*-(*p*-dimethylamino-phenyl)-*a*-hydroxy-*o*-toluene-sulfonic Acid (*C. A. nomen.*)



$= C_{17}H_{22}N_2O_4S = 350$

FORMATION.—Tetramethyl-diamino-diphenyl-methane (from condensation of dimethyl-aniline and formaldehyde) is dissolved in monohydrate and sulfonated with 25 per cent oleum at 110°. This methane-sulfonic acid is now oxidized with lead peroxide to the hydrol derivative

LITERATURE.—Ger. Pat. 88085; Frdl. **4**, 219
Cain, Intermediate Products (2d Ed.), 102
Lange, Zwischenprodukte, #1312
Georgievics and Grandmougin, Dye Chemistry, 208

Dye Derived from Tetramethyl-diamino-benzohydrol-sulfonic Acid

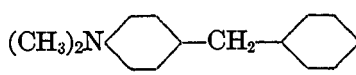
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
531	Eriocyanine A	I '14:— 25,091 I '20:— 8,223 M '20:— ?	Dibenzyl-aniline-sulfonic [or disulfonic] Acid [Oxidation]	A

Tetramethyl-diamino-benzophenone

See, Ketone

***p*: *p'*-Tetramethyl-diamino-diphenyl-methane**

p: *p'*-Methylene-bis-[*N*: *N*-dimethyl-aniline] (*C. A. nomen.*)



$= C_{17}H_{22}N_2 = 254$

STATISTICS.—Manufactured '20:— ?

FORMATION.—From dimethyl-aniline (2 mols) by condensing with formaldehyde in the presence of hydrochloric acid

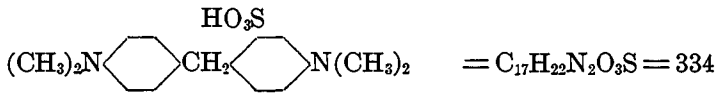
LITERATURE.—Cain, Intermediate Products (2d Ed.), 102
Lange, Zwischenprodukte, #1301

Dyes Derived from *p*: *p'*-Tetramethyl-diamino-diphenyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AURAMINES			
493	Auramine	I '14:—449,276 M '17:— ? M '18:— 45,634 M '19:—127,567 I '20:— 74,414 M '20:— ?	[Sulfur and ammonia]	B
	ACRIDINE DYE			
603	Acridine Orange NO	I '14:— 2,336 I '20:— 1,925	[Dinitration, Reduction] [Ammonia Removal, Oxidation]	B

***p*: *p'*-Tetramethyl-diamino-diphenylmethane-sulfonic Acid**

6-(*p*-Dimethylamino-benzyl)-*N*: *N*-dimethyl-*m*etanilic Acid (*C.A. nomen.*)



$= C_{17}H_{22}N_2O_3S = 334$

FORMATION.—By sulfonation of tetramethyl-diamino-diphenylmethane; or by condensation of dimethyl-metanilic acid and dimethyl-aniline with formaldehyde

LITERATURE.—Lange, Zwischenprodukte, #1312
Cain, Intermediate Products (2d Ed.), 102
Georgievics and Grandmougin, Dye Chemistry, 208

USES.—For preparation of *p*: *p'*-tetramethyl-diamino-benzohydrol-sulfonic acid

***N'*: *N'*: *N''*: *N''*-Tetramethyl-*m*: *p'*: *p''*-methenyl-trisaniline** (*C.A. nomen.*)

See, *m*-Amino-tetramethyl-*p'*: *p''*-diamino-triphenyl-methane

α-Tetranitro-naphthalene

From 1: 5-Dinitro-naphthalene

β-Tetranitro-naphthalene

1: 3: 6: 8-Tetranitro-naphthalene (*not considered herein*)

γ-Tetranitro-naphthalene

1: 3: 5: 8-Tetranitro-naphthalene (*not considered herein*)

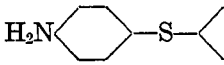
δ-Tetranitro-naphthalene

1: 2: 5: 8-Tetranitro-naphthalene (*not considered herein*)

Thioaniline

p: *p'*-Thio-bis*a*niline (*C. A. nomen.*)

p: *p'*-Diamino-diphenyl-sulfide



$= C_{12}H_{12}N_2S = 216$

FORMATION.—From aniline by heating with sulfur in presence of lead oxide

LITERATURE.—Meyer-Jacobson, Organische Chemie (1902), II, **1**, 476

Dyes Derived from Thioaniline

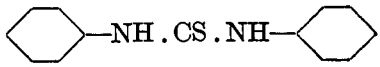
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
293	Milling Red G	I '14:— 699 I '20:— 200	Schaeffer's Acid (2 mols)	A
294	Anthracene Yellow C Fast Mordant Yellow	I '14:— 3,678 I '20:— 887	Salicylic Acid (2 mols)	A ACr

***p*: *p'*-Thio-bisaniline** (*C. A. nomen.*)

See, Thioaniline

Thio-carbanilide (*C. A. nomen.*)

Diphenyl-thiourea



$= C_{13}H_{12}N_2S = 228$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:—1,326,236 lbs.
Manufactured '19:—2,268,375 lbs.
Manufactured '20:—2,226,807 lbs.

FORMATION.—From aniline by action of carbon disulfide

LITERATURE.—Ullmann, Enzy. tech. Chemie, **6**, 304

Dyes Derived from Thio-carbanilide

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
874	Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 I '20:—520,347 M '20:— 18,178,231	Thio-carbanilide (2 mols) [KCN, etc.]	V
876	Indigo MLB Indigo White		Thio-carbanilide (2 mols) [KCN, etc.; Reduction] *or* [Indigo Reduced]	V
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 I '20:— 5,512 M '20:— 1,395,000	Thio-carbanilide (2 mols), etc. *or* [Indigo Sulfonated]	A

Dyes Derived from Thio-carbanilide (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
878	Indigotine P		Thio-carbanilide (2 mols), etc. *or* [Indigo Sulfonated]	A
879	Brom Indigo Rathjen	I '14:— 53,610 M '20:— ?	Thio-carbanilide (2 mols), etc. *or* [Indigo Brominated]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	Thio-carbanilide (2 mols), etc. *or* [Indigo, Brominated]	V
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Thio-carbanilide (2 mols), etc. *or* [Indigo, Brominated]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	Thio-carbanilide (2 mols), etc. *or* [Indigo, Brominated]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Thio-carbanilide (2 mols), etc. *or* [Indigo, Brominated]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Thio-carbanilide (2 mols), etc. *or* [Indigo, Chlorinated Brominated]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	Thio-carbanilide (2 mols), etc. *or* [Indigo Chlorinated]	V

Dyes Derived from Thio-carbanilide (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
886	Brilliant Indigo BASF/G	I '14:— 12,057	Thio-carbanilide (2 mols), etc. *or* [Indigo Chlorinated, Brominated]	V
889	Indigo Yellow 3G		Thio-carbanilide (2 mols), etc. Benzoyl Chloride *or* [Indigo, Benzoyl Chloride]	V
890	Ciba Yellow G	I '14:— 48	Thio-carbanilide (2 mols), etc. Benzoyl Chloride [Bromination] *or* [Indigo Yellow 3G, Brominated]	V

Thio-indoxyl

See, 2-Hydroxy-thionaphthene

Thio-indoxyl-carboxylic Acid

See, 2-Hydroxy-thionaphthene-1-carboxylic Acid

***o*-Thiol-benzoic Acid**

See, Thio-salicylic Acid

Thio-salicylic Acid

o-Mercapto-benzoic Acid (*C. A. nomen.*)

o-Thiol-benzoic Acid

Thiophenol-*o*-carboxylic Acid

$= C_7H_6O_2S = 154$

FORMATION.—(1) From *o*-chloro-benzoic acid by reaction with potassium hydrogen sulfide. (2) From anthranilic acid by diazotizing and then running into a solution of sodium polysulfide and sodium hydroxide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 151
Lange, Zwischenprodukte, #507–510

Dyes Derived from Thio-salicylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
912	Thio Indigo Red B	I '14:— 1,102 I '20:— 275	Thio-salicylic Acid (2 mols) [Chloro-acetic Acid 2 mols; etc.]	V
919	Ciba Bordeaux B	I '14:— 899 I '20:— 1,786	Thio-salicylic Acid (2 mols) [Chloro-acetic Acid 2 mols; etc.; Bromination] *or* [Thio Indigo Red, brominated]	V

Tobias Acid

See, 2-Naphthylamine-1-sulfonic Acid

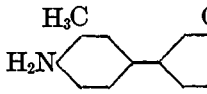
Also applied to, 2-Naphthol-1-sulfonic Acid

Tolidine

See, *o*-Tolidine

o-Tolidine (*C. A. nomen.*)

Tolidine



$= C_{14}H_{16}N_2 = 212$

STATISTICS.—Imported '14:— 5,874 lbs.
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—143,012 lbs.
Manufactured '20:—375,905 lbs.

FORMATION.—From *o*-nitro-toluene by reduction with zinc dust and hydrochloric acid, and conversion of the hydrazo-toluene into tolidine by boiling with hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 95
Lange, Zwischenprodukte, #1204, 1216

Dyes Derived from *o*-Tolidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
338	Naphthamine Blue 3B	I '14:— 11,707 I '20:— 400	K Acid (2 mols)	D
362	Toluylene Orange R Oxy Diamine Orange	I '14:— 25,908 M '19:— ? I '20:— 1,653	4: 6-Diamino-*m*-toluene-sulfonic Acid (2 mols)	D
363	Benzopurpurin 4B	I '14:—351,712 M '17:— ? M '18:—356,522 M '19:—288,021 I '20:— 3,492 M '20:—617,629	Naphthionic Acid (2 mols)	D
364	Benzo Purpurin 6B	I '14:— 9,171 I '20:— 4,743	Laurent's Acid (2 mols)	D
365	Benzopurpurin B	I '14:— 21,090 M '17:— ? M '18:— ? M '19:— ?	Broenner's Acid (2 mols)	D
366	Diamine Red B Deltapurpurin 5B	I '14:— 21,058 M '17:— ? M '18:— ? I '20:— 1,896	2-Naphthylamine-7-sulfonic Acid Broenner's Acid	D

Dyes Derived from *o*-Tolidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
367	Diamine Red 3B Deltapurpurin 7B		2-Naphthylamine-7-sulfonic Acid (2 mols)	D
368	Brilliant Purpurin 4B	I' 14:— 6,634	Naphthionic Acid Broenner's Acid	D
369	Brilliant Purpurin R	I '14:— 8,051	Amino-R Acid Naphthionic Acid	D
370	Brilliant Congo R	I '14:— 19,133 I '20:— 11,129	Amino-R Acid Broenner's Acid	D
371	Rosazurine G		Ethyl-2-naphthyl-amine-7-sulfonic Acid 2-Naphthylamine-7-sulfonic Acid	D
372	Rosazurine B		Ethyl-2-naphthylamine-7-sulfonic Acid (2 mols)	D
373	Congo Orange R	I '14:— 7,027 I '20:— 254	Amino-R Acid Phenol [Ethylation]	D
374	Congo 4R Congo Red 4R	M'18:— ?	Naphthionic Acid Resorcinol	D
375	Congo Corinth B	I '14:— 2,196 M'19:— ?	Naphthionic Acid Nevile-Winther's Acid	D
376	Pyramidol Brown T		Resorcinol (2 mols)	D
377	Azo Blue	I '14:— 198 M'19:— ? M'20:— ?	Nevile-Winther's Acid (2 mols)	D
378	Trisulfon Blue R	I '14:— 911 M'19:— ? M'20:— ?	1-Naphthol-3:6:8-trisulfonic Acid β-Naphthol	D

Dyes Derived from *o*-Tolidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
379	Dianil Blue 2R Benzo New Blue 2B	I '14:— 14,434	Chromotropic Acid Nevile-Winther's Acid	D
380	Dianil Blue B		Chromotropic Acid (2 mols)	D
381	Azo Black Blue B, R		H Acid *m*-Hydroxy-diphenylamine	D
382	Azo Mauve B	M '17:— ? M '20:— ?	H Acid α-Naphthylamine	D
383	Naphthazurine B	I '14:— 4,782	H Acid β-Naphthylamine	D
384	Chicago Blue 2R Diamine Blue C2R	I '14:— 23,877	Croceine Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
385	Oxamine Blue 4R	I '14:— 573 M '20:— ?	J Acid Nevile-Winther's Acid	D
386	Diamine Blue BX Benzo Blue BX	I '14:— 1,740 M '17:— ? M '18:— ? M '19:— 92,214 I '20:— 4,520 M '20:— 90,147	Nevile-Winther's Acid H Acid	D
387	Columbia Blue G	I '14:— 7,094	1-Naphthol-3:8-disulfonic Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
388	Chicago Blue R		1-Amino-8-naphthol-4-sulfonic Acid (2 mols)	D

Dyes Derived from *o*-Tolidine (*continued*)

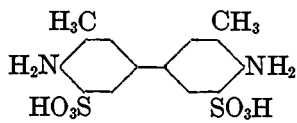
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
389	Eboli Blue B		1-Amino-8-naphthol-3:5-disulfonic Acid (2 mols)	D
390	Benzo Cyanine B	I '14:— 201	H Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
391	Diamine Blue 3B Benzo Blue 3B	I '14:— 1,365 M '17:— 14,533 M '18:— 99,645 M '19:—182,946 I '20:— 1,120 M '20:—136,891	H Acid (2 mols)	D
392	Toluylene Orange G	I '14:— 67,022 M '18:— ? M '19:— ? I '20:— 273 M '20:— ?	4:6-Diamino-*m*-toluene-sulfonic Acid *o*-Cresotic Acid	D
393	Diphenyl Brown 3GN	M '20:— ?	Salicylic Acid Dimethyl-gamma Acid	D
394	Chrysamine R	I '14:— 6,261 M '20:— ?	Salicylic Acid (2 mols)	D
395	Cresotine Yellow R		*o*-Cresotic Acid (2 mols)	D
396	Indazurine RM		1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid Nevile-Winther's Acid	D
397	Direct Blue R	M '17:— ?	1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid Nevile-Winther's Acid	D
398	Direct Gray B		1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid (2 mols)	D

Dyes Derived from *o*-Tolidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
399	Indazurine GS		1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid Gamma Acid	D
	TRISAZO DYES			
450	Benzo Black Blue R		α-Naphthylamine Nevile-Winther's Acid (2 mols)	D
451	Congo Fast Blue R	I '14:— 4,449 M '19:— ? I '20:— 723	α-Naphthylamine 1-Naphthol-3: 8-disulfonic Acid (2 mols)	D
452	Benzo Indigo Blue		α-Naphthylamine 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
453	Columbia Black R	I '14:— 1,307	2 R Acid *m*-Tolylene-diamine (2 mols)	D
454	Trisulfon Brown G	I '14:— 1,323	2 R Acid Salicylic Acid *m*-Phenylene-diamine	D
481	Azo Corinth		Naphthionic Acid Resorcinol 3-Amino-1-phenol-4-sulfonic Acid	D

o-Tolidine-disulfonic Acid

2: 2′-Diamino-5: 5′-bi-*m*-toluene-sulfonic Acid (*C. A. nomen.*)



$= C_{14}H_{16}N_2O_6S_2 = 372$

FORMATION.—From tolidine sulfate by heating with 2 parts of sulfuric acid at 210° from 36 to 48 hours

LITERATURE.—Cain, Intermediate Products (2d Ed.), 96
Lange, Zwischenprodukte, #1269–1271

Dye Derived from *o*-Tolidine-disulfonic Acid

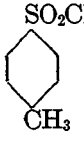
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
400	DISAZO DYE Milling Scarlet 4R Acid Anthracene Red 3B	I '14:— 18,330 I '20:— 2,336	β-Naphthol (2 mols)	A

p-Toluene-sulfochloride

See, *p*-Toluene-sulfonyl Chloride (*C. A. nomen.*)

p-Toluene-sulfonyl Chloride (*C. A. nomen.*)

p-Toluene-sulfochloride



$= C_7H_7ClO_2S = 190.5$

STATISTICS.—Imports '14:—small amount
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—58,932 lbs.
Manufactured '20:— ?

FORMATION.—Toluene is sulfonated with oleum giving a mixture of *o- and p*-toluene-sulfonic acids, which are converted to sodium salts and dried, and then treated with $PCl_3 + Cl$, resulting in *o- and p*-toluene-sulfonyl chlorides. The $POCl_3$ formed is first distilled off and then the mass cooled, whereupon the *p*-toluene-sulfonyl chloride crystallizes out

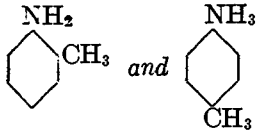
LITERATURE.—Thorpe, Dic. Chemistry, 4, 606
Biel., II, 132

Dye Derived from *p*-Toluene-sulfonyl Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
182	MONOAZO DYE Fast Sulfon Violet Brilliant Sulfon Red B	I '14:— 4,871 I '20:— 4,740	H Acid Aniline	A

Toluidines, *mixed*

Mixed Toluidines



$= C_7H_9N = 107$

STATISTICS.—Imported '14:— 108,835 lbs.
Manufactured '17:—1,366,321 lbs.
Manufactured '18:— 308,667 lbs.
Manufactured '19:— 806,210 lbs.
Manufactured '20:—1,145,361 lbs.

FORMATION.—Toluene is nitrated using mixed acid, and the mixture of *o- and p*-nitro-toluenes is reduced with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 57
Lange, Zwischenprodukte, #234–240

Dyes Derived from Toluidines, *mixed*

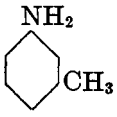
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
21	PYRAZOLONE DYE Pigment Chrome Yellow L		3-Methyl-1-phenyl-5-pyrazolone	CL

Dyes Derived from Toluidines, *mixed* (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
70	Brilliant Orange O	I '14:— 21,480 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Schaeffer's Acid	A
71	Azo Fuchsine B		1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	A
	AZINE DYE			
688	Rosolane Mauve	I '14:— 796 I '20:— 3	Aniline Toluidines (3 mols)	B

m-Toluidine

Note.—C. A. numbering begins with NH_2, while German and English numbering generally start from CH_3



$= C_7H_9N = 107$

STATISTICS.—Imported '14:—945 lbs.
Manufactured '20:— ?

FORMATION.—*m*-Nitro-benzaldehyde is chlorinated to *m*-nitro-benzylidine chloride ($C_6H_4 . NO_2 . CHCl_2$), which by reduction with zinc at low temperatures, forms *m*-toluidine

LITERATURE.—Ber. **13**, 677; **15**, 2011; **18**, 3398

Dyes Derived from *m*-Toluidine

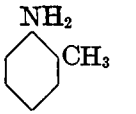
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
240	Janus Red B	I '14:— 250 I '20:— 176	*m*-Amino-phenyl-trimethyl-ammonium Chloride β-Naphthol	B

Dyes Derived from *m*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYE			
435	Janus Brown B		*m*-Amino-phenyl-trimethyl-ammonium Chloride Aniline *m*-Phenylene-diamine	B

o-Toluidine

Note.—C. A. numbering begins with NH_2, while German and English numbering generally starts from CH_3



$= C_7H_9N = 107$

STATISTICS.—Imported '14:— 656,320 lbs.
Manufactured '17:— 336,985 lbs.
Manufactured '18:— 638,874 lbs.
Manufactured '19:—1,002,982 lbs.
Manufactured '20:—1,302,097 lbs.

FORMATION.—Toluene is nitrated to a mixture of *o- and p*-nitro-toluenes, which are separated. The *o*-nitro-toluene is reduced with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 57
Lange, Zwischenprodukte, #234–240

Dyes Derived from *o*-Toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
68	Spirit Yellow R	M '19:— ? M '20:— ?	*o*-Toluidine (2 mols)	ss
69	Chrysoidine R		*m*-Tolylene-diamine	B

Dyes Derived from *o*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
124	Diazine Green S	I '14:— 1,340	*p*-Tolylene-diamine Aniline *or* 2d mol *o*-Toluidine [Preceding used as Safranine] *with* Dimethyl-aniline	B
125	Diazine Black	I '14:— 2,630 I '20:— 701	*p*-Tolylene-diamine Aniline *or* 2d mol *o*-Toluidine [Preceding used as Safranine] *with* Phenol	B
126	Indoine Blue R Union Blue R	I '14:— 15,353 M '17:— ? M '18:— ?	*p*-Tolylene-diamine Aniline *or* 2d mol *o*-Toluidine [Preceding used as Safranine] *with* β-Naphthol	B
127	Methyl Indoine B	M '17:— ?	*p*-Tolylene-diamine Aniline *or* 2d mol *o*-Toluidine [Preceding used as Safranine] *with* "Amino-naphthols"	B
128	Janus Gray B		*p*-Tolylene-diamine Aniline *or* 2d mol *o*-Toluidine [Preceding used as Safranine] [Other intermediate unknown]	B

Dyes Derived from *o*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
280	Azidine Fast Scarlet GGS		*o*-Toluidine (2 mols) Sulfo-*m*-tolylene-diamine-bis(carbonyl-amino-naphthol-sulfonic Acid)	D
281	Azidine Fast Scarlet 4BS		*β*-Naphthylamine Sulfo-*m*-tolylene-diamine-bis(carbonyl-amino-naphthol-sulfonic acid)	D
	TRISAZO DYE			
482	Alizarin Yellow FS		Aniline *and* *p*-Toluidine [as Fuchsine] Salicylic Acid (3 mols)	M
	TRIPHENYL-METHANE DYES			
512	Magenta Fuchsine	I '14:— 87,102 M '17:— 17,739 M '18:— 71,675 M' 19:—155,830 I '20:— 189 M '20:—284,285	Aniline *p*-Toluidine [Arsenic Acid *or* Nitro-benzene]	B
513	New Fuchsine O	I '14:— 300 M '18:— ? M '19:— ? M '20:— ?	Anhydro-formaldehyde-*o*-toluidine *or* Diamino-*o*-ditolyl-methane [*o*-Nitro-toluene, etc.]	B
514	Red Violet 5R	I '14:— 331 I '20:— 750	Aniline *p*-Toluidine [Nitro-benzene, etc., *or* Arsenic Acid] [Methylation *or* ethylation] *or* [Magenta methylated *or* ethylated]	B

Dyes Derived from *o*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*
	TRIPHENYL-METHANE DYES (*continued*)		
521	Spirit Blue Aniline Blue	I '14:— 50,563 M '17:— ? M '18:— ? M '19:— ? I '20:— 723 M '20:— ?	Aniline (3–4 mols) *p*-Toluidine [Benzoic Acid] *or* [Magenta phenylated]
524	Fuchsine S Acid Magenta	I '14:— 19,098 I '20:— 524 M '20:— ?	Aniline *p*-Toluidine [Sulfonation] *or* [Magenta sulfonated]
525	Red Violet 5RS		Aniline *p*-Toluidine, etc. [Ethylation Sulfonation] *or* [Red Violet 5R, sulfonated]
526	Acid Violet 4RS		Aniline *p*-Toluidine [Dimethylation, Trisulfonation] *or* [Magenta dimethylated, trisulfonated]
536	Alkali Blue	I '14:—286,751 M '17:— ? M '18:— 43,184 M '19:— 77,796 I '20:— 6,778 M '20:— 74,253	*p*-Toluidine Aniline (3–4 mols) [Sulfonation] *or* [Spirit Blue sulfonated]

Dyes Derived from *o*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
537	Methyl Blue for Silk Marine Blue	I '14:— 34,867 M '18:— ? M '19:— ? I '20:— 2,395 M '20:— ?	Aniline (4 mols) *p*-Toluidine [Sulfonation]	A
538	Methyl Blue Cotton Blue	I '14:— 50,255	Aniline (4 mols) *p*-Toluidine [Di- *and* trisulfonation]	B
539	Water Blue Soluble Blue	I '14:— 91,152 M '18:— ? M '19:— 16,315 I '20:— 1,387 M '20:— 98,770	*p*-Toluidine Aniline (3–4 mols) [Di- *and* tri-sulfonation] *or* [Spirit Blue di- *and* tri-sulfonated]	A
540	Pacific Blue		Aniline *p*-Toluidine Diamino-diphenyl-methane [Sulfonation]	D
541	Brilliant Dianil Blue 6G		β-Naphthylamine (3 mols) Aniline *p*-Toluidine [Disulfonation]	B
	XANTHONE DYE			
582	Fast Acid Violet A2R	I '14:— 875 I '20:— 2,679 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) *o*-Toluidine (2 mols) [PCl_5, Sulfonation]	A
	ACRIDINE DYE			
606	Phosphine	I '14:—168,175 M '17:— ? M '18:— ? M '19:— 14,648 I '20:— 19,259 M '20:— ?	*p*-Toluidine Aniline [Magenta by-product]	B

Dyes Derived from *o*-Toluidine *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
679	Safranine	I '14:— 59,921 M '17:— ? M '18:—106,591 M '19:—131,042 I '20:— 386 M '20:—149,629	*p*-Tolylene-diamine Aniline *or* o-Toluidine (extra mol)	B
683	Salfranine MN	I '14:— 198 M '18:— ? M '19:— ? M '20:— ?	Dimethyl-*p*-phenylene-diamine Aniline [Oxidation]	B
687	Rosolane O	I '20:— 1,083	*o*-Amino-diphenylamine Aniline [Oxidation]	B
702	Para Blue		Aniline (3–4 mols) *p*-Toluidine *p*-Phenylene-diamine *or* [Spirit Blue, *p*-Phenylene-diamine]	B
703	Rubramine		Nitroso-dimethyl-aniline *p*-Toluidine	B
704	Indamine 3R		Nitroso-dimethyl-aniline	B
705	Indamine 6R	I '14:— 66,170 I '20:— 9,681	Nitroso-dimethyl-aniline *p*-Toluidine	B
	SULFUR DYE			
733	Immedial Indone	I '14:— 4,236	*p*-Amino-phenol [S+Na_2S]	S
	INDIGO GROUP DYE			
888	Indigo MLB/T	I '14:— 10,730 I '20:— 827	*o*-Toluidine (2 mols) [Chloro-acetic, soda-amide, etc.]	V

p-Toluidine

Note.—C. A. numbering begins with NH_2, while German and English numbering generally starts from CH_3

$= C_7H_9N = 107$

STATISTICS.—Imported '14:— 24,686 lbs.
Manufactured '17:—223,778 lbs.
Manufactured '18:—205,852 lbs.
Manufactured '19:—575,841 lbs.
Manufactured '20:—894,169 lbs.

FORMATION.—Toluene is nitrated to a mixture of *o- and p*-nitro-toluenes, which are separated. The *p*-nitro-toluene is reduced with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 58
Lange, Zwischenprodukte, #234–240, 261

Dyes Derived from *p*-Toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES			
482	Alizarin Yellow FS		Aniline *and* *o*-Toluidine [*or* Magenta] Salicylic Acid (3 mols)	M
	TRIPHENYL-METHANE DYES			
511	Parafuchsine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	Aniline (2 mols) [Nitro-benzene and iron *or* Arsenic Acid]	B
512	Magenta Fuchsine	I '14:— 87,102 M '17:— 17,739 M '18:— 71,675 M '19:—155,830 I '20:— 189 M '20:—284,285	Aniline *o*-Toluidine [Nitro-benzene, etc.; *or* Arsenic Acid]	B

Dyes Derived from *p*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
514	Red Violet 5R	I '14:— 331 I '20:— 750	Aniline *o*-Toluidine [Nitro-benzene, etc.; *or* Arsenic Acid] [Methylation *or* ethylation] *or* [Magenta methylated *or* ethylated]	B
520	Light Blue Superfine Spirit Soluble Diphenylamine Blue	I '14:— 2,149	Aniline (5 mols) [Benzoic Acid]	ss
521	Spirit Blue Aniline Blue	I '14:— 50,563 M '17:— ? M '18:— ? M '19:— ? I '20:— 723 M '20:— ?	Aniline (3–4 mols) *o*-Toluidine [Benzoic Acid] *or* [Magenta phenylated]	ss
524	Fuchsine S Acid Magenta	I '14:— 19,098 I '20:— 524 M '20:— ?	Aniline *o*-Toluidine [Sulfonation] *or* [Magenta sulfonated]	A
525	Red Violet 5RS		Aniline *o*-Toluidine [Ethylation, Sulfonation] *or* [Red Violet 5R sulfonated]	A
526	Acid Violet 4RS		Aniline *o*-Toluidine [Dimethylation, Trisulfonation] *or* [Magenta methylated, sulfonated]	A

Dyes Derived from *p*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
535	Methyl Alkali Blue	I '14:— 273 M '18:— ? M '19:— ? I '20:— 29	Aniline (5 mols) [Sulfonation]	A
536	Alkali Blue	I '14:—286,751 M '17:— ? M '18:— 43,184 M '19:— 77,796 I '20:— 6,778 M '20:— 74,253	*o*-Toluidine Aniline (3–4 mols) [Sulfonation]	A
537	Methyl Blue for Silk Marine Blue	I '14:— 34,867 M '18:— ? M '19:— ? I '20:— 2,395 M '20:— ?	*o*-Toluidine Aniline (4 mols) [Sulfonation]	A
538	Methyl Blue Cotton Blue	I '14:— 50,255	*o*-Toluidine Aniline (4 mols) [Di- *and* tri-sulfonation]	B
539	Water Blue Soluble Blue	I '14:— 91,152 M '18:— ? M '19:— 16,315 I '20:— 1,387 M '20:— 98,770	*o*-Toluidine Aniline (3–5 mols) [Di- *and* tri-sulfonation] *or* [Spirit Blue Sulfonated]	A
540	Pacific Blue		Aniline *o*-Toluidine Diamino-diphenyl-methane [Sulfonation]	D
541	Brilliant Dianil Blue 6G		β-Naphthylamine (3 mols) Aniline *o*-Toluidine [Disulfonation]	B

Dyes Derived from *p*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYE			
580	Fast Acid Violet B	I '14:— 20,688 M '19:— ? I '20:— 2,907	Phthalic anhydride Resorcinol (2 mols) *p*-Toluidine (2 mols) *or* Aniline (2 mols) [PCl_5, Sulfonation]	A
	ACRIDINE DYE			
606	Phosphine	I '14:—168,175 M '17:— ? M '18:— ? M '19:— 14,648 I '20:— 19,259 M '20:— ?	Aniline *o*-Toluidine *or* 2d mol Aniline [Magenta by-product]	B
	THIOBENZENYL DYE			
616	Primuline	I '14:— 67,976 M '17:— 72,461 M '18:— 72,778 M '19:—271,338 I '20:— 441 M '20:—183,179	*p*-Toluidine (4 mols) [Sulfur, Sulfonation]	D
	AZINE DYES			
683	Safranine MN	I '14:— 198 M '18:— ? M '19:— ? M '20:— ?	Dimethyl-*p*-phenylene-diamine Aniline [Oxidation]	B
686	Amethyst Violet		Diethyl-*p*-phenylene-diamine Diethyl-aniline [Oxidation]	D
702	Para Blue		Aniline (3–4 mols) *o*-Toluidine *p*-Phenylene-diamine *or* [Spirit Blue and *p*-Phenylene-diamine]	B
703	Rubramine		Nitroso-dimethyl-aniline *o*-Toluidine	B

Dyes Derived from *p*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYE (*continued*)			
705	Indamine 6R	I '14:— 66,170 I '20:— 9,681	Nitroso-dimethyl-aniline *o*-Toluidine	B
	ANTHRAQUINONE AND ALLIED DYES			
852	Alizarin Irisol D, R	I '20:— 401	Quinizarin [Sulfonation]	A
853	Anthraquinone Violet	I '14:— 1,202 I '20:— 1,649	1: 5-Dinitro-anthraquinone [Sulfonation]	ACr
854	Alizarin Viridine DG, FF	I '20:— 11,397	Anthraquinone-2-sulfonic Acid [Sulfonation] [*Or through* Alizarin Bordeaux *from* Alizarin]	M
855	Alizarin Pure Blue B		1-Amino-2: 4-dibromo-anthraquinone [Sulfonation]	ACr
856	Alizarin Astrol B	I '14:— 10,907 I '20:— 15,518	1-Bromo-4-methyl-amino-anthraquinone [Sulfonation]	ACr
859	Cyananthrol R	I '14:— 18,792 I '20:— 2,416	1-Amino-4-bromo-2-methyl-anthraquinone [Sulfonation]	A
860	Cyananthrol G		1-Amino-4-bromo-(chloro)-2-methyl-anthraquinone, etc. [Sulfonation]	A
864	Anthraquinone Green GX	I '14:— 1,709 I '20:— 2,531	1-Nitro-anthraquinone-6-sulfonic Acid Aniline	ACr

Dyes Derived from *p*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
865	Alizarin Cyanine Green E		Quinizarin *p*-Toluidine (2 mols) [Sulfonation]	ACr

o-Toluidine-*m*-sulfonic Acid

See, 4-Amino-*m*-toluene-sulfonic Acid (*C. A. nomen.*)

p-Toluidine-*o*-sulfonic Acid

See, 5-Amino-*o*-toluene-sulfonic Acid (*C. A. nomen.*)

8-*p*-Toluino-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

See, *p*-Tolyl-1-naphthylamine-8-sulfonic Acid

***m*-Toluylene-diamine**

See, *m*-Tolylene-diamine

***o*: *p*-Toluylene-diamine**

See, *m*-Tolylene-diamine

Toluylene-diamine-sulfonic Acid

See, 3: 5-Diamino-*p*-toluene-sulfonic Acid (*C. A. nomen.*)

***m*-Toluylene-diamine-sulfonic Acid**

See, 4: 6-Diamino-*m*-toluene-sulfonic Acid (*C. A. nomen.*)

***p*-(*o*-Tolyl-azo-)-*o*-toluidine** (*C. A. nomen.*)

See, *o*-Amino-azo-toluene

4-*m*-Tolylene-bis(thiourea) (*C. A. nomen.*)

See, m-Tolylene-dithiourea

4-*m*-Tolylene-diamine (*C. A. nomen.*)

See, m-Tolylene-diamine

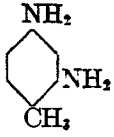
m-Tolylene-diamine

4-*m*-Tolylene-diamine (*C. A. nomen. $NH_2=1$*)

m-Toluylene-diamine

o:*p*-Toluylene-diamine

Note.—English and Germans often start numbering from CH_3



$=C_7H_{10}N_2=122$

STATISTICS.—Imported '14:—135,383 lbs.
Manufactured '17:—302,596 lbs.
Manufactured '18:—612,163 lbs.
Manufactured '19:—439,544 lbs.
Manufactured '20:—689,036 lbs.

FORMATION.—From *m*-dinitro-toluene by reduction with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 86

Dyes Derived from *m*-Tolylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
34	Chrysoidine R	I '14:—111,006 M '17:— 58,115 M '18:—137,035 M '19:—220,542 I '20:— 1,102 M '20:—186,793	Aniline	B

Dyes Derived from *m*-Tolylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
69	Chrysoidine R		*o*-Toluidine	B
	DISAZO DYES			
284	Vesuvine B Bismarck Brown R	I '14:—171,133 M '17:—262,600 M '18:—295,080 M '19:—631,308 M '20:—484,929	*m*-Tolylene-diamine (3 mols)	B
295	Diphenyl Fast Black	I '14:— 882	Gamma Acid *p*:*p'*-diamino-ditolyl-amine	D
352	Direct Violet R	I '14:— 661 M '19:— ?	Benzidine 1:7-Dihydroxy-6-naph-thoic-3-sulfonic Acid	D
413	Direct Violet BB	I '14:— 4,396	Dianisidine 1:7-Dihydroxy-naph-thalene-4-sulfonic Acid	D
	TRISAZO DYES			
453	Columbia Black R	I '14:— 1,307	Tolidine 2R Acid *m*-Tolylene-diamine (2 mols)	D
455	Columbia Black B	I '14:—165,727	Dianisidine 2R Acid *m*-Tolylene-diamine (2 mols)	D
458	Carbon Black		*p*-Phenylene-diamine-sulfonic Acid [*from* *p*-Nitro-aniline-*o*-sulfonic Acid] 1-Naphthylamine-6(7)-sulfonic Acid *m*-Tolylene-diamine (2 mols)	D

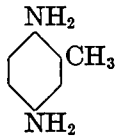
Dyes Derived from *m*-Tolylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
461	Coomassie Union Black		1:4-Naphthylene-diamine-2-sulfonic Acid Gamma Acid *m*-Tolylene-diamine (2 mols)	D
463	Erie Direct Black RX Cotton Black E	I '14:—248,567 M '19:— ? M '20:— 2,050,741	Benzidine Aniline H Acid	D
	ACRIDINE DYES			
602	Acridine Yellow	I '14:— 1,913 M '19:— ?	*m*-Tolylene-diamine (2 mols) [Formaldehyde, Ammonia removal, Oxidation]	B
605	Benzoflavine	I '14:— 600	*m*-Tolylene-diamine (2 mols) Benzaldehyde [Ammonia removal, Oxidation]	B
	AZINE DYE			
670	Neutral Red	M '18:— ?	Nitroso-dimethyl-aniline *or* Dimethyl-*p*-phenylene-diamine [Oxidation]	B
	SULFUR DYE			
710	Immedial Yellow D	I '14:— 13,400	[Sulfur]	S
711	Immedial Orange N	I '14:— 500	[Sulfur]	S

p-Tolylene-diamine (*C. A. nomen. $NH_2 = 1$*)

p-Toluylene-diamine

Note.—English and Germans often start numbering with CH_3



$= C_7H_{10}N_2 = 122$

STATISTICS.—Manufactured '20:— ?

FORMATION.—By reduction of amino-azo-toluene (from *o*-toluidine) with zinc dust and hydrochloric acid

LITERATURE.—Nietzki, Ber. **10**, 1158
Green, Organic Coloring Matters (1908), 37

Dyes Derived from *p*-Tolylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
124	Diazine Green S	I '14:— 1,340	*o*-Toluidine Aniline *or* *o*-Toluidine [*or* Safranine] Dimethyl-aniline	B
125	Diazine Black	I '14:— 2,630 I '20:— 701	*o*-Toluidine Aniline *or* *o*-Toluidine [*or* Safranine] Phenol	B
126	Indoine Blue R	I '14:— 15,353 M '17:— ? M '18:— ?	*o*-Toluidine Aniline *or* *o*-Toluidine [*or* Safranine] β-Naphthol	B

Dyes Derived from *p*-Tolylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
127	Methyl Indone B	M '17:— ?	*o*-Toluidine Aniline *or* *o*-Toluidine [*or* Safranine] ["Amino-naphthols"]	B
128	Janus Gray B		*o*-Toluidine Aniline *or* *o*-Toluidine [*or* Safranine] etc.	B
	AZINE DYE			
679	Safranine	I '14:— 59,920 M '17:— ? M '18:—106,591 M '19:—131,042 I '20:— 386 M '20:—149,629	*o*-Toluidine Aniline *or* 2d mol *o*-Toluidine	B

1-Tolylene-2:6-diamine-4-sulfonic Acid

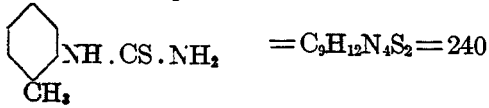
See, 3: 5-Diamino-*p*-toluene-sulfonic Acid (*C. A. nomen.*)

***m*-Tolylene-diamine-sulfonic Acid**

See, 4: 6-Diamino-*m*-toluene-sulfonic Acid (*C. A. nomen.*)

***m*-Tolylene-dithiourea**

4-*m*-Tolylene-bis[thiourea] (*C. A. nomen.*)



$= C_9H_{12}N_4S_2 = 240$

FORMATION.—By heating *m*-tolylene-diamine thiocyanate several hours on a water bath

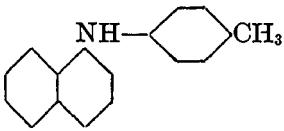
LITERATURE.—Lange, Zwischenprodukte, #801

Dyes Derived from *m*-Tolylene-dithiourea

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
712	Kryogene Yellow G	I '14:— 1,126 I '20:— 1,543	Benzidine [Sulfur]	S
716	Kryogene Yellow R	I '14:— 4,804	[Sulfur]	S

p-Tolyl-α-naphthylamine

N-p-Tolyl-1-naphthylamine (*C. A. nomen.*)



$= C_{17}H_{15}N = 233$

FORMATION.—From α-naphthylamine hydrochloride and *p*-toluidine by heating together to about 280°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 186

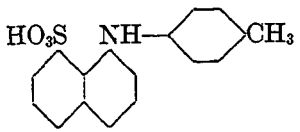
Dye Derived from *p*-Tolyl-α-naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYE			
560	Night Blue	I '14:— 361 M '19:— ? I '20:— 11	Tetraethyl-diamino-benzophenone	B

p-Tolyl-1-naphthylamine-8-sulfonic Acid

8-*p*-Toluino-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

Tolyl-peri Acid



$=C_{17}H_{15}NO_3S=313$

STATISTICS.—Imports '14:—1,097 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—From 1-naphthylamine-8-sulfonic acid and *p*-toluidine by heating together in an autoclave

LITERATURE.—Cain, Intermediate Products (2d Ed.), 195
Lange, Zwischenprodukte, #2859

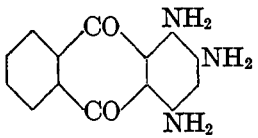
Dyes Derived from *p*-Tolyl-1-naphthylamine-8-sulfonic Acid

Schultz Number Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
89	Sulfon Acid Blue B	I '14:— 35,560 M '17:— ? M '19:— ? M '20:— ?	H Acid	A
	DISAZO DYE			
257	Sulfoncyanine	I '14:—145,694 M '17:— ? M '18:— ? M '19:— ? I '20:— 18,327 M '20:— ?	Metanilic Acid α-Naphthylamine	A

Tolyl-peri Acid

See, *p*-Tolyl-1-naphthylamine-8-sulfonic Acid

1:2:4-Triamino-*an*thraquinone



$= C_{14}H_{11}N_3O_2 = 253$

FORMATION.—1:4-Diamino-anthraquinone is diacetylated, and then nitrated with nitric acid of sp. gr. 1.5. By reduction of the nitrated product the 1:2:4-triamino-anthraquinone is prepared

LITERATURE.—Lange, Zwischenprodukte, #3333

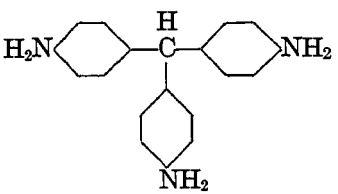
Dye Derived from 1:2:4-Triamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
822	Algol Brilliant Orange FR	I '14:— 6,195 I '20:— 482	Benzoyl Chloride	V

Triamino-triphenyl-methane

Tris(*p*-amino-phenyl)-*me*thane (*C. A. nomen.*)

p-Leucaniline



$= C_{19}H_{19}N_3 = 289$

FORMATION.—(1) From para-rosaniline by reduction with zinc. (2) From corresponding nitro-compounds by reduction

LITERATURE.—Beilstein, Organische Chemie (3d Ed.), **4**, 1194

Dye Derived from Triamino-triphenyl-methane

Schultz Number or Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	TRIPHENYL-METHANE DYE			
511	Parafuchsine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	(Oxidation)	B

α-Trichloro-toluene

See, Benzo-trichloride

3:4:5-Trihydroxy-benzoic Acid

See, Gallic Acid

Trimethyl-*m*-amino-phenyl-ammonium Chloride

See, (*m*-Amino-phenyl)-trimethyl-ammonium Chloride

α-Trinitro-naphthalene

1:3:5-Trinitro-naphthalene (*not considered herein*)

β-Trinitro-naphthalene

1:3:8-Trinitro-naphthalene (*not considered herein*)

γ-Trinitro-naphthalene

1:4:5-Trinitro-naphthalene (*not considered herein*)

δ-Trinitro-naphthalene

1:2:5-Trinitro-naphthalene (*not considered herein*)

1:3:5-Triphenyl-hexahydro-*s*-triazine (*C. A. nomen.*)

See, Anhydro-formaldehyde-aniline

Tris(*p*-amino-phenyl)-methane (*C. A. nomen.*)

See, Triamino-triphenyl-methane

Trisulfonic Acid

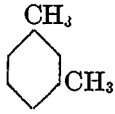
See, Naphthalene-1:3:6-trisulfonic Acid

5:5′-Ureido-bis(2-amino-benzene-sulfonic Acid) (*C. A. nomen.*)

See, Diamino-diphenyl-urea-disulfonic Acid

***m*-Xylene** (*C. A. nomen.*)

m-Xylol



$= C_8H_{10} = 106$

FORMATION.—This occurs in commercial crude xylol as the most abundant constituent, and is separated from its isomers by treating the crude xylol with a limited quantity of sulfuric acid, and by hydrolysis of the sulfonate formed

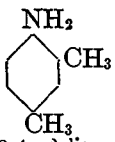
LITERATURE.—Green, Organic Coloring Matters (1908 Ed.), 5

Dye Derived from *m*-Xylene

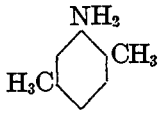
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
564	TRIPHENYL-METHANE DYE(?) Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	*p*-Dimethylamino-benzaldehyde Dimethyl-aniline	A

Xylidine

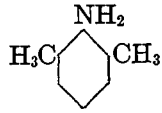
The crude mixture contains the following isomers:—



2 4-xylidine
(*m*-4-xylidine)

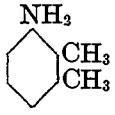


2 5-xylidine
(*p*-xylidine)

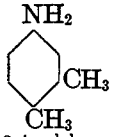


2 6-xylidine
(*m*-2-xylidine)

(*C A nomen* $NH_2 = 1$)
($CH_3 = 1$)



2 3-xylidine
(*o*-3-xylidine)



3 4-xylidine
(*o*-3-xylidine)

(*C A nomen.* $NH_2 = 1$)
($CH_3 = 1$)

$= C_8H_{11}N = 121$

STATISTICS.—Imported '14:— 21,836 lbs.
Manufactured '17:—425,873 lbs.
Manufactured '18:—534,834 lbs.
Manufactured '19:—386,635 lbs.
Manufactured '20:—1,054,476 lbs.

FORMATION.—Xylene is nitrated with mixed acid, preferably cold. The mixed nitro-xylenes are then reduced with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 58
Lange, Zwischenprodukte, #742–747

Dyes Derived from Xylidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
76	Sudan II	I '14:— 501 M '17:— 27,595 M '18:— 23,692 M '19:— ? M '20:—170,658	β-Naphthol	ss
77	Azo Coccine 2R		Nevile-Winther's Acid	A
78	Cochineal Scarlet 4R		1-Naphthol-5-sulfonic Acid	A

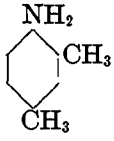
Dyes Derived from Xylidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
79	Brilliant Orange R Xylidine Orange 2R	I '14:— 4,204 M '17:— ? M '18:— 18,909 M '19:— ? M '20:— ?	Schaeffer's Acid	A
80	Wool Scarlet R	I '14:— 39,888	1-Naphthol-4: 8-disulfonic Acid	A
82	Ponceau R	I '14:— 35,259 M '17:—633,429 M'18:— 1,189,054 M '19:—552,680 M '20:— 1,286,002	R Acid	A
	AZINE DYE			
685	Tannin Heliotrope	I '14:— 1,398 I '20:— 249	Nitroso-dimethyl-aniline	B

2: 4-Xylidine (*C. A. nomen. $NH_2=1$*)

m 4-Xylidine (*$CH_3=1$*)

m-Xylidine



$=C_8H_{11}N=121$

STATISTICS.—Manufactured '20:—but amount not disclosed

FORMATION.—By separation from commercial xylidine as acetate

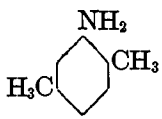
LITERATURE.—Cain, Intermediate Products (2d Ed.), 59

Dyes Derived from 2:4-Xylidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
81	Palatine Scarlet A Brilliant Cochineal	I '14:— 7,510	1-Naphthol-3: 6-disulfonic Acid	A
82	Ponceau 2R Scarlet 2R	I '14:— 35,259 M '17:—633,429 M '18:— 1,189,054 M '19:—552,680 M '20:— 1,286,002	R Acid [Only small part of total production from *m*-xylidine]	A
	DISAZO DYE			
211	Resorcine Brown	I '14:— 13,189 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,484 M '20:— ?	Sulfanilic Acid Resorcinol	A

2:5-Xylidine (*C. A. nomen. $NH_2=1$*)

p-Xylidine (*$CH_3=1$*)



$= C_8H_{11}N = 121$

FORMATION.—Crude xylidine is treated with sufficient glacial acetic acid to cause the *m*-xylidine acetate to crystallize out. The mother liquor is mixed with hydrochloric acid, and after a few days the *p*-xylidine hydrochloride is separated

LITERATURE.—Cain, Intermediate Products (2d Ed.), 59
Lange, Zwischenprodukte, #742–747

Dye Derived from 2: 5-Xylidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYE			
438	Melogene Blue BH	M '17:— ? M '18:— ?	Benzidine H Acid (2 mols)	D

m-Xylidine

See, 2: 4-Xylidine (*C. A. nomen.*)

m-4-Xylidine

See, 2: 4-Xylidine (*C. A. nomen.*)

p-Xylidine

See, 2: 5-Xylidine (*C. A. nomen.*)

Xylidine-sulfonic Acid

$C_6H_2 . NH_2 . (CH_3)_2 . SO_3H \quad = C_8H_{11}NO_3S = 201$

FORMATION.—Probably by sulfonation of either crude or purified xylidine with sulfuric acid in a vacuum or in a current of an indifferent gas

LITERATURE.—Thorpe, Dic. Chemistry, **5**, 797, 798
Junghahn, Ber. **35**, 3747–3767 (1902)

Dye Derived from Xylidine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
214	Fast Brown O	I '14:— 2,000	Xylidine-sulfonic Acid (2 mols) α-Naphthol	A

4-(2: 4-Xylyl-azo)-2: 5-xylidine (*C. A. nomen.*)

See, Amino-azo-xylene

Y Acid

See, G Acid

Yellow Acid

1: 3-Dihydroxy-naphthalene-5: 7-disulfonic Acid (*not considered herein*)

Zeta Acid

Naphthasultone-3-sulfonic Acid (*not considered herein*)

FORMULA INDEX OF INTERMEDIATES

The formulas are indexed here for the 487 intermediates for which data and tables are listed. Only one chemical name is given, but on the pages referred to there are enumerated the various trivial names and synonyms.

The arrangement of the formulas follows that of the 1920 Chemical Abstracts (C. A. **14**, 4557) where "The arrangement of symbols in formulas is alphabetical except that in carbon compounds C always comes first, followed immediately by H." "The arrangement of the formulas is also alphabetical except that the number of atoms of any specific kind influences the order of compounds," *e.g.*, all compounds with C_6 come before those with C_7, thus C_6H_5Cl precedes $C_7H_6ClNO_2$. This is likewise true for *all* the other atoms, and consequently we find $C_7H_6ClNO_2$ before C_7H_9N, and $C_8H_2Br_2ClNO$ before $C_8H_2Cl_4O_4$.

It is believed that a formula index affords the easiest and surest way to find an organic compound, and it is for this reason that this index is given. This is particularly true of intermediates where often many names are used for the same chemical individual.

PART II

GLOSSARY OF DYE NAMES

AND

PAGE INDEX OF SCHULTZ NUMBERS

GLOSSARY OF DYE NAMES

The number of dye names in use is very large. Norton, in *Artificial stuffs Used in U. S.*, lists almost six thousand in his index where n a number of individual marks are grouped together under the reviation V.M. (Various Marks).

The list of dyes in stock in the German dye factories on August 15, 9, the so-called Reparation Dyes, embrace over seven thousand ks.

hroughout Germany, Switzerland, United States, France and Eng-, there are probably twelve thousand different dye marks in use, y of these being for the same chemical compound of the same or ifferent degrees of purity.

his glossary is based largely upon the list given in the index of Dr. mas H. Norton's *Artificial Dyestuffs Used in the U. S.*, which is by permission. A number of corrections have been made to this and a great number of additions. These additions comprise all names first given in Schultz's *Farbstofftabellen*, and many more from ous sources. However, a number of the separate marks for a n name are often here listed on the same line to save space.

ie new American and English names that have arisen during the few years have not been included, due to difficulty of adequately ing them.

his glossary copies Norton in assigning Schultz numbers followed by rs to dyes closely related to a given Schultz Dye. Norton's prac-regarding dyes of unknown composition is also used, the numbers employed being the same as given in Norton. Hence ready refer-can be made to Norton's book for statistical information con-ng these dyes of unknown composition, which could not be classi-n these tables. Some of Norton's dyes of unknown composition been identified and the proper Schultz number assigned.

der Serial Number Column those numbers without any letter ed refer to Schultz Numbers; those with a prefix of A, S, or U to Azo, Sulfur or unclassified dyes of unknown composition. is used for Various Marks as applied to dye names, and Var. s various manufacturers and is employed rather than list a con-able number of manufacturers for a given dye.

The following abbreviations are used for manufacturers.

A.....Actien-Gesellschaft für Anilin-Fabrikation, Berlin
AW.....A. Wiescher & Co., Successors, Haeren, Belgium
B.....Badische Anilin- und Soda-Fabrik, Ludwigshafen
BrAlizCo.British Alizarin Co.
BD.....British Dyes, Ltd., Huddersfield
BK.....Leipziger Anilinfabrik Beyer & Kegel, Fürstenberg
By.....Farbenfabriken vorm. F. Bayer & Co., Leverkusen
ByCo....Bayer & Co., Rensselaer, N. Y.
C.....Leopold Cassella & Co., Frankfort on the Main
ClCo ....Clayton Aniline Co., Clayton near Manchester
CDCo...Central Dyestuff Co., Newark, N. J.
CG.....Chemikalienwerk Griesheim, Griesheim on the Main
CJ.....Carl Jäger Anilinfarbenfabrik, Düsseldorf
CR.....Clauss & Co. (formerly Claus & Rée), Clayton near Manchester
CV.....Colne Vale Chemical Co., Milnsbridge near Huddersfield
DH.....Farbwerke vorm. L. Durand, Huguenin & Co., Germany and France
FA.....Farbwerk Ammersfoort, Ammersfoort, Netherlands
G.....Geigy, Basel
GrE.....Chemische Fabrik Griesheim-Elektron, Offenbach on the Main
H.....Read Holliday & Sons, Huddersfield
H&M....Heller & Merz Co., Newark, N. J.
I.....Gesellschaft für chemische Industrie, Basel
K.....Kalle & Co., Biebrich on the Rhine
Ki.....Kinzlberger & Co., in Prague
L.....Farbwerk Mülheim vorm. A. Leonhardt & Co., Mülheim
Lev.....Levenstein, Ltd., Crumpsall Vale
M.....Farbwerke vorm. Meister Lucius & Brüning, Höchst
NF.....Niederländesche Farben- und Chemikalienfabrik Delft, Delft.
P.....Société Anonyme des Matières colorantes et produits chimiques St. Denis (formerly A. Poirrer), St. Denis
Q.....Imports of Unknown Source
S.....Chemische Fabrik vorm. Sandoz & Co. Basel
Sch.....Schoellkopf Aniline & Chemical Works, Buffalo, now National Aniline & Chemical Co.
tM.....Chemische Fabriken vorm. Weiler-ter-Meer, Uerdinger
WB.....W. Beckers Aniline and Chemical Works, Brooklyn
WD.....Wülfing Dahl & Co., Barmen

Note. Within the past few years many of these companies have consolidated or changed names.

Name	Manufacturer	Serial No
Acetyl Red GX	B	U90
Acetylene Blue 3 B	G	U648
Acetylene Blue 6 B	G	U649
Acid Alizarin Black	M	159
Acid Alizarin Black R	M	159
Acid Alizarin Black SF	M	288
Acid Alizarin Black SN	M	289
Acid Alizarin Black SR	CV	288a
Acid Alizarin Brown B	B	154
Acid Alizarin Blue		790
Acid Alizarin Blue BB GR	M	790
Acid Alizarin Garnet		155
Acid Alizarin Garnet R	M	155
Acid Alizarin Green B G	M	790
Acid Alizarin Green 3 G	I	790a
Acid Alizarin Red B	M	202
Acid Alizarin Violet N	M	294
Acid Alizarin Yellow GGW	M	150
Acid Anthracene Brown	By	88
Acid Anthracene Brown M P	By	88a
Acid Anthracene Brown PG	By	88a
Acid Anthracene Brown R	By	88
Acid Anthracene Brown RH W	By	88a
Acid Anthracene Brown WSG	By	88a
Acid Anthracene Red 3 B	By	400
Acid Anthracene Red 5 BL G	By	400a
Acid Black	AW	217e
Acid Black AO	I	217e
Acid Black AS	O	209e
Acid Black 10 B	WB	217
Acid Black 6 BA	CC	217e
Acid Black 4 BD	I	217e
Acid Black BR	G	209e
Acid Black BR	tM	209
Acid Black D	I	217e
Acid Black D	By	A141
Acid Black LW	Q	209e
Acid Black G IIA HAS	I	217e
Acid Black H	S	217e
Acid Black MB	Q	209e
Acid Black M	By	A115
Acid Black M	BK	217e
Acid Black M	H	209e
Acid Black SO	S	217e
Acid Black 32	H	209e
Acid Black 2034	K	217e
Acid Black 2195	BK	217e
Acid Blue	AW	543e
Acid Blue	H&M	539
Acid Blue	K	U301
Acid Blue greenish	K	U301
Acid Blue B	S	505
Acid Blue 7 B	S	505b
Acid Blue BA C DRS	Q	513e
Acid Blue L	AW	513e
Acid Blue LX	S	565b
Acid Blue OG	K	U301
Acid Blue AG	K	U301
Acid Blue PN	Q	513e
Acid Blue R	AW	543e
Acid Blue R	S	565b
Acid Blue 5 R	Q	543e
Acid Blue RBF		562
Acid Blue V	AW	543
Acid Blue Y	AW	543e
Acid Blue 466	M	U100
Acid Blue 22244	S	505b
Acid Blue 23579	S	505b
Acid Blue Black	AW	A531
Acid Brilliant Red 2 B	By	A146
Acid Brown	C	U273
Acid Brown G	tM BK	212
Acid Brown R	K	212a
Acid Brown RN	G	212a
Acid Brown SR	K	212a
Acid Brown V	I	212a
Acid Brown Y	P	212
Acid Chrome Black G	I	A147a
Acid Chrome Black I G	By	A147
Acid Chrome Black RH	By	A148
Acid Chrome Black RH	G	A610
Acid Chrome Black RHN	BK	A148a
Acid Chrome Black WS	By	A149
Acid Chrome Black 1551	CV	A723
Acid Chrome Blue	K	U302
Acid Chrome Blue (reddish)	AW	A532
Acid Chrome Red B	By	U209
Acid Chrome Blue B	CV	A724
Acid Chrome Blue 3 G	By	U206
Acid Chrome Red N	CV	A725
Acid Chrome Blue 2 R	By	U207
Acid Chrome Blue 5 R	By	U208
Acid Chrome Violet R	By	U210
Acid Corinth	tM	U522
Acid Corinth 240 S	G	U602
Acid Cresol Black 4196	GIE	U501
Acid Crimson	S	166a
Acid Crimson D	Q	166a
Acid Cyanine BF	A	705b
Acid Dark Green	I	505b
Acid Dosine		590
Acid Fosine CA G	B	590a
Acid Fosine 3 G	CJ	590a
Acid Fosine New LB	B	590a
Acid Dosine L 27314 SP	B	590a
Acid Fosine 1032	K	590a
Acid Fosine 13389	CJ	590a
Acid Fast Blue SB	WB	189
Acid Fast Blue SR	WB	188
Acid Fast Green S B	AW	A533
Acid Fast Violet	AW	U551
Acid Fuchsine		524
Acid Green	I	504
Acid Green	CM	502a
Acid Green	WD	505
Acid Green (V M)	C	505a
Acid Green 2 A B 2 BA	tM	502a
Acid Green 2 B	P	502
Acid Green (B BW		504
Acid Green 2 BG	tM	502
Acid Green G	K	505
Acid Green GG	By	505
Acid Indigotine		877
Acid Kraft Brown	B	U91
Acid Magenta	By C	524
Acid Magenta	H Sch	524
Acid Magenta 6 B	CV	524
Acid Magenta B F	G	524
Acid Magenta FCNS	GrE	524
Acid Magenta G	G	524
Acid Magenta O	M	524
Acid Magenta S	A B	524
Acid Magenta S	Grl.	524
Acid Magenta 2	CV	524
Acid Magenta Crystals I	CV	524
Acid Milling Black B		265
Acid Milling Red G		203
Acid Milling Scarlet	ClCo	484
Acid Navy Blue SI	AW	A534
Acid Olive 2704	K	U303
Acidol Azo Violet R	tM	A512
Acidol Azo Violet S	tM	A513
Acidol Fast Violet A 2 R	tM	A514
Acidol Violet BR	tM	U523

Name	Manufacturer	Serial No.
Acid Phosphine R	CR	606d
Acid Pure Blue R	G	U603
Acid Pure Blue RC	G	U604
Acid Purple	Q	U774
Acid Red 2 B, 4 B	K	U304
Acid Red 6 BF	BK	U47S
Acid Red CB	Q	U775
Acid Red FL	S	U694
Acid Red G	K	U304
Acid Red G	Q	U776
Acid Red 3 G	K	U304
Acid Red R	K	U304
Acid Red 4 R	K	U304
Acid Red S	AW	A536
Acid Red 3 S	K	U304
Acid Red C19	K	U304
Acid Red 1622	K	U304
Acid Red 1642	K	U304
Acid Red 1645	K	U304
Acid Rhodamine B	B	U92
Acid Rhodamine 3 B	B	U93
Acid Rhodamine BG	B	U94
Acid Rhodamine G	B	U95
Acid Rhodamine R	B	U95
Acid Rosamine A	M	583
Acid Rubine	CJ	524
Acid Scarlet G	Q	U777
Acid Scarlet 2 R	Q	U778
Acid Scarlet SG	A	U779
Acid Silk Black R	By	A150
Acid Silver Black R	By	A150
Acid Silver Gray	Q	U780
Acid Sky Blue	AW	A535
Azo Violet	By,etc.	407
Acid Violet (V. M.)	C	530a
Acid Violet B	BK	530a
Acid Violet BB	B, K	530a
Acid Violet 2 B	H	534a
Acid Violet 4 B	By, K	530
Acid Violet 4 B	Var.	530
Acid Violet 5 B	AW, By	530
Acid Violet 5 B	G, K	530a
Acid Violet 6 B	A, By	529
Acid Violet 6 B	G, tM	530
Acid Violet 6 B	H	548
Acid Violet 7 B	AW	527
Acid Violet 7 B	B,H,I	534
Acid Violet 7 B	K	530a
Acid Violet 8 B	By	527a
Acid Violet 4 BC	B	530
Acid Violet 5 BF	M	530a
Acid Violet 4 BL	B	530a
Acid Violet 4 BLO	B	530a
Acid Violet 4 BLOO	K	530a
Acid Violet 4 BLOOF	B	530
Acid Violet 4 BN	B, I	527
Acid Violet 6 BN	B, M	548
Acid Violet 6 BN	I, WD	548
Acid Violet 6 BN	tM	530
Acid Violet 7 BN	By	527
Acid Violet 7 BN	M	533
Acid Violet 6 BNB	By	527
Acid Violet 6 BNG	G	530
Acid Violet 3 BNO	B	530a
Acid Violet 6 BNO	B	530a
Acid Violet 6 BNOO	K	530a
Acid Violet 4 BNS	S	527
Acid Violet 5 BNS	S	561
Acid Violet 4 BS	Q	530
Acid Violet 6 BS	WD	548
Acid Violet BSC	K	530a
Acid Violet 4 BV	AW	530a
Acid Violet BW	By	527a
Acid Violet C2B, C10B	B	530a
Acid Violet C10B	AW	530a
Acid Violet D	S	561a
Acid Violet HB	H	534a
Acid Violet HW	By	527a
Acid Violet KB	K	530a
Acid Violet NFDS	H	534a
Acid Violet NG	K	530a
Acid Violet PW	B	530a
Acid Violet R	By	527a
Acid Violet R	G	530a
Acid Violet R	Q	530a
Acid Violet 4 R	B	530a
Acid Violet 4 R	By	527a
Acid Violet 4 R	I	534a
Acid Violet 4 RN	K	530a
Acid Violet 4 RS	M	526
Acid Violet RX	H	534a
Acid Violet S	S	561a
Acid Violet SB	Q	530a
Acid Violet 1704	K	530a
Acid Violet 2405	tM	530a
Acid Violet 4746	BK	530a
Acid Violet 10471	I	534a
Acid Violet 10475	I	534a
Acid Violet 18502	I	534a
Acid Violet 26449	S	561a
Acid Violet Blue	Q	U781
Acid Violet Red	Q	U782
Acid Wool Black	Q	217h
Acid Yellow	A,AW	137
Acid Yellow AC	K	137
Acid Yellow D	A	139
Acid Yellow FF	H	137
Acid Yellow G	A, BK	137
Acid Yellow G	Q, S	137
Acid Yellow GG	GrE	136
Acid Yellow GF	H	137
Acid Yellow LR	K	137
Acid Yellow MGS	GrE	136
Acridine Golden Yellow	G	602a
Acridine Golden Yellow 54666A	L	602a
Acridine Golden Yellow, G, GG, W	L	602
Acridine Orange	DH	603
Acridine Orange NOO, NO	L	603
Acridine Orange R	L	604
Acridine Red B	L	569
Acridine Yellow	L	602
Afghan Yellow GX	BD	9
Agalma Black 4 BX	B	217a
Agalma Black 10 BX, 10 B	B	217
Agalma Black 201211	B	217a
Agalma Black Green T	B	217b
Agalma Green B	B	542
Algol Blue G	By	844a
Algol Blue 3 G	By	844
Algol Blue K	By	839
Algol Blue 3 R, 3 RP	By	821
Algol Bordeaux 3 B	By	829
Algol Brilliant Orange FR	By	822
Algol Brilliant Red 2 B	By	819
Algol Brilliant Violet 2 B	By	821
Algol Brilliant Violet R	By	820
Algol Brown B	By	869
Algol Brown R	By	869a
Algol Corinth R	By	870
Algol Dark Green B	By	847a
Algol Gray	By	834
Algol Gray B, BB	By	834
Algol Green B	By	847
Algol Olive R	By	833

Name	Manufacturer	Serial No.
l Orange R	By	824
l Pink R	By	818
l Red B	By	825
l Red BB, FF	By	819
l Red 2 G, 3 G	By	816a
l Red 5 G	By	816
l Red, FF, R	By	819
l Scarlet G	By	815
l Violet B	By	823
l Yellow 3 G	By	811
l Yellow 6 GL	By	811a
l Yellow R	By	817
l Yellow WF, WG	By	814
dine Black	H	U744
dine Black M	H	U744
dine Deep Brown 3 R	H	U745
dine Orange M	...	779
dine Yellow Y	H	U746
rin Orange	H	U748
rin paste	Br.Aliz. Co.	778
rin powder	Br.Aliz. Co.	778
in	Q, etc.	780
rin 11 AB	By	778
rin D 1140	M	778
rin D 1149	M	778
rin D 1399	M	778
rin DCR	M	806a
rin GD	B	784
rin GGX	By	785a
rin GI	B	785
rin I	M	778
rin IB	By, M	778
rin IP	By	778
rin IT	M	778
in IWS	M	780
in RG	B	785
in RVT	By	784a
in S	By	784b
in SDG	M	785
in SX	B	784
in SXGD	B	784
in V 1, V 2 A	B	778
in W	By	780
in 11 X	By	778
in XGP	By	785a
in XP	By	785a
in 744, 1140	M	778
in Astrol B, G	By	856
in Azurine D 3 R	M	U401
in Black (V.M.)	B	774
in Black (V.M.)	C	774b
in Black AB	AW, CV	774b
in Black AC	M	806a
in Black B, 3 B	By	774b
in Black S B	AW	774b
in Black DES, EN	M	806a
in Black ENT	M	806a
in Black IA	By	774b
in Black P	M	806
in Black R	M	806a
in Black S	B	774
in Black S, SE	M	807
in Black SET, SN	M	807
in Black SNT	M	807
in Black SR, WR	B	774
in Blue (V.M.)	C	803a
in Blue A, AS	By	803a
in Blue A	M	803
in Blue B	M	803a
in Blue BB, DB	M	803a
in Blue BR, BR 3 G	By	803a

Name	Manufacturer	Serial No.
Alizarin Blue C 2 G	...	799
Alizarin Blue CWRB, CWRR	...	788
Alizarin Blue DH6 GM, DN	M	803a
Alizarin Blue D 2 R, D 4 R	M	803a
Alizarin Blue GR, GW	M	803a
Alizarin Blue GWDS, HJ	By	803a
Alizarin Blue IIX	By	803a
Alizarin Blue JR	By	852
Alizarin Blue NFA, NHN	By	803a
Alizarin Blue NS	By	788
Alizarin Blue NSG	By	803a
Alizarin Blue S	Var.	804
Alizarin Blue SAE	By	858
Alizarin Blue SAP	By	858
Alizarin Blue SAWSA	By	804
Alizarin Blue SB	M	804a
Alizarin Blue SRM	M	804
Alizarin Blue WG	...	803
Alizarin Blue WX	B	803
Alizarin Blue 942	M	804a
Alizarin Blue (violet shade)	S	803a
Alizarin Blue (violet shade) P	S	803a
Alizarin Blue Black	...	862
Alizarin Blue Black B	C	774a
Alizarin Blue Black B	CV, M	862
Alizarin Blue Black B	Q	862
Alizarin Blue Black B, 3 B	By	862
Alizarin Blue Black B, 3 B	M	862
Alizarin Blue Black GT	B	774a
Alizarin Bordeaux	...	787
Alizarin Bordeaux B, BD	By	787
Alizarin Brown	M	782
Alizarin Brown B, D3GO, G	M	782
Alizarin Brown DR, N, RR	M	782
Alizarin Brown O	Q	782
Alizarin Claret R	M	797
Alizarin Claret Red DB	M	U405
Alizarin Claret Red DG	M	U406
Alizarin Chrome Blue T	S	803b
Alizarin Chrome Brown DG	M	U402
Alizarin Chrome Brown DR	M	U403
Alizarin Crimson DB	M	U407
Alizarin Crimson DG	M	U408
Alizarin Chrome Green A	...	260
Alizarin Cyanine G, 2 G, 3 G	By	799
Alizarin Cyanine R	By	788
Alizarin Cyanine WRR	By	788
Alizarin Cyanine Green E (& V.M.)	By	865
Alizarin Cyanole B	...	851
Alizarin Dark Blue DR, S	M	804b
Alizarin Dark Green W	B	775
Alizarin Direct Blue B	M	851
Alizarin Direct Blue FB	M	851a
Alizarin Direct Blue ESB	M	851a
Alizarin Direct Blue ESR	M	851a
Alizarin Direct Cyanine FA	M	U409
Alizarin Direct Green CG, G	M	865
Alizarin Direct Violet R	M	852
Alizarin Direct Yellow DR	M	U410
Alizarin Direct Yellow DS	M	U411
Alizarin Fast Blue DGL	M	U412
Alizarin Fast Brown DB	M	U413
Alizarin Fast Brown D 3 R	M	U414
Alizarin Fast Brown 3 R	M	U415
Alizarin Fast Gray DBL	M	U416
Alizarin Fast Orange DO	M	U417
Alizarin Fast Red D 244	M	U418
Alizarin Fast Scarlet D 6 BS	M	U419
Alizarin Fast Scarlet D 8 BS	M	U420
Alizarin Garnet	AW	797
Alizarin Garnet R	M	797

Name	Manufacturer	Serial No.
Alizarin Gray	C	774d
Alizarin Gray G	M	U421
Alizarin Green B	WD	657
Alizarin Green BB	M	805
Alizarin Green CE, CK	By	808a
Alizarin Green C, CG	By	865
Alizarin Green DGN, DMA	M	805
Alizarin Green G	WD	656
Alizarin Green 3 G, S	M	805
Alizarin Green S	B	808
Alizarin Green SP 4	By	808a
Alizarin Green SW	M	805
Alizarin Green V, VD	By	808a
Alizarin V 3 W	B	778
Alizarin Green WB	M	805
Alizarin Green X	B	808
Alizarin Indigo B	By	894
Alizarin Indigo G	By	893
Alizarin Indigo 3 R	By	895
Alizarin Indigo Blue S	B	809
Alizarin Indigo Green B	By	894a
Alizarin Indigo Violet B	By	894b
Alizarin Irisol D, R	...	852
Alizarin Lake	Q	U783
Alizarin Light Red D 8 BW	M	U422
Alizarin Milling Black 8 B	AW	774c
Alizarin Maroon W	B	798
Alizarin Orange	M, etc.	779
Alizarin Orange A	B	779
Alizarin Orange DG, DN, GR	M	779
Alizarin Orange R	By	779
Alizarin Pure Blue B	By	855
Alizarin Pure Blue DPH	M	U423
Alizarin Pure Yellow DHS	M	U424
Alizarin Red (V.M.)	By	780
Alizarin Red (yellow)	M	780a
Alizarin Red D4B, D10B, DG	M	780a
Alizarin Red G	M	786
Alizarin Red IWS	M	780
Alizarin Red SWB, SWBB	B	780
Alizarin Red SWR, WB	B	780
Alizarin Red SX	B	784
Alizarin Red 3 WS	M	786
Alizarin Red YCA	Br. Aliz.	785
Alizarin Rose GWG	Q	U784
Alizarin Rubinol 5 G, R	By	856a
Alizarin Saphirol B, SE	By	858
Alizarin Sky Blue B	By	855
Alizarin Uianol 12 B	By	U211
Alizarin Uranol R	By	U212
Alizarin Violet (V.M.)	C	599
Alizarin Violet BL	Q	599
Alizarin Violet DH	M	599
Alizarin Viridine DG, FF	By	854
Alizarin Violet N	M	599
Alizarin Yellow A	B	770
Alizarin Yellow C	B	769
Alizarin Yellow CY	By	48
Alizarin Yellow DGC, D 3 G	M	48
Alizarin Yellow DOG, DOO, DR	M	48
Alizarin Yellow FF	WB	48
Alizarin Yellow FS	DH	482
Alizarin Yellow G	S	48
Alizarin Yellow GG	By, I, M	48
Alizarin Yellow 5 G	I, M	48
Alizarin Yellow GGW	M	48
Alizarin Yellow O	M	58a
Alizarin Yellow R	Var.	58
Alizarin Yellow 3 RN	M	58
Alizarin Yellow RW	M	58
Alkali Azurine G		410
Alkali Black	WD	U538
Alkali Blue	ByCo	
Alkali Blue	H&M	536
Alkali Blue	Var.	536
Alkali Blues, green shades	Sch	536
Alkali Blues, red shades	Sch	536
Alkali Blue (V.M.)	C	536
Alkali Blue (for printing ink)	G, tM	536
Alkali Blue III	A	536
Alkali Blue IV A	M	536
Alkali Blue 2 AS	M	536
Alkali Blue AWG, AWR	M	536
Alkali Blue AWRG	M	536
Alkali Blue 2 B	A, B	536
Alkali Blue 2 B	M, tM	536
Alkali Blue 3 B	S, tM	536
Alkali Blue 4 B	I, M	536
Alkali Blue 5 BA	B	536
Alkali Blue BK 2	K	536
Alkali Blue 5 BI	B	536
Alkali Blue 7 BOO	GrE	536
Alkali Blue D	A	535
Alkali Blue H 5 BKOOO	GrE	536
Alkali Blue HEOOO	GrE	536
Alkali Blue HHRROOO	GrE	536
Alkali Blue I	A	536
Alkali Blue MN	M	536
Alkali Blue N	B	536
Alkali Blue R	I	536
Alkali Blue 3 R, 5 R, 6 R	tM	536
Alkali Blue RM, RRM	M	536
Alkali Blue 2	M	536
Alkali Blue 1756	K	536
Alkali Blue 1757	K	536
Alkali Blue 1140S	B	536
Alkali Brilliant Blue G	WD	536a
Alkali Brown	WD	190
Alkali Dark Brown GV	WD	331
Alkali Fast Green 3 G	By	U213
Alkali Fast Yellow	WD	199a
Alkali Green D	...	475
Alkali Orange GT	...	392
Alkali Rubine	WD	U539
Alkali Violet	K	532
Alkali Violet AS	M	532
Alkali Violet 6 B	B	532
Alkali Violet 6 BO	B	532
Alkali Violet I.R	By	U214
Alkali Violet 421	K	532
Alkali Yellow	AW	199
Alkali Yellow R	WD	350
Alpha Black 6 BN	CV	U716
Alpha Black JC	CV	U717
Alpha Chrome Blue A	CV	U718
Alpha Chrome Brown 6 GA	CV	U719
Alpha Chrome Brown N	CV	U720
Alpha Chrome Green 6 B	CV	U721
Alpha Chrome Orange RK	CV	U722
Alpha Chrome Red 3 B	CV	U723
Alpha Chrome Yellow C	CV	U724
Alphanol Black (V.M.)	C	A303
Alphanol Blue (V.M.)	C	257
Amaranth	C, etc.	168
Amaranth	CDCo	168
Amaranth B	C	168
Amaranth D	BK	168
Amaranth DE	B	168
Amaranth SA	tM	168
Amethyst Violet	K	686
Amido Acid Black B, 4 B, BS	A	220a
Amido-azo-benzene	Var.	31
Amido Azo Black	M	A413
Amido-azo-toluene	CDCo	68
Amido Black A 2 G	M	217f

Name	Manufacturer	Serial No
Amido Black 10 B	M	217
Amido Black 4034	M	217f
Amido Blue B	M	U425
Amido Blue GGR	M	U426
Amido Dark Bottle Green B	M	U427
Amido Gallamine Blue	DH	638
Amido Naphthol Black 4 B	M	A414
Amido Naphthol Black RR	M	A415
Amido Naphthol Red 2 B	M	66a
Amido Naphthol Red 6 B	M	66
Amido Naphthol Red G	M	42
Amido Red BL	M	A416
Amido Yellow T	M	A417
Amine Black 4 B	A	U64
Amine Black 10 B	A	U65
Amine Black 4 BM	A	U66
Amine Black S 4 B	A	U67
Amine Black SI	A	U68
Amine Black Green B	A	U69
Amine Red	A	U70
Aniline Black	Var	922
Aniline Black 15908	B	922
Aniline Blue Spirit Soluble	Var	521
Aniline Blue B	tM	521
Aniline Blue 2 B	A	521
Aniline Blue 3 B RN	tM	521
Aniline Blue 6416	CG	521
Aniline Red B	I	512
Aniline Yellow	B	6
Aniline Yellow	Q	6
Anthosine B	B	U97
Anthosine 3 B	B	U98
Anthosine 5 B	B	U99
Anthracene Acid Black (V M)	C etc	277
Anthracene Acid Blue (V M)	C	A311
Anthracene Acid Brown		231
Anthracene Acid Brown B	M C	492
Anthracene Acid Brown G R	C	221
Anthracene Acid Green	G	U650
Anthracene Acid Red 3 B		355
Anthracene Black T1	C	A312
Anthracene Blue	Var	800
Anthracene Blue 3 G	M	800a
Anthracene Blue SWG	B	790a
Anthracene Blue SWGG SWR	B	790a
Anthracene Blue SWX	B	790
Anthracene Blue WB WG	B	800
Anthracene Blue WGG	B	801
Anthracene Blue WN	B	790a
Anthracene Blue WR W 3 R	B	789
Anthracene Blue WG new	B	802
Anthracene Blue Black (V M)	C	181a
Anthracene Brown	B	782
Anthracene Brown G R	By	782a
Anthracene Brown RH	H	782
Anthracene Brown VV	By	782a
Anthracene Brown SW	B	782
Anthracene Chromate Brown (V M)	C	A318
Anthracene Chromate Green FF	C	865
Anthracene Chromate Yellow	C	A322
Anthracene Chrome Blue (V M)	C	A313
Anthracene Chrome Black (V M)	C	185
Anthracene Chrome Black Tex	C	185
Anthracene Chrome Brown	C	A323
Anthracene Chrome Green	C	A325
Anthracene Chrome Red (V M)	C	A326
Anthracene Dark Blue W	B	790b
Anthracene Direct Green	C	U271
Anthracene Red	Bv, I	355
Anthracene Red WB	B	355
Anthracene Red 10430	I	355
Anthracene Violet	I	599
Anthracene Yellow	By	773
Anthracene Yellow (V M)	C	177a
Anthracene Yellow C	By etc	290
Anthracene Yellow C	Bk	294
Anthracene Yellow G	I	773a
Anthracene Yellow RN 3 RN	M	588
Anthrachrome Red A	I	A501
Anthracite Black	C	207
Anthracyanine S SR		627
Anthracyl Blue SWR	CV	A736
Anthracyl Chrome Blue 2 B	tM	A524
Anthracyl Chrome Blue D	tM	A525
Anthracyl Chrome Brown D	WD	151
Anthracyl Chrome Green A D	WD	91
Anthraflavone G	B	759
Anthranol Green B	WD	U540
Anthraquinone Black	B	749
Anthraquinone Blue SR	B	861
Anthraquinone Blue Green BXO	B	863
Anthraquinone Green GXNO GX	B	864
Anthraquinone Violet	B	851
Anthramuline 395	K	U395
Apollo Red B	G	51
Apollo Red G	G	51
Archil Substitute V	P	52
Archil Substitute 3 VN	P	53
Artificial Silk Black R	By	U216
Artificial Silk Black G	By	U215
Auracine G	By	401
Auramine	Var	493
Auramine G	I B	494
Auramine G	(M C	494
Auramine N	S	493
Auramine O	By, I	493
Auramine OO	C	493
Auramine OO 3 OO 4	K	493
Auramine OOD	B K	493
Auramine OOP	I	493
Auramine OOA	B	493
Auramine 23112	K	493
Auramine base	K	493
Aurine	B etc	555
Auro Tannine KR	M	600c
Auronal Black	(M	722
Auronal Black 3 A 4 A	G	722a
Auronal Black 4 A 4 G 5 G	tM	722a
Auronal Black B	tM	727
Auronal Black N 2 R	(M	722
Auronal Black 3	tM	722a
Auronal Blue D	(M	S137
Auronal Green TA	(M	S138
Auronal Orange R	tM	S110
Auronal Orange S	tM	S131
Azophosphine G 4 G	A	606a
Austrian Black	Q	U785
Autogene Black	P	732
Autogene Black ELB	P	723
Autol Red BL	B	501
Autol Red RL RI P	B	1001
Azurine S	M	86
Azidine Blue B BAI G	CJ	410
Azidine Blue 3 B	CJ	391
Azidine Blue BAN	CJ	410

Name	Manufacturer	Serial No.
Azidine Blue BX	CJ	386
Azidine Blue 24574	CJ	410
Azidine Bordeaux G	CJ	313
Azidine Dark Brown	CJ	A454
Azidine Fast Orange ES	CJ	A455
Azidine Fast Scarlet 4 BS	CJ	281
Azidine Fast Scarlet 7 BS	CJ	282
Azidine Fast Scarlet E 4 BS	CJ	A456
Azidine Fast Scarlet GGS	CJ	280
Azidine Orange G	CJ	392
Azidine Sky Blue FF	CJ	424
Azidine Yellow CP	CJ	304
Azidine Wool Blue B	CJ	420
Azo Acid Black B 15	M	A418
Azo Acid Black 3 BL	M	A419
Azo Acid Black R	M	A420
Azo Acid Black TL II	M	A421
Azo Acid Blue	M	63
Azo Acid Blue B	K, M	63
Azo Acid Blue B	S	63
Azo Acid Blue 2 G	By	63a
Azo Acid Brown 26049	By	A151
Azo Acid Magenta G	M	64b
Azo Acid Red B	M	64
Azo Acid Red 5 B	M	64a
Azo Acid Red BA	M	64
Azo Acid Rubine	WD	163
Azo Acid Rubine (V.M.)	K	163
Azo Acid Rubine 2 B	Var.	168
Azo Acid Violet	By	229
Azo Acid Violet A 2 B, AL	By	229
Azo Acid Yellow	A	141
Azo Alizarin Black I	DH	202
Azo Alizarin Bordeaux W	DH	391
Azo Alizarin Brown I	By	A152
Azo Archil R	A	44
Azo Black O	M	A422
Azo Black Blue B, R	GrE	381
Azo Blue	By, etc.	377
Azo Bordeaux	Sch	112
Azo Brown V	M	160a
Azo Cardinal G	A	50
Azo Carmine	B	673
Azo Carmine	Var	672
Azo Carmine B	B	673
Azo Carmine BX	B	673
Azo Carmine G	B	672
Azo Carmine GX	B	672
Azo Cerise M, 1618	K	A389
Azo Chrome Blue B	...	164
Azo Chrome Blue R	K	163b
Azo Chromine	G	84
Azo Coccine 2 R	A	77
Azo Cochineal	By	95
Azo Coralline	WD	65
Azo Coralline L	WD	65
Azo Corinth	GrE	481
Azo Crimson L	...	65
Azo Crimson S	By	A153
Azo Eosine	By, etc.	94
Azo Fast Blue (V.M.)	C	A329
Azo Fast Violet	C	A332
Azo Flavine CX	B	141a
Azo Flavine FF, 3 G	B	141a
Azo Flavine GX, 3 R	B	141a
Azo Flavine 3 R	tM	140
Azo Flavine 2 RNH, RX	B	141a
Azo Flavine RS	B	140
Azo Flavine S	B	141
Azo Flavine SGR	B	141a
Azo Fuchsine B	By	71
Azo Fuchsine 6 B	By	147
Azo Fuchsine G, 4 G	By	146

Name	Manufacturer	Serial No.
Azo Fuchsine GN	By	147
Azo Galleine	G	62
Azo Green	By	510
Azo Indigine 6 B	AW	A537
Azo Indigine S	AW	A538
Azo Indigine 419, 420	K	A390
Azo Magenta 6 BX	B	A 67
Azo Magenta G	CV	146
Azo Magenta RS	B	A68
Azo Mauve B	GrE	382
Azo Merino Black	C	A333
Azo Milling Yellow 5 G	GrE	A457
Azomine Black FF	CV	A727
Azomine Fast Yellow AL	CV	A728
Azomine Milling Black N	CV	A729
Azomine Yellow G	Q	U786
Azomine Yellow R	Q	U787
Azo Orange Rubine	M	A423
Azo Orscille 2 B	C	A334
Azo Orscille R	A	44
Azo Orscilline	FA	312a
Azophor Black S	M	408
Azophor Blue D	M	408
Azophor Orange MN	M	46
Azo Phosphine GO	M	60
Azo Red A	C, A	165
Azo Rhodine 2 B	S	A711
Azo Rubine	Sch	163
Azo Rubine (V.M.)	C, etc.	163
Azo Rubine A	tM	163
Azo Rubine S	GrE	163
Azo Rubine S	S	168
Azo Rubine SG	A	163
Azo Rubine WB	WB	163
Azotol C	C	239
Azo Turkish Red	GrE	115
Azo Violet	By	407
Azo Wool Black (V.M.)	C	A335
Azo Wool Blue (V.M.)	C	61
Azo Wool Violet (V.M.)	C	A336
Azo Wool Violet 415	K	A391
Azo Yellow	K, M	141
Azo Yellow	Var.	141
Azo Yellow	Sch	141
Azo Yellow 3 A, 3 AN	tM	141c
Azo Yellow A 5 W	Sch	141
Azo Yellow 3 G	tM	141
Azo Yellow I	I	141
Azo Yellow 3 Y	tM	141c
Azure Blue	K	U306
Azure Blue A, ASI	K	U306
Azurine B	I	520a
Azure Blue O, VS	K	U306
Basic Black TES	K	U307
Basic Blue BA	AW	U552
Basic Blue R	DH	677
Basic Gray	Q	U788
Basic Green Z	...	499
Basic Kraft Brown Y 2	B	U100
Basic Violet	Q	U789
Benzamine Azo Blue G	WD	337
Benzamine Brown 3 G	WD	476a
Benzamine Brown 3 GO	WD	476
Benzamine Pure Blue	WD	426
Benzamine Violet G	WD	326
Benzidine Puro	M	318
Benzine Black	C	U275
Benzine Blue	C	U276
Benzo Azo Red B	WD	A526
Benzoazurine (V.M.)	K	410
Benzoazurine G	A, etc.	410
Benzoazurine G	By, CG	410
Benzoazurine G	S, etc.	410

Name	Manufacturer	Serial No
Bismarck Brown YS	tM	283
Bismarck Brown 53	Sch	284
Bismarck Brown 1568	CV	283
Black (V M)	CJ	U494
Black (V M)	H	U749
Black AJ	P	700a
Black BH	AW	U553
Black CBR	P	698
Black CE	H	U749
Black C 2 N	P	698
Black DX	H	U749
Black E	B	U101
Black HB	AW	U554
Black M	H	U749
Black N	H	U749
Black NSA	P	700a
Black RW X	H	U749
Black soluble in fats	G	U605
Black soluble in oil	C	U277
Black Base BB	B	U102
Black Base S	B	U103
Black Black O	M	U428
Blue (V M)	H	U750
Blue AS	S	U695
Blue 3 BB	GrE	U502
Blue BS	P	539
Blue 5 BS	tM	U524
Blue BS 3 BB	GrE	U503
Blue BSJ	GrE	U504
Blue BSR	GrE	U505
Blue CA	I	U653
Blue CV	AW	U555
Blue DB	Q	U790
Blue DR	Q	U791
Blue DS	H	U750
Blue JB	C	U278
Blue N	S	U696
Blue PCN	DH	697
Blue PCV	G	U606
Blue RR	GrE	U506
Blue 3 R	tM	U525
Blue RS	P	537b
Blue 25	S	U697
Blue 26	S	U698
Blue 214	B	U104
Blue 1900 TC	DH	635
Blue 16519	I.	U514
Blue 27071	By	U217
Blue for silk RN	P	537b
Blue (greenish) spirit soluble	M	521
Blue Black B	M	209b
Blue Black N	K	215
Blue Black O	M	209b
Blue Black for Half Wool G	By	U218
Blue Crystals 3035	K	U309
Blue Residue BW 6 M	K	U310
Boma Black BH	AW	U556
Boma Black BHX	AW	U557
Boma Pink	AW	U558
Boma Yellow BBF	AW	U559
Bordeaux	AW	168
Bordeaux extra	Sch	320
Bordeaux B	Var	112
Bordeaux BLA	tM	320
Bordeaux BR	BK	112
Bordeaux BX	By	237
Bordeaux COV	A	320
Bordeaux G	By, M	454
Bordeaux G	BK	112
Bordeaux R	BK,k	112
Bordeaux S	A	168
Bordeaux 5005	BK	112
Bordeaux Black	Q	U792
Brilliant Acid Blue A	A, By	545
Brilliant Acid Blue B, FF, L	By	545c
Brilliant Acid Blue V	By	543
Brilliant Acid Blue 25601	S	545c
Brilliant Acid Carmine B BOO	GrE	66b
Brilliant Acid Green 6 B	By	503
Brilliant Acid Red G	k	U312
Brilliant Alizarin Blue	Var	667
Brilliant Alizarin Blue D 3 G	M	667
Brilliant Alizarin Blue D 6 G	M	667
Brilliant Alizarin Blue DRI	M	667
Brilliant Alizarin Blue R & (V M)	By	667
Brilliant Alizarin Blue R	CR	667
Brilliant Alizarin Blue 3 R	By	667
Brilliant Alizarin Green	WD	657a
Brilliant Anthrazurol	B	U105
Brilliant Archil C	C	55
Brilliant Azo Acid Blue 3 G	S	63b
Brilliant Azure Blue VS	K	U313
Brilliant Azurine B, R, 5 R	By	416a
Brilliant Azurine 5 G	By,A,L	416
Brilliant Benzo Blue 6 B	By	424
Brilliant Benzo Green B	By	A207
Brilliant Benzo Violet B	By	A208
Brilliant Benzo Violet 2 R	By	A209
Brilliant Benzo Fast Violet 2 RL	By	A206
Brilliant Benzo Fast Violet BL	By	A206a
Brilliant Black	Var	272
Brilliant Black B	B etc	272
Brilliant Black 3 B, G	B	272
Brilliant Blue A	CV	U725
Brilliant Blue G	S	U699
Brilliant Blue GG	CV	U726
Brilliant Blue 217	Q	U793
Brilliant Blue 286	Q	U794
Brilliant Bordeaux SD	A	A1
Brilliant Brown 205	Q	U795
Brilliant Carmine CI	B	U106
Brilliant Carmine GG	B	U107
Brilliant Carmine I	B	U108
Brilliant Chrome Blue P	S	626
Brilliant Chrome Violet BD	By	519a
Brilliant Cloth Blue	k	189a
Brilliant Cochineal 2 R	C	81
Brilliant Congo G	A L	316
Brilliant Congo R	A, L	370
Brilliant Congo R	By	370
Brilliant Congo R	S	370
Brilliant Congo Blue B	A	U73
Brilliant Congo Blue 5 R	A	U74
Brilliant Congo Violet R	A	U75
Brilliant Copper Blue BW	A	U76
Brilliant Copper Blue GW	A	U77
Brilliant Cotton Blue N	By	538
Brilliant Croceine (V M)	C	227
Brilliant Croceine 3 B, MOO	By	227
Brilliant Croceine 9 B	C	270
Brilliant Croceine 3 BA	By	227
Brilliant Croceine MD	GrE	227
Brilliant Croceine NZ	M	227
Brilliant Crimson	M	163
Brilliant Crimson N	M	163
Brilliant Delphine Blue B	K	U314
Brilliant Delphine Blue BS, VS	S	622
Brilliant Diamil Blue 6 G	M	541
Brilliant Diamol Red R	I.W	358
Brilliant Diazine Blue 1230	K	U315
Brilliant Double Scarlet	BK	176b

Name	Manufacturer	Serial No
ıazurine 3 G	By etc	411
ıazurine R	By	410
ıazurine 3 R	GrE	385
ıazurine WB	WB	410
› Black Blue G	By	459
› Black Blue 5 G	By	460
› Black Blue R	By	450
› Blue 2 B	By	337
› Blue 3 B	Bv	391
ı Blue BX	By	386
ı Blue RW	By	419
› Bordeaux 6 B	By	A154
› Brilliant Blue 2 GDN	BK	A442
ı Bronze E	By	A155
ı Bronze GC	By	A156
› Brown B	By	487
› Brown BX	By	490
› Brown D 3 G	By	485a
› Brown G	Bv	485
› Brown 5G 2GC 3GC	By	485a
› Brown MC NBX	By	485a
› Brown 5 R	By	190
› Brown RC, TR	By	485a
› Chrome Black Blue B	By	A157
Chrome Brown B	By	A158
› Chrome Brown BS	By	A159
› Chrome Brown G	By	A160
› Chrome Brown 5 G	By	A161
› Chrome Brown R	By	A162
› Copper Blue B	By	A163
› Copper Blue 2 B	By	A164
Cyanine B	By	390
Cyanine 3 B	By	425
› Cyanine R	By	336
Dark Brown	By	A165
Dark Green B	By	A166
Dark Green GG	By	A167
Deep Black SS	By	A168
Fast Black	G	A611
Fast Black L	By	A169
Fast Blue B BN	By	456
Fast Blue FRL 2 GL	By	456ı
Fast Blue 4 GL 2 L	By	456a
Fast Blue R	A	451
Fast Bordeaux 6 BL	By	A170
Fast Brown 3 GL	By	A171
Fast Brown RL	By	A172
Fast Eosine BL	By	A173
Fast Gray	By	A174
Fast Gray BL	By	A175
Fast Heliotrope BL	By	A176
Fast Heliotrope 4 BI	By	A177
Fast Heliotrope 5 RH	By	A178
Fast Heliotrope 2 RL	By	A179
Fast Orange 2 RL	By	A180
Fast Orange S	By	A181
Fast Orange WS	By	340a
Fast Pink 2 BL	By	297
Fast Red	By	332
FastRed 8 BL 9 BL D	By	332
Fast Red FC	By	343
Fast Red GL L	By	332
Fast Rubine BL	By	A183
Fast Scarlet (V M)	By	279
Fast Scarlet 4BS 5BS	By	279
Fast Scarlet 8 BS 3N	By	279
Fast Scarlet GS	By	279
Fast Violet NC	By	327
Fast Violet R	By	327a
Fast Yellow 4 GL	By	296a
Fast Yellow 5 GL	By	296
Fast Yellow RL	By	296a

Name	Manufacturer	Serial No
Benzoflavine O	GrF	605
Benzoform Blue B	By	A196
Benzoform Brown R	By	A197
Benzoform Orange G	A	U71
Benzoform Orange G	By	A198
Benzoform Red G	A	U72
Benzoform Red G	By	A199
Benzoform Red 2 GF	By	A200
Benzoform Scarlet B	By	A201
Benzoform Yellow R	By	A202
Benzo Gray S	By	447
Benzo Green BB	By	A184
Benzo Green C	By	A185
Benzo Green FF	Bv	A186
Benzo Green FFG	By	A187
Benzo Green G	By	A188
Benzoin Blue 5 GN, RH	BK	410
Benzoin Brilliant Blue GDN	BK	410
Benzoin Brown C	BK	477
Benzoin Fast Red AE	BK	194
Benzo Indigo Blue	By	452
Benzo New Blue 2 B	By	379
Benzo New Blue 5 B	By	379
Benzo New Red 4 B	By	A189
Benzo Olive	By	446
Benzo Orange R	By	340
Benzo Pure Yellow FF	By	A190
Benzopurpurin	AW	365a
Benzopurpurin	H	365
Benzopurpurin	I	365a
Benzopurpurin AM	By	365a
Benzopurpurin B	A etc	365
Benzopurpurin 4 B	A etc	363
Benzopurpurin 6 B	By etc	364
Benzopurpurin 10 B	A etc	405
Benzopurpurin 4 BM	A	363
Benzopurpurin 4 BN	BK	363
Benzopurpurin 4 BP	GrE	363
Benzopurpurin 4 BX	Q	363
Benzo Red 10 B	By	A191
Benzo Red 12 B	By	A192
Benzo Rhodulıne Red B	By	A203
Benzo Rhodulıne Red 3 B	By	A204
Benzo Rubine HW	By	A193
Benzo Rubine SC	By	A194
Benzo Scarlet	By	319
Benzo Scarlet BC	By	A195
Benzo Sky Blue	By	426
Benzo Violet	CR	517
Benzo Violet O	By	326
Benzo Violet R	By	326a
Benzoyl Pink	P	104
Benzyl Black B	I	A661
Benzyl Blue B	I	U651
Benzyl Bordeaux B 17619	I	U652
Benzyl Green B	I	503
Benzyl Red	I	A662
Benzyl Violet	I	517
Benzyl Violet 4 B, 6 B 10 B	I	517
Benzyl Violet 5 BN	I	517
Betamine Blue 8 B		541
Biebrich Acid Blue G	K	U308
Biebrich Acid Blue V	K	U309
Biebrich Acid Violet R	K	A392
Biebrich Patent Black	K	278
Bismarck Acid Brown	By	A205
Bismarck Brown	A, etc	283
Bismarck Brown (V M)	C	283
Bismarck Brown EL	A	283
Bismarck Brown G	I	283
Bismarck Brown R	CV etc	284
Bismarck Brown 2 R 2 RV	tM	284
Bismarck Brown Y	Sch	283

Name	Manufacturer	Serial No
Bismarck Brown YS	tM	283
Bismarck Brown 53	Sch	284
Bismarck Brown 1568	CV	283
Black (V M)	CJ	U494
Black (V M)	H	U749
Black AJ	P	700a
Black BH	AW	U553
Black CBR	P	698
Black CE	H	U749
Black C 2 N	P	698
Black DX	H	U749
Black E	B	U101
Black HB	AW	U554
Black M	H	U749
Black N	H	U749
Black NSA	P	700a
Black RW, X	H	U749
Black soluble in fats	G	U605
Black soluble in oil	C	U277
Black Base BB	B	U102
Black Base S	B	U103
Black Black O	M	U428
Blue (V M)	H	U750
Blue AS	S	U695
Blue 3 BB	GrE	U502
Blue BS	P	539
Blue 5 BS	tM	U524
Blue BS 3 BB	GrE	U503
Blue BSJ	GrE	U504
Blue BSR	GrE	U505
Blue CA	I	U653
Blue CV	AW	U555
Blue DB	Q	U790
Blue DR	Q	U791
Blue DS	H	U750
Blue JB	C	U278
Blue N	S	U696
Blue PCN	DH	697
Blue PCV	G	U606
Blue RR	GrE	U506
Blue 3 R	tM	U525
Blue RS	P	537b
Blue 25	S	U697
Blue 26	S	U698
Blue 214	B	U104
Blue 1900 TC	DH	635
Blue 16519	I.	U514
Blue 27071	By	U217
Blue for silk RN	P	537b
Blue (greenish) spirit soluble	M	521
Blue Black B	M	269b
Blue Black N	K	215
Blue Black O	M	269b
Blue Black for Half Wool G	By	U218
Blue Crystals 3035	K	U309
Blue Residue BW G M	K	U310
Boma Black BII	AW	U556
Boma Black BHX	AW	U557
Boma Pink	AW	U558
Boma Yellow BBF	AW	U559
Bordeaux	AW	168
Bordeaux extra	Sch	320
Bordeaux B	Var	112
Bordeaux BLA	tM	320
Bordeaux BR	BK	112
Bordeaux BX	By	237
Bordeaux COV	A	320
Bordeaux G	By M	254
Bordeaux G	BK	112
Bordeaux R	BK,K	112
Bordeaux S	A	168
Bordeaux 5005	BK	112
Bordeaux Black	Q	U792
Brilliant Acid Blue A	A By	545
Brilliant Acid Blue B, FF, L	By	545c
Brilliant Acid Blue V	By	543
Brilliant Acid Blue 25601	S	545c
Brilliant Acid Carmine B, BOO	GrE	66b
Brilliant Acid Green 6 B	By	503
Brilliant Acid Red G	K	U312
Brilliant Alizarin Blue	Var	667
Brilliant Alizarin Blue D 3 G	M	667
Brilliant Alizarin Blue D 6 G	M	667
Brilliant Alizarin Blue DRI	M	667
Brilliant Alizarin Blue R & (V M)	By	667
Brilliant Alizarin Blue R	CR	667
Brilliant Alizarin Blue 3 R	By	667
Brilliant Alizarin Green	WD	657a
Brilliant Anthrazurol	B	U105
Brilliant Archil C	C	55
Brilliant Azo Acid Blue 3 G	S	63b
Brilliant Azure Blue VS	K	U313
Brilliant Azurine B, R 5 R	By	416a
Brilliant Azurine 5 G	By,A,L	416
Brilliant Benzo Blue 6 B	By	424
Brilliant Benzo Green B	By	A207
Brilliant Benzo Violet B	By	A208
Brilliant Benzo Violet 2 R	By	A209
Brilliant Benzo Fast Violet 3 RL	By	A206
Brilliant Benzo Fast Violet BL	By	A206a
Brilliant Black	Var	272
Brilliant Black B	B, etc	272
Brilliant Black 3 B, G	B	272
Brilliant Blue A	CV	U725
Brilliant Blue G	S	U699
Brilliant Blue GG	CV	U726
Brilliant Blue 217	Q	U793
Brilliant Blue 286	Q	U794
Brilliant Bordeaux SD	A	A1
Brilliant Brown 205	Q	U795
Brilliant Carmine CJ.	B	U106
Brilliant Carmine GG	B	U107
Brilliant Carmine I	B	U108
Brilliant Chrome Blue P	S	626
Brilliant Chrome Violet BD	By	549a
Brilliant Cloth Blue	K	189a
Brilliant Cochineal 2 R	C	81
Brilliant Congo G	A L	316
Brilliant Congo R	A, L	370
Brilliant Congo R	By	370
Brilliant Congo R	S	370
Brilliant Congo Blue B	A	U73
Brilliant Congo Blue 5 R	A	U74
Brilliant Congo Violet R	A	U75
Brilliant Copper Blue BW	A	U76
Brilliant Copper Blue GW	A	U77
Brilliant Cotton Blue N	By	538
Brilliant Croceine (V M)	C	227
Brilliant Croceine 3 B, MOO	By	227
Brilliant Croceine 9 B	C	270
Brilliant Croceine 3 BA	By	227
Brilliant Croceine MD	GrL	227
Brilliant Croceine NZ	M	227
Brilliant Crimson	M	163
Brilliant Crimson N	M	163
Brilliant Delphine Blue B	K	U314
Brilliant Delphine Blue BS VS	S	622
Brilliant Dianil Blue 6 G	M	541
Brilliant Dianol Red R	I.W	358
Brilliant Diazine Blue 1230	K	U315
Brilliant Double Scarlet	BK	176b

Name	Manufacturer	Serial No
nt Fast Black	I	U654
nt Fast Blue	AW	A539
nt Fast Blue B	By	A210
nt Fast Blue 3 B X	By	A211
nt Fast Blue 2 G	By	A212
nt Fast Blue 4 G	By	A213
nt Fast Red G	B	162
nt Fast Red P	By	A214
nt Geranine B	By	118
nt Glacier Blue	I	501
nt Green	Var	499
nt Green B	tM	495
nt Green 6 B		499
nt Green BN	tM	499
nt Green D	C	499
nt Green PND	GrL	499
nt Green S	CJ	490
nt Hessian Purple	L	302
nt Indigo B	B	883
at Indigo BD	B	885
nt Indigo 2 B BBD	B	884
nt Indigo 4 G	B	887
nt Indigo G GD D	B	886
nt Lake Red R	M	45
nt Lanafuchsine I)	C	U280
it Milling Blue (V M)	C	U281
nt Milling Blue B	K	U316
it Milling Green B	C	503
at Naphthol Blue	C	U282
nt Orange G	A By	339
it Orange O	M	70
it Orange R	M,etc	79
it Orseille	C	55
it Orseille C	C	55
it Patent Blue A	K	U317
it Patent Blue A	M	545
it Phosphine	I	606b
it Phosphine G 5 G	I	606
it Pink	S	571a
it Ponceau 5 R	By	169
it Pure Yellow 6 G	By	U219
it Purpurin 4 B	A By	368
it Purpurin 10 B	A	368a
it Purpurin R	A etc	369
it Red R paste		45
it Rhodulin Red B	By	684b
it Rhodulin Violet	By	684a
it Safranine G	A	679
it Safranine R	Sch	684
it Scarlet (V M)	C	U283
it Scarlet AL	M	A424
it Scarlet NY 47	B	U109
it Scarlet R	BK	A443
it Scarlet 2 R	tM	A515
it Scarlet 3 R	Sch	169
it Scarlet 4 R 4 RSP	tM	A516
t Scarlet 141113	B	U110
it Sky Blue 5 B	By	U220
it Sky Blue 6 B		424
t Sky Blue G	By	U221
it Sky Blue 5 G	By	511
t Sky Blue 8 G	By	U223
t Sulfonazurine R	By	361a
t Sulfon Red B 5 B	S	182
t Victoria Blue RB	I	559b
tWool Blue B TFR G	By	462a
t Yellow	By	U224
t Yellow	Var	303
t Yellow	tM	142
t Yellow C	Sch	303
Brilliant Yellow S	B etc	142
Bromofluoresceic Acid A 3 G	M	587b
Bromofluoresceic Acid BA BL	M	587b
Bromofluoresceic Acid Crystals	M	587b
Bromo Indigo FB	By	881
Bromo Indigo Rathjen		879
Bromo Metanil Yellow	P	135
Brown	BK	U479
Brown A 1678	B	U111
Brown GC	G	U607
Brown PCC	DH	U596
Brown Y	H	283
Brown PCC	G	U607
Brown 43	S	U700
Brown 339	Lev	283b
Brown 37104	H	283
Buffalo Black AD	Sch	266
Buffalo Black 2 B	Sch	272
Buffalo Black 4 B	Sch	269
Buffalo Black 8 B 10 B	Sch	261
Buffalo Black LA	Sch	268
Buffalo Black NB	Sch	217
Buffalo Black PY	Sch	220
Buffalo Black R	Sch	261
Buffalo Chrome Black BWN	Sch	275
Buffalo Cyanine R 3 R	Sch	257
Buffalo Direct Blue G	Sch	410
Buffalo Direct Cardinal 7 B	Sch	405
Buffalo Direct Crimson B	Sch	313
Buffalo Direct Garnet R	Sch	312
Buffalo Direct Orange R	Sch	362
Buffalo Direct Orange Y	Sch	392
Buffalo Direct Red 4 B	Sch	363
Buffalo Direct Violet 4 R	Sch	375
Buffalo Direct Yellow CG	Sch	342
Buffalo Direct Yellow CRR	Sch	394
Buffalo Fast Blue B	Sch	189
Buffalo Fast Blue R	Sch	188
Buffalo Fast Crimson G	Sch	64
Buffalo Fast Crimson R	Sch	66
Buffalo Fast Fuchsine B	Sch	147
Buffalo Flamine B	Sch	94
Buffalo Flamine G	Sch	95
Buffalo Rubine	Sch	110
Butter Yellow	A etc	32
Cachou (V M)	Lev	U731
Cachou de Laval	P	706
Calcutta Black D	H	U751
Calcutta Blue	S	626
Calcut a Blue 2	S	U701
Caledon Blue R		842
Caledon Green		765
Caledon Purple		763
Caledon Violet		766
Candle Blue	K	U318
Candle Violet	K	U319
Canelle AL	B	606
Capri Blue GON	By L	620
Capri Green BN	I	620a
Carbazole Wool Green	C	U284
Carbide Black	I	462f
Carbide Black D, EX SX	I	462f
Carbide Fast Black GI	I	462f
Carbide Violet V	I	462g
Carbindol Blue R		745
Carbon Black (V M)	K	458
Carbon Black 4 B	M	272
Cardinal 3 B	H	512
Cardinal Red J	H	161
Carmine Blue A	AW	U560
Carmine special	P	U592

Name	Manufacturer	Serial No.
Carmine Blue V	K	U320
Carmine Brilliant Blue	AW	U561
Carmine Naphth Garnet	DH	106
Carmoisine	A, S	163
Carmoisine B	By	163
Carmoisine 3 B	By	163a
Carmoisine 6 B, R	H	163a
Carmoisine L, WS	...	163
Carpet Red B, BT, R	K	U321
Carthamine 6 A, B	tM	573a
Cashmere Black 3 BN	By	A215
Cashmere Black MCS	H	A733
Cashmere Black V	By	A216
Cashmere Blue TG	By	A217
Celestial Blue	WD	U541
Celestine Blue B	By	641
Cerasine Brown AN	C	U285
Cerasine Dark Red I, II	C	223a
Cerasine Orange G	C	35
Cerasine Red 56 I, 56 II	C	223
Ceres Blue 4	By	U225
Ceres Brown 3	By	U226
Ceres Brown 4	By	U227
Ceres Orange 3	By	U228
Ceres Red 3	By	U229
Ceres Red 6	By	U230
Cerise DN, DIV	B	512
Cerise M	tM	512
Cerise N	C	512
Ceroflavine	B	U112
Cerotine Scarlet G	CJ	34b
Chicago Blue B	A	423
Chicago Blue 4 B	A	422
Chicago Blue 6 B	A	424
Chicago Blue R	A, By	388
Chicago Blue 2 R	A	384
Chicago Blue 4 R	A	324
Chicago Blue RW	A	419
Chicago Blue new	A	422a
Chicago Orange G	G	15
Chicago Red 111	G	A612
China Blue	A	539
Chinaldine Yellow	...	613
Chloramine Black BH	S	469
Chloramine Black BH	S	333
Chloramine Black EXD, FF	S	469a
Chloramine Black HW	S	473
Chloramine Black N	S	469
Chloramine Blue 2 B	S	337
Chloramine Blue 3 B	S	471a
Chloramine Blue 3 G	S	471
Chloramine Blue BXR	S	386
Chloramine Blue HW	S	472
Chloramine Brilliant Red 8 B	S	358
Chloramine Brown G	By	A218
Chloramine Dark Green B	S	470a
Chloramine Fast Red F, FF	S	343
Chloramine Fast Yellow B	By	617
Chloramine Green B	S	470
Chloramine Green G	S	475
Chloramine Orange	S	11
Chloramine Orange G	By	11
Chloramine Pure Blue	S	471b
Chloramine Red B, 3 B	S	319
Chloramine Red 8 B, 8 BS	By	358
Chloramine Sky Blue Aconc	S	426
Chloramine Sky Blue 6 B, FF	S	424
Chloramine Violet	By	A220
Chloramine Violet N	S	327
Chloramine Violet R	By	A221
Chloramine Yellow	By, etc.	617
Chloramine Yellow DB, FF	By	617
Chloramine Yellow G	S	617
Chloramine Yellow GG, HW, M	By	617
Chloramine Yellow M	S	617
Chloramine Yellow RC	By	617
Chloranisidine Scarlet	M	97
Chloranthrene Yellow G	...	849
Chlorantine Blue BB	I	A663
Chlorantine Brown BB	I	A664
Chlorantine Brown R	I	A665
Chlorantine Brown 15521	I	A666
Chlorantine Brown 15895	I	A667
Chlorantine Fast Blue RL	I	451
Chlorantine Lilac B	I	A668
Chlorantine Lilac BB	I	A669
Chlorantine Orange TR	I	A670
Chlorantine Orange 11323	I	A671
Chlorantine Pure Blue	I	A672
Chlorantine Red	I	358
Chlorantine Violet BB	I	A673
Chlorantine Yellow JJ	I	617
Chlorazol Blue GBDS	H	417
Chlorazol Blue 3 G	H	417
Chlorazol Blue R	H	417
Chlorazol Brilliant Blue 3 B, 10 B	H	417a
Chlorazol Brilliant Blue 14 B, F	H	417a
Chlorazol Brilliant Bordeaux RH	H	A734
Chlorazol Brilliant Green G	H	A738
Chlorazol Brown G	H	A735
Chlorazol Brown M	H	A736
Chlorazol Brown MAS	H	A737
Chlorazol Catechine B	H	A739
Chlorazol Drab RH	H	A740
Chlorazol Fast Blue RH	H	A741
Chlorazol Fast Bordeaux B	H	A742
Chlorazol Fast Red 10 B	H	A743
Chlorazol Fast Scarlet RH	H	A744
Chlorazol Fast Yellow A	H	A745
Chlorazol Fast Yellow AF	H	A746
Chlorazol Fast Yellow AG	H	A747
Chlorazol Fast Yellow BS	H	A748
Chlorazol Fast Yellow R	H	A749
Chlorazol Green B	H	474
Chlorazol Green G	H	A750
Chlorazol Orange 2 R	H	340
Chlorazol Red A	H	A751
Chlorazol Sky Blue FF	H	A752
Chlorazol Sky Blue FFS	H	A753
Chlorazol Violet B	H	A754
Chlorazol Violet 3 B	H	A755
Chlorazol Violet R	H	A756
Chlorophenine	ClCo	17
Chocolate Brown	AW	U568
Chocolate Brown G	B	U113
Chocolate Brown R	B	U114
Chromal Blue G, GC	G	552
Chromal Dark Blue K	G	552a
Chromal Fast Brown G	G	U608
Chromal Fast Brown R	G	U609
Chromanil Black BF	A	A2
Chromanil Black FF	A	A3
Chromanil Blue R	A	A4
Chromanil Brown 2 G	A	A5
Chromazine Blue G	M	U429
Chromazone Blue R	G	130
Chromazone Red (new), A	G	129
Chrome Acid Black	I	U655
Chrome Acid Black RSI	I	U656
Chrome Azurol S	G	554
Chrome Black	WD	275a
Chrome Black BA	Q	A765

Name	Manufacturer	Serial No
Black A	CG	275a
Black DF	AW	275a
Black DΓ	M	A425
Black ΓPP G	AW	275a
Black I	H	275a
Black LV	K	U322
Black M Z	H	275a
Black 2841	K	U322
Black 57006	H	275a
Blue	By	567
Blue ATX	B	163b
Blue B	WB	626
Blue 2 B IBX	Bk	163b
Blue G	Q	163b
Blue R	AW	163
Blue R	WB	599
Blue RX	B	163b
Blue Black B	K	U323
Bordeaux	By	550
Brown	AW	158a
Brown CS	K	158a
Brown P	P	90
Brown RR	G	158
Brown RVV	G	158
Brown 414	Iev	158a
Brown 2813	K	158a
Deep Black A	G	275b
Deep Black A	tM	275
Deep Black G	G	275b
Deep Black G	tM	275
Fast Black	G	275
Fast Black A	CG	181c
Fast Black B	I	275c
Fast Black Γ	A	A6
Fast Black Γ		275
Fast Black ΓW	I	275c
Fast Black P4B	A	A7
Fast Black PΓ	A	A8
Fast Black PON	CG	181c
Fast Black PT	A	A9
Fast Black PV		157
Fast Black PWBI	I	181
Fast Black PWRR	I	181
Fast Black 12172	CG	181c
Fast Blue B	B	U115
Fast Blue 4 B	A	U78
Fast Blue R	I	U657
Fast Blue 13366	I	U658
Fast Brown A	I	A674
Fast Brown BC	I	A675
Fast Brown G	I	A676
Fast Brown R	A	A10
Fast Brown ΓP	By	U231
Fast Brown ΓV	I	A677
Fast Brown V	I	A679
Fast Brown 12681	I	A678
Fast Brown 15823	I	A680
Fast Cyanine G	I	A681
Fast Garnet BL	A	U79
Fast Green G	I	A682
Fast Green GL	I	A683
Fast Green 16304	I	A684
Fast Orange R	I	A685
Fast Orange RD	By	U232
Fast Pure Blue BX	I	551
Fast Red G	A	A11
Fast Violet B	I	A686
Fast Yellow BN	CG	177d
Fast Yellow G	A	96a
Fast Yellow 2 G	A	96
Fast Yellow GG	I	96a
Fast Yellow GA O	I	96a

Name	Manufacturer	Serial No
Chrome Fast Yellow R 2 R	A	177
Chrome Gallus Brown RR	G	158a
Chrome Green	By	509
Chrome Green (V M)	K	U324
Chrome Green C	K	U324
Chrome Green G	L	U515
Chrome Heliotrope	DH	625
Chrome Leather Black D	B	U116
Chrome Leather Black E	By	U233
Chrome Leather Black L	S	U702
Chrome Leather Black LA	B	U117
Chrome Leather Black I	WD	U542
Chrome Leather Black M	By	U234
Chrome Leather Brown R	S	U703
Chrome Orange GR	By	U235
Chrome Patent Green N	K	219
Chrome Red 2593	K	U325
Chrome Violet	By	549
Chrome Violet	G	557
Chrome Violet Brown 9457	K	U326
Chrome Violet S for printing	G	557
Chrome Yellow	By	177
Chrome Yellow	I	177c
Chrome Yellow D DΓ	By	177
Chrome Yellow G GG	S	177c
Chrome Yellow R	AW	177c
Chrome Yellow R	By	177
Chrome Yellow SM 2501	K	A303
Chromine G	K	614
Chromine RR	S	611a
Chromine Blue	A	U562
Chromine Blue B	AW	U563
Chromine Brown R	AW	U564
Chromine Brown V	AW	U565
Chromine Fast Blue S	AW	U566
Chromine Violet 2 R	AW	U567
Chromocitronine R	DH	140a
Chromocyanine B V	DH	631
Chromogene I	M	777
Chromogene Violet B	M	U130
Chromopurpurin H	DH	U597
Chromotrope 2 B	M	57
Chromotrope 6 B	M	67
Chromotrope 8 B	M	171
Chromotrope 10 B	M	114
Chromotrope DW	M	57a
Chromotrope I 4 B	M	164
Chromotrope 2 R	M	40
Chromotrope S	M	57a
Chromoxane Blue R	By	U236
Chromoxane Violet 5 B	By	U237
Chrysamine G	By otc	342
Chrysamine K	S	342
Chrysamine R	By I	304
Chrysobarine	tM	304c
Chrysobarine R	tM	304c
Chrysoidine	Var	33
Chrysoidine A	B	33
Chrysoidin AR	tM	34
Chrysoidine C 2 Γ	P	33
Chrysoidine Γ	B	33
Chrysoidine GS	I	33
Chrysoidine 3 N	tM	33
Chrysoidine R	Var	34
Chrysoidine R	C DH	(P)
Chrysoidine 3 R	Sch	34
Chrysoidine RD	CV	33
Chrysoidine RL	P	34
Chrysoidine RG		34
Chrysoidine RL RI D	B	34
Chrysoidine T base	B	34a
Chrysoidine Y	Var	33

Name	Manufacturer	Serial No
Chrysoidine 2 Y	tM	33
Chrysoidine 46803	A	33
Chrysoidine Base	K	33
Chrysoidine crystals	Sch	33
Chrysoine	Var	143
Chrysolarine A	tM	U526
Chrysoline	G S P	586
Chrysophenine	I, S	304
Chrysophenine G	Var	304
Chrysophenine GOO	L	304
Chrysophenine R W	By	304a
Chrysophenine III	AW	304
Chrysophenine 190	K	304
Ciba Blue B	I	880
Ciba Blue 2 B 2 BD	I	881
Ciba Blue G G 2 B	I	882
Ciba Bordeaux B	I	916
Ciba Gray B G	I	899
Ciba Green G	I	891
Ciba Heliotrope B	I	897
Cibanone Black B BG 2 G	I	794
Cibanone Blue 3 G	I	793
Cibanone Brown B V	I	808
Cibanone Green G	I	792a
Cibanone Olive B G	I	792b
Cibanone Orange R	I	792
Cibanone Yellow R	I	795
Ciba Orange G	I	911
Ciba Pink R	I	910a
Ciba Red R	I	905
Ciba Red B	I	909
Ciba Red G	I	906
Ciba Scarlet G	I	907
Ciba Violet B	I	901
Ciba Violet 3 B	I	900
Ciba Violet R	I	901
Ciba Yellow G	I	890
Cinnabar Scarlet BF	BK	299
Cinnabar Scarlet G, R	BK	300
Citronine GOO	L	141
Citronine GOOO 2 ROOOO	GrE	140
Claret NY Z 1413	B	U118
Claret Lake BL	By	U238
Claret Red	B	U119
Claret Red	H	A757
Claret Red B BO	M	112a
Claret Red SS	B	U120
Claret Red X	M	112a
Clayton Cloth Red	ClCo	193
Clayton Yellow	ClCo	198
Cloth Blue 1769 1770	K	U327
Cloth Fast Black B	I	U659
Cloth Fast Blue B	I	693
Cloth Fast Blue GTB	I	U661
Cloth Fast Blue R	I	257
Cloth Fast Red R	I	484
Cloth Red B	By	233
Cloth Red B	GrE K	236
Cloth Red BB	K	A394
Cloth Red B 2 B	WD	236
Cloth Red 3 B	By	231
Cloth Red BA	A	236
Cloth Red BC	By	2..3a
Cloth Red BO	GrE	236
Cloth Red G	By	224
Cloth Red G	By GrE	234
Cloth Red GA	A	234
Cloth Red 3 GA	A	230
Cloth Red GTL GI	A	234
Cloth Red O	M	236
Cloth Red 1769 2586	K	A394
Cloth Scarlet C G	K	246
Cloth Scarlet R	K	252
Cloth Scarlet 2584	K	U327a
Cloth Yellow R	GrE	A458
Cochineal Orange	P	227a
Cochineal 2 BG 3 BG	A	167
Cochineal B	M	101
Cochineal	P	81b
Cochineal Red A	B	169
Cochineal Scarlet B	WD	95
Cochineal Scarlet 4 R	Sch	78
Cœrulein B	M	600
Cœrulein I	B	601
Cœrulein MS powder	DH	601
Cœrulein S	B, etc	601
Cœrulein SL powder	BD	601
Cœrulein SW	B, By	601
Columbia Black	A	436
Columbia Black B	A	455
Columbia Black LA	A	455a
Columbia Black FF FB F 2B	A	436
Columbia Black R	A	453
Columbia Black WA	A	455a
Columbia Black Green D	A	465
Columbia Blue G GM	A	387
Columbia Blue R	A	325
Columbia Bordeaux B	A	U80
Columbia Brown M	A	A12
Columbia Brown R	A	A13
Columbia Catechine 3 B	A	U81
Columbia Catechine G	A	U82
Columbia Catechine O	A	U83
Columbia Catechine R	A	U84
Columbia Fast Black D	A	U86
Columbia Fast Black FF	A	U87
Columbia Fast Black G	A	U88
Columbia Fast Black V	A	U89
Columbia Fast Blue 2 G	A	A16
Columbia Fast Blue R	A	A17
Columbia Fast Red F	A	343
Columbia Fast Scarlet 4 B	A	279
Columbia Green	A	478
Columbia Green B 3 B, G	A	478
Columbia Orange R	A	A14
Columbia Violet R	A	A15
Columbia Yellow	A	617
Columbo Blue 4 R	I	U663
Coomassie Acid Blue R	BD	188
Coomassie Black B	Lev	433
Coomassie Blue Black	Lev	217
Coomassie Navy Blue	Lev	434
Coomassie Navy Blue 2 RNX	BD	252
Coomassie Union Blacks	Lev	461
Coomassie Wool Black D	Lev	266
Coomassie Wool Black S	Lev	244
Coomassie Wool Black R	Lev	243
Concentrated Blue BB	H	U752
Concentrated Cotton Blue B, 2	M	539
Congo	A	307
Congo 4 R	A	374
Congo Blue 2 B	By	412
Congo Blue 3 B	A	391
Congo Brown	Var	477
Congo Brown G	A Lev	477
Congo Brown R	A Lev	490
Congo Corinth B	Var	375
Congo Corinth G	Var	312
Congo Fast Blue B	A	456
Congo Fast Blue R	A	451
Congo Magenta	K	A395
Congo Magenta 3616	K	A395
Congo Orange G	Var	315
Congo Orange R	A L	373
Congo Orange R, RG	By	373

Name	Manufacturer	Serial No.
Congo Red	Var	307
Congo Red 4 B	Sch	307
Congo Red 4 R	By	374
Congo Rubine	Var	313
Congo Rubine G	S	313
Congo Rubine Z	BK	313
Congo Rubine 8714	CG	313
Corcine AR, AB	DH	646
Corcine 2 R	DH	641
Corioflavine G,GG,GOOO,R	GrE	609e
Coriphosphine OS, OX	By	606e
Corvan Black BG	B	A69
Corvan Black T	B	A70
Corvoline BT	B	U121
Cotton Black	S	462c
Cotton Black	WD	738
Cotton Black (V. M.)	K	A396
Cotton Black 3 B	B	A71
Cotton Black BGX	B	A72
Cotton Black BNX	B	A73
Cotton Black BT	Q	462c
Cotton Black CC, CT	Lev	462c
Cotton Black CK	K	A396
Cotton Black E	B	463
Cotton Black GB	K	A396
Cotton Black GS, RS	S	462c
Cotton Black PF	B	A75
Cotton Black RW	B	462h
Cotton Black UG	K	A396
Cotton Black V, Y	Lev	462c
Cotton Black 4	B	A74
Cotton Blue	WD	538
Cotton Blue	...	649
Cotton Blue (V. M.)	Lev	538a
Cotton Blue B	K	U328
Cotton Blue BCB	CG	U490
Cotton Blue BCB	Q	538a
Cotton Blue BR	K	U328
Cotton Blue BSJ	GrE	538a
Cotton Blue CC	K	U328
Cotton Blue G	M	539
Cotton Blue N	B	649
Cotton Blue OOO	Q	538a
Cotton Blue R, RN	B	649
Cotton Blue 5190	BK	538a
Cotton Blue Double cone	...	539
Cotton Brown	WD	737
Cotton Brown (V. M.)	C	490
Cotton Brown B	K	U329
Cotton Brown B	Lev	490a
Cotton Brown CNP	B	U122
Cotton Brown CR	Q	490a
Cotton Brown FS	Lev	490a
Cotton Brown 4 G	K	U329
Cotton Brown M	S	490a
Cotton Brown O, 2 R	K	U329
Cotton Brown 3 R	Lev	490a
Cotton Brown RN	B	U123
Cotton Brown T	I, S	490a
Cotton Brown V	K	U329
Cotton Brown 100, 137, 153	Lev	490a
Cotton Corinth G	B,GrE	312
Cotton Cutch 21 A	Lev	A732
Cotton Dark Green B, N	K	U330
Cotton Dark Green 138	Lev	U732
Cotton Fast Red 4 BSP, 4 BX	B	363
Cotton Green	K	U331
Cotton Green A, 88 A, 105 A, B	Lev	U733
Cotton Green D	S	A714
Cotton Green 2 G	L	U516
Cotton Marine Blue	K	U332
Cotton Milling Black	B	U124
Cotton Olive	Lev	U734
Cotton Orange	K	U333
Cotton Orange	Q	210c
Cotton Orange	S	34d
Cotton Orange (V. M.)	Lev	210a
Cotton Orange FB, GK	K	U333
Cotton Orange G	B, S	192
Cotton Orange R	B	210
Cotton Orange RR, R 2 O	K	U333
Cotton Orange 16737	I	34c
Cotton Orange Brown (V. M.)	Lev	210b
Cotton Pink B	B	U125
Cotton Ponceau	BK	300
Cotton Pure Blue B	A	U1
Cotton Purple 5 BN	B	366
Cotton Red	B	363
Cotton Red	M	307
Cotton Red A	C	307a
Cotton Red 65 A, 201 A	Lev	307a
Cotton Red B	S	365
Cotton Red 4 B	B	363
Cotton Red 4 B	GrE	307
Cotton Red 8 BN	GG	307a
Cotton Rubine	B	313
Cotton Ruby	Lev	313a
Cotton Scarlet	B	227
Cotton Scarlet	K	U334
Cotton Scarlet	Q	227b
Cotton Scarlet NP, NPX	B	227
Cotton Violet 43 A	Lev	U735
Cotton Violet 2 B	Q	U796
Cotton Violet 5 B	Q	U797
Cotton Violet R	R	U798
Cotton Violet X	Lev	U735
Cotton Yellow	Q	199b
Cotton Yellow CH	I	304
Cotton Yellow G	B	290
Cotton Yellow GI, GX	B	296
Cotton Yellow R	B	199
Cresol Black (V. M.)	GrE	U510
Cresotine Yellow G	GrE, M	351
Cresotine Yellow GOO	GrE	351
Cresotine Yellow R	GrE	305
Cresyl Blue BBS, RRN	I.	621
Cresyl Fast Violet 2 B	L	U567
Crimson BBT	By	163a
Crimson Benine G	AW	U569
Croceine AZ	C	225
Croceine B	Sch	226
Croceine 3 B	Sch	235
Croceine Orange	Var	37
Croceine Orange G	Var	37
Croceine Orange R	Sch	70
Croceine Orange X	C	37
Croceine Orange Y	Sch	37
Croceine Scarlet (V. M.)	K	160a
Croceine Scarlet 3 B	By, etc.	249
Croceine Scarlet 7 B, 8 B	By	255
Croceine Scarlet 10 B	By	249a
Croceine Scarlet 8 BL	K	255
Croceine Scarlet 2 BX	By	167
Croceine Scarlet 3 BX	By, K	167
Croceine Scarlet MO	WD	A527
Croceine Scarlet MOO	Sch	227
Croceine Scarlet MOO	WD	A528
Croceine Scarlet O	K	251
Croceine Scarlet OO	K	251
Cross Dye Black (V. M.)	H	720H
Cross Dye Blue FR	H	S174
Cross Dye Brown 2 D	H	S175
Cross Dye Brown 4 R	H	S176
Cross Dye Drab N	H	S177
Cross Dye Green G	H	S181

Name	Manufacturer	Serial No.
Cross Dye Yellow D	H	S178
Cross Dye Yellow R	H	S179
Cross Dye Yellow Y	H	S180
Crumpsall Direct Fast Brown B	Lev	444
Crumpsall Direct Fast Brown O	Lev	445
Crumpsall Direct Fast Red R	Lev	341
Crumpsall Yellow	Lev	178
Crystal Orange	...	38
Crystal Orange 2 G	Var	38
Crystal Ponceau	B, etc.	113
Crystal Ponceau 6 R	A, BK	113
Crystal Scarlet	WD	U543
Crystal Scarlet 6 R	C	U286
Crystal Violet	Var	516
Crystal Violet 5 BO	...	516
Crystal Violet 6 B	A	516
Crystal Violet CV	B	516
Crystal Violet 484	I	516
Cumidine Scarlet	Sch	83
Cupranil Brown R	I	A689
Cupranil Brown	I	A687
Cupranil Brown G	I	A688
Cupranil Brown 12366	I	A690
Cupranil Brown 15596	I	A690
Cupranil Brown 15903	I	A690
Curcumeine	A, BK	140
Curcumeine GG	BK	140
Curcumeine S	A	140
Curcumine	tM, G	142
Curcumine L, LC	G	142
Curcumine 8000	L	9
Curcuphenine	ClCo	16
Curch Brown	AW	A540
Curch Brown D	M	A426
Cutch Brown R	S	A715
Cutch Brown 11759	I	A691
Cyanthracene Blue 3 B	CV	U727
Cyanthracene Blue 2 BL	CV	U728
Cyanthracene Yellow S	CV	U729
Cyanthrol BGA, G, 3 GO	B	860
Cyananthrol R, RB	B	859
Cyananthrol RBA, RBX	B	859
Cyananthrol RXO, RBY	B	859
Cyanazurine	DH	630
Cyanine B	A, M	544
Cyanine BF	A	544
Cyanine Blue	CV	544a
Cyanine Blue	tM	U527
Cyanogen Blue 13623	I	U664
Cyanol (V. M.)	C	546
Cyanol Green (V. M.)	C	566b
Cyanol Fast Green B	C	566
Cyanosine B	I	598
Cyanosine spirit soluble	M, K, S	594
Cyprus Green B	A	A19
Dark Navy Blue 2035	Lev	537a
Dark Purple (printing paste)	Lev	U736
Deep Black D	tM	U528
Deep Fat Black Color	A	U2
Delphine Blue B	S, By	622
Deltapurpurin	I	366
Deltapurpurin 3 B	AW	366a
Deltapurpurin 5 B	Var	366
Deltapurpurin 7 B	Lev	367
Develop Black	WD	333d
Develop Black NZ	Q	333d
Developed Black B	AW	U570
Developed Black BH	AW	333
Developed Black N	AW	U571
Developed Black R	AW	U572
Developed Black W	AW	U573
Developed Blue GG	AW	U574
Developed Brown M	AW	U575
Developed Green F	AW	U576
Diamine Aldehyde Blue	C	A338
Diamine Aldehyde Scarlet	C	A339
Diamine Azo Blue	C	A340
Diamine Azo Bordeaux B	C	A341
Diamine Azo Scarlet (V.M.)	C	A342
Diamine Black (V. M.)	C	333b
Diamine Black BH	C	333
Diamine Black BO	C	403
Diamine Black HW	C	473
Diamine Black RO	C	328
Diamine Blue Black E	C	402
Diamine Blue (V. M.)	C	384a
Diamine Blue 2 B	C	337
Diamine Blue 3 B	C	391
Diamine Blue BX	C	386
Diamine Blue C 2 R	C	384
Diamine Blue 6 G	C	271
Diamine Blue 3 R	C	401
Diamine Blue RW	C	419
Diamine Brilliant Blue G	C	418
Diamine Brilliant Bordeaux R	C	319a
Diamine Brilliant Rubine	C	A343
Diamine Brilliant Scarlet	C	A344
Diamine Brilliant Violet	C	A345
Diamine Bronze G	C	448
Diamine Brown (V. M.)	C	344
Diamine Brown B	C	349
Diamine Brown M	C	344
Diamine Brown V	C	329
Diamine Catechine (V.M.)	C	A346
Diamine Catechine G	S	A716
Diamine Cutch	C	432
Diamine Dark Blue B	C	A347
Diamine Dark Green N	C	A348
Diamine Fast Black (V.M.)	C	A349
Diamine Fast Blue (V. M.)	C	A351
Diamine Fast Bordeaux	C	A352
Diamine Fast Brown (V.M.)	C	A353
Diamine Fast Gray	C	A354
Diamine Fast Orange (V.M.)	C	A355
Diamine Fast Red F & (V.M.)	C	343
Diamine Fast Scarlet (V.M.)	C	A357
Diamine Fast Violet (V.M.)	C	A358
Diamine Fast Yellow (V.M.)	C	617a
Diamine Fast Yellow 3 G	C	296
Diamine Gold	C	431
Diamine Golden Yellow	C	431
Diamine Gray G	C	241
Diamine Green (V. M.)	C	474a
Diamine Green B	C	474
Diamine Green G	C	475
Diamine Heliotrope (V. M.)	C	A360
Diamine Jet Black (V. M.)	C	A361
Diamine Neron (V. M.)	C	A362
Diamine New Blue	C	A363
Diamine Nitrazol Brown G	C	A364
Diamine Nitrazol Green	C	A365
Diamine Nitrazol Orange	C	A366
Diamine Orange (V. M.)	C	A367
Diamine Pure Blue	C	426
Diamineral Blue (V. M.)	C	A371
Diamineral Brown G	C	A372
Diamine Red (V. M.)	C	363a
Diamine Red B	A	366
Diamine Red 3 B	A	367
Diamine Rose (V. M.)	C	119
Diamine Rose FFB	C	121
Diamine Scarlet (V. M.)	C	319
Diamine Scarlet HS	C	319
Diamine Sky Blue FF	C	424

Name	Manufacturer	Serial No.
Diamine Sky Blue (V.M.)	C	A368
Diamine Violet N	C	327
Diamine Violet Red B	C	A369
Diamine Yellow (V.M.)	C	A370
Diamine Yellow CP	C	304
Diamine Yellow N	C	404
Diaminogen (V.M.)	C	274
Diaminogen Blue (V.M.)	C	273
Diaminogen Blue BB, NA	C	273
Diaminogen Sky Blue N	C	A373
Diamond Black	Var	275
Diamond Black AF, CY, EA, ET	By	275
Diamond Black F	B, L, By	275
Diamond Black FB	B, By	275
Diamond Black GA	By	275
Diamond Black GAF	B	275
Diamond Black P 2 B, PV, PVT	By	157
Diamond Blue R	By	164a
Diamond Blue Black EB	By	181
Diamond Bordeaux R	By	A222
Diamond Flavine G	By	102
Diamond Green	...	276
Diamond Green B	B	495
Diamond Green B	By	276
Diamond Green BX	B	495
Diamond Green G, GF, GN	B	499
Diamond Green 3 G	By	276
Diamond Green SS	By	276
Diamond Green special	By	276
Diamond Magenta	B	U128
Diamond Magenta I	B	U129
Diamond Phosphine (V.M.)	C	609b
Diamond Red BH	By	A223
Diamond Red G	By	A224
Diamond Violet BB	AW	U577
Diamond Yellow G	By	204
Dianil Black PR	M	491
Dianil Black R	M	479
Dianil Blue B	M	380
Dianil Blue G	M	415
Dianil Blue R	M	323
Dianil Blue 2 R	M	379
Dianil Crimson B	M	A427
Dianil Garnet B	M	332
Dianil Yellow 3 G	M	25
Dianil Yellow R	M	26
Dianil Yellow 2 R	M	27
Dianisidine Blue	M	408
Dianol Black (V. M.)	Lev	436a
Dianol Black BH	Lev	436a
Dianol Black E	Lev	436a
Dianol Black EX	Lev	436a
Dianol Black RO, RW	Lev	328
Dianol Blue 402	Lev	424a
Dianol Brilliant Blue G	Lev	424b
Dianol Brown CDFB	Lev	356a
Dianol Brown LF	Lev	356a
Dianol Fast Red K	BD	279
Dianol Fast Red FG	BD	343
Dianol Green B	Lev	474
Dianol Orange 217 A	Lev	356b
Dianol Orange Brown	Lev	356c
Dianol Orange Brown X	BD	356
Dianol Red B	Lev	357
Dianol Red 2 B	Lev	356
Dianthrene Blue 2 B	I	881
Diazanil BB	M	273
Diazanil Scarlet B	M	A428
Diazanil Scarlet 6 B	M	A429
Diazine Black	K	125
Diazine Black H	Sch	333
Diazine Black 1401	K	125
Diazine Green S	K	124
Diazo Black B, OB, OT	By	308
Diazo Black R	By	308
Diazo Black 10020	BK	308
Diazo Black BIIAD	S	333
Diazo Black BHN	By	333
Diazo Black BHN	WB	333
Diazo Blue X	By	A236
Diazo Blue Black RS	By	441
Diazo Bordeaux 7 B	By	A225
Diazo Brilliant Black	...	364
Diazo Brilliant Black B	By	364
Diazo Brilliant Orange GR	By	A226
Diazo Brilliant Scarlet B	By	A227
Diazo Brilliant Scarlet 3 B	By	A228
Diazo Brilliant Scarlet 6 B	By	A232
Diazo Brilliant Scarlet 2 BL	By	A230
Diazo Brilliant Scarlet 5 BL	By	A231
Diazo Brilliant Scarlet BG	By	A229
Diazo Brilliant Scarlet G	By	A233
Diazo Brilliant Scarlet PR	By	A234
Diazo Brilliant Scarlet PR	WD	A520
Diazo Brilliant Scarlet S 4 B	By	A235
Diazo Brown G	By	A237
Diazo Brown 3 G	By	A238
Diazo Brown 6 G	By	A239
Diazo Brown NR	By	A240
Diazo Brown 3 RB	By	A241
Diazo Fast Black	By	A242
Diazo Fast Black BHX	By	A243
Diazo Fast Black G	By	A244
Diazo Fast Black MG	By	A245
Diazo Fast Black SD	By	A246
Diazo Fast Black V	By	A247
Diazo Fast Bordeaux BL	By	A248
Diazo Fast Green GE	By	A249
Diazo Fast Red 7 BL	By	A250
Diazo Fast Violet BL	By	A251
Diazo Fast Violet 3 RL	By	A252
Diazo Fast Yellow G	By	A253
Diazo Fast Yellow 2 G	By	A254
Diazogene Black	AW	A541
Diazogene Black AB	AW	A542
Diazogene Black AD	AW	A543
Diazogene Black N	AW	A515
Diazogene Blue R	AW	A516
Diazogene Blue 2 R, 4585	K	A307
Diazogene Blue RD	AW	A547
Diazogene Garnet BB	AW	A548
Diazogene Red 8 B	AW	A549
Diazo Indigo Blue BR	By	274n
Diazo Indigo Blue 2 RL, 3 RL	By	274a
Diazomine Red L	CV	U730
Diazo Olive G	By	A255
Diazophenyl Black L	G	A613
Diazophenyl Blue BC	G	AB14
Diazo Pure Blue 3 GL	By	A255n
Diazo Rubine B	By	A256
Diazo Sky Blue 3 GL	By	A258
Diazo Sky Blue B	By	A257
Diazurine B	By	400
Dichroine Brown	Q	U790
Dicyanine	M	U431
Dimethyl-indigo	M	888
Dioxine	L	3
Diphene Blue B	A	695a
Diphene Blue R	A	690
Diphenylamine Blue	DH	520
Diphenyl Black	M	922
Diphenyl Black L	G	A615
Diphenyl Black RC	G	A616
Diphenyl Blue 3 BC	G	A617

Name	Manufacturer	Serial No
Diphenyl Blue BEC	G	A618
Diphenyl Blue BTC	G	A620
Diphenyl Blue BBEC	G	A619
Diphenyl Blue 2 R	G	A621
Diphenyl Blue Black	G	334
Diphenyl Brown BBNC BGN	G	348
Diphenyl Brown BN BVCN	G	348
Diphenyl Brown 3 GN 3 GNC	G	393
Diphenyl Brown GS	G	348
Diphenyl Brown RN	G	347
Diphenyl Brown TB	G	449
Diphenyl Catechine G	G	206
Diphenyl Chlorine Yellow FF	G	617
Diphenyl Chlorine Yellow G 229	G	18a
Diphenyl Chrysoine G, GC	G	14
Diphenyl Chrysoine 3 GN GOO	G	14
Diphenyl Chrysoine RR	G	205
Diphenyl Citronine G	G	12
Diphenyl Dark Green BC	G	A633
Diphenyl Deep Black GC	G	A622
Diphenyl Deep Black GN	G	A623
Diphenyl Deep Black GWC	G	A624
Diphenyl Deep Black VN	G	A625
Diphenyl Deep Black VP	G	A626
Diphenyl Fast Black	G	295
Diphenyl Fast Brown G, GNC ..	G	207
Diphenyl Fast Gray BC	G	A627
Diphenyl Fast Red	G	343
Diphenyl Fast Violet BC	G	A628
Diphenyl Fast Yellow extra	G	18
Diphenyl Fast Yellow G	G	18
Diphenyl Green BC	G	A629
Diphenyl Green G	G	467
Diphenyl Green 3 G	G	468
Diphenyl Green 3 GC, 3 GF	G	A629
Diphenyl Green NGW	G	467
Diphenyl Orange GG	G	13a
Diphenyl Orange RR	G	13
Diphenyl Red 8 B SC	G	358
Diphenyl Red 184 340	G	358
Diphenyl Scarlet 3 B	G	A634
Diphenyl Violet BVC	G	A635
Disulphine Blue 47073 DS	H	U753
Direct Black (V M)	H	442a
Direct Black ABC	AW	A500
Direct Black C	AW	A501
Direct Black D	K	U335
Direct Black D	Q	442a
Direct Black DB	K	U335
Direct Black E	I	A692
Direct Black FBS	By	A209
Direct Black FBS	CG	333a
Direct Black G	K	U335
Direct Black 3 G	S	442a
Direct Black 3 R	K	U335
Direct Black RC	By	A200
Direct Black RO	S	442a
Direct Black T	K	U335
Direct Black V	S	442
Direct Black VT	By	A261
Direct Black WC 3899 3919	K	U335
Direct Black 7065	CV	442a
Direct Black 8035	K	U335
Direct Black 14714	I	A693
Direct Black 33336	S	442a
Direct Blue	H	428a
Direct Blue (V M)	K	U336
Direct Blue A	K	U336
Direct Blue AB	Q	428a
Direct Blue B	I	428
Direct Blue 3 B	I	428a
Direct Blue 5 B	BK	379b
Direct Blue 5 B	Q	428a
Direct Blue 7 B 12 B BK, FF	K	U336
Direct Blue BX	I	428a
Direct Blue C G	AW	428a
Direct Blue 3 G	S	428a
Direct Blue GN	CG	428a
Direct Blue GRC N 2 B R 5 R	K	U336
Direct Blue R	I	397
Direct Blue RW	I	428a
Direct Blue WBB	WB	337
Direct Blue X 2 B	K	U336
Direct Blue 30	I	428a
Direct Blue 7079	CV	428a
Direct Blue 13108 13503	I	428a
Direct Blue 51096	H	428a
Direct Blue Black B	By	455
Direct Blue Black 313	Lev	455b
Direct Brilliant Blue S B	I	428b
Direct Brown	L	A502
Direct Brown (V M)	K	U337
Direct Brown B, H	K	U337
Direct Brown G	L	A503
Direct Brown 2 G		457
Direct Brown 3 GNC	G	A636
Direct Brown HB	I	A504
Direct Brown J JJB JP	I	486
Direct Brown M	I	344
Direct Brown N	L	A505
Direct Brown RW	Q	344a
Direct Brown TB	K	U337
Direct Catechine G	S	A717
Direct Catechine 30	S	A718
Direct Chrome Black 14722	I	A694
Direct Chrome Brown	AW	A552
Direct Cotton Blue GS RDB	K	U338
Direct Cotton Gray	K	U340
Direct Cotton Green 2 B	K	U339
Direct Cutch GG	I	A695
Direct Dark Brown M	L	344
Direct Dark Green	K	U341
Direct Dark Green S	I	478b
Direct Dark Violet BE	K	U342
Direct Deep Black E	A	A20
Direct Deep Black E	By	462a
Direct Deep Black EW	By	462
Direct Deep Black NTS	K	U343
Direct Deep Black RW	By	403
Direct Fast Black B	I	A696
Direct Fast Blue	AW	A553
Direct Fast Blue FFB	K	U344
Direct Fast Brown C GB	K	U345
Direct Fast Brown GG	By	A262
Direct Fast Gray RN	K	U346
Direct Fast Orange 16710	I	392c
Direct Fast Red F	I	343
Direct Fast Red 17727 25420	I	343a
Direct Fast Scarlet (V M)	I	A698
Direct Fast Scarlet 4 BS	S	U704
Direct Fast Scarlet 4 BS 8 BS	K	U347
Direct Fast Scarlet SE	I	279
Direct Fast Violet 3654	K	U348
Direct Fast Yellow	tM	617c
Direct Fast Yellow OO, R	GrE	617c
Direct Gray B	I	398
Direct Gray B J	P	681
Direct Gray R	I	354

Name	Manufacturer	Serial No	Name	Manufacturer	Serial No
reen	I	478a	Direct Yellow WII	WB	31'
reen B	CG	A444	Direct Yellow Z	O	9h
reen B	I S	478a	Direct Yellow 212	C C o	9
reen C	C G	A 115	Direct Yellow D 305	1	1001
reen G	CG	A446	Domingo Alizarin Black I I	1	A 504
reen G	S	475	Domingo Alizarin Blue G	1	A 508
reen 3 GG Y	I	478a	Domingo Alizarin Blue R	1	A 507
reen KGD	CG	A447	Domingo Alizarin Blue new	1	A 500a
reen U	Q	478a	Domingo Black 40 21	1.	A 510
reen 10865	CG	A 148	Domingo Blue Black B	1.	516
reen 9753, 34267	S	478a	Domingo Violet A	1.	83
ıdigo Blue A	I	439	Double Brilliant Scarlet G	(M o C)	171
ıdigo Blue BK	I	410	Double Ponceau R	By	108
ıdigo Blue BN	I	353	Double Ponceau 2 R	By	A 501
ıdone Blue R	S	443	Double Ponceau 4 R	By	A 61
avy Blue	K	U349	Double Scarlet	K	217
avy Blue B	K	U349	Double Scarlet extra S	A I cv	170
range BR G	S	302b	Drazalmo Alizarin	AW	A 1
range G	I	302	Drazalmo Black BH	AW	A 1
range H	G	11b	Drazalmo Blue 10 B	AW	A 58
range R	I	362	Drazalmo Blue 2 B H	AW	A 57
range R	K	11a	Drazalmo Blue GV	AW	A 58
range 6 R	L	A506	Drazalmo Blue I	AW	A 59
range 1901	BK	302b	Drazalmo Blue I I	K	U352
range 6693	I	302b	Drazalmo Blue I S	AW	A 580
ıre Blue	CG	U491	Drazalmo Blue R I.	AW	A 582
urple N	K	U350	Drazalmo Blue VVV	AW	A 63
ed	I S	307b	Drazalmo Blue Black HWI	AW	A 581
ed B	DH	307b	Drazalmo Bordeaux 6 B	AW	A 503
ed 3 B	S	307b	Drazalmo Brilliant Yellow	AW	A 585
ed N	K	U351	Drazalmo Brown G 3 B	AW	A5506
ed 215, 1725	I	307b	Drazalmo Brown I I.	AW	A 567
ıframine B	I	A699	Drazalmo Brown G	AW	A 568
arlet AB	Q	U500	Drazalmo Brown 3 G I	AW	A 569
arlet B	S	U705	Drazalmo Brown 4 J	AW	A 570
arlet 3 B	S	U704	Drazalmo Brown R	AW	A 571
arlet FB	BK	U180	Drazalmo Chlorine Yellow G	AW	A 572
ty Blue	I	A700	Drazalmo Diamond Violet BB	AW	A 573
ty Blue B	WB	420	Drazalmo Fast Blue 4 G I.	AW	A 574
ty Blue FF	S	A719	Drazalmo Fast Gray	AW	A 575
ty Blue 22	S	A720	Drazalmo Fast Red	AW	A 576
ty Blue 13108	I	A700	Drazalmo Fast Red I	AW	A 577
ty Blue, greenish		424	Drazalmo Fast Yellow B	AW	A 578
iolet B	H	413a	Drazalmo Garnet BB	AW	A 579
iolet BB	I	413	Drazalmo Garnet I I	AW	A 580
iolet R	CG	A440	Drazalmo Green BA	AW	A 581
iolet R	Q	352	Drazalmo Indigo Blue	AW	A 582
iolet R	I	352	Drazalmo New Red	AW	A 583
iolet RR	S	113a	Drazalmo New Red 10 B	AW	A 584
iolet 3653 4561	K	A398	Drazalmo Orange I L	AW	A 586
iolet 11508	CG	A450	Drazalmo Orange G	AW	A 589
iolet 12932 18510	I	413a	Drazalmo Orange R	AW	A 587
ellow (V M)	K	9b	Drazalmo Red I	AW	A 588
ellow B	A	9g	Drazalmo Red I L	AW	A 590
ellow BK	K	9b	Drazalmo Red I V	AW	A 591
ellow C	S	9e	Drazalmo Scarlet B	AW	A 592
ellow CA	H	9h	Drazalmo Sky Blue I I	AW	A 593
ellow CR	I	304b	Drazalmo Violet D	AW	A 594
ellow LGOO	GrE	A450	Drazalmo Violet N I.	AW	A 595
ellow P	Sch	9	Drazalmo Violet VB	AW	A 596
ellow G GBE GR	K	9b	Drazalmo Yellow R	AW	A 597
ellow G	L	304b	Drazalmo Yellow R	M	U133
ellow 2 G	K	9b	Drazalmo Yellow S	AW	A5508
ellow 6 G	S	9f	Drazanne Yellow I	AW	A5508
ellow GOO	GrE	A460	Duranthrene Blue C C		842
ellow MC	G	9d	Duranthrene Blue RS		848
ellow PC	Q	9h	Duranthrene Yellow		849
ellow PI	K	9b	Durindone Blue 4 B	BD	881
ellow R	By GrE	9	Durindone Blue 5 B	BD	882
ellow R	GrE	A461	Durindone Blue G B	BD	883
ellow 2 RF	Sch	9	Durindone Red B	BD	912
ellow TO	I	617b	Durindone Red N	BD	917
ellow V	AW	9e			

Name	Manufacturer	Serial No.
Durindone Scarlet R	BD	905
Dutch Yellow	FA	103
Eboli Blue B	L	389
Eboli Green	L	466
Eclipse Black C	G	720G
Eclipse Brown B	G	S141
Eclipse Brown GC	G	S142
Eclipse Brown R	G	S143
Eclipse Fast Brown BC	G	S144
Eclipse Fast Brown GC	G	S145
Eclipse Fast Brown 3 GC	G	S146
Eclipse Fast Brown 4 R	G	S147
Eclipse Fast Dark Brown BC	G	S148
Eclipse Fast Red Brown	G	S149
Eclipse Fast Red Brown E	G	S150
Eclipse Phosphine GGC	G	S151
Eclipse Phosphine RRC	G	S152
Eclipse Yellow G	G	S153
Eclipse Yellow 3 G	G	S154
Emine Red	A	123
Eosamine B, G	A	100
Eosine	Var	587
Eosine (V. M.)	Var	587
Eosine A	B, By	587a
Eosine AG	B	587a
Eosine AG, A 3 G, BB	M	587
Eosine BN, BNL	B	590
Eosine CA, W	B	587a
Eosine S, SP	B	589
Eosine Spirit Soluble	tM	588
Eosine (yellowish) 701	G	587
Era Black J	Lev	275
Ergane Yellow G	B	U130
Ergane Yellow R	B	U131
Ergane Yellow W	B	U132
Erganone Blue B	B	U133
Erganone Blue G	B	U134
Erganone Gray B	B	U135
Erganone Violet R	B	U136
Erica B	A, etc.	121
Erica BB	S	121
Erica BN	A	121
Erica G	A, Lev	122
Erica G	S	122a
Erica GN	A	122
Erica 2 GN	A	117
Erie Direct Black G, GX	Sch	462
Erie Direct Black R	Sch	463
Erie Direct Black RX	Sch	463
Erie Direct Brown GB	Sch	477a
Erie Direct Brown GR	Sch	477
Erie Direct Brown 3 RB	Sch	344
Erie Direct Brown RF, 2 RF	Sch	488
Erie Direct Green ET	Sch	464
Erie Direct Green MT	Sch	474
Erie Direct Green WT	Sch	464
Erie Orange 2 R	Sch	311
Erioazurine BC	G	A638
Eriocarmine 2 BC	G	A639
Eriochromal Brown EB	G	U612
Eriochromal Gray 5 G	G	U613
Eriochrome Azurol B, BC	G	551
Eriochrome Azural S	G	554
Eriochrome Black A	G	184
Eriochrome Black T	G	183
Eriochrome Blue Black B, BC	G	180
Eriochrome Blue Black G	G	180a
Eriochrome Blue Black R	G	181
Eriochrome Brown RC	G	A640
Eriochrome Brown SDE	G	A641
Eriochrome Brown V	G	A642
Eriochrome Cyanine R, RC	G	553
Eriochrome Geranol R	G	U614

Nams	Manufacturer	Serial No.
Eriochrome Green H	G	U615
Eriochrome Green L	G	U616
Eriochrome Green M	G	U617
Eriochrome Green O	G	U618
Eriochrome Olive G	G	U619
Eriochrome Phosphine R	G	133
Eriochrome Red AW, B	G	29
Eriochrome Verdon A, S	G	260
Eriochrome Violet B	G	A643
Eriochrome Violet 2 BL	G	A644
Eriochrome Yellow 2 G	G	A645
Eriochrome Yellow 3 G	G	A646
Eriochrome Yellow GR	G	A647
Eriochrome Yellow S	G	A648
Eriocyanine A, AC, R	G	531
Erio Fast Blue SWR	G	A637
Erioflavine SX	G	19
Eriofloxine 6 B	G	66
Eriofloxine 2 G	G	42
Erioglaucine	G	506
Erioglaucine A, AP, EP, X	G	506
Erioglaucine 49141	H	506
Erio Green B	G	564
Erio Green N	G	564
Erio Green Supra	G	564
Eriorubine B	G	A649
Erio Violet BC	G	U610
Erio Violet RLC	G	U611
Erioviridine B	G	503
Erweco Alizarin Acid Blue R	RWCo	357
Erweco Alizarin Acid Red BS	RWCo	781
Erythrine 7 B	B	255
Erythrine C	C	A374
Erythrine P	B	228
Erythrine RR	B	249
Erythrosine	M	592
Erythrosine A	M	592
Erythrosine B	M, etc.	592
Erythrosine G	B, L	591
Ethyl Acid Blue RR	B	63
Ethyl Acid Violet S 4 BXX	B	61
Ethyl Blue B	B	A 76
Ethyl Purple	B, etc.	518
Ethyl Violet	B, G	518
Ethyl Violet	M, I	518
Ethyl Violet 8682	I	518
Euchrysine (V.M.)	B	608
Euchrysine RR, GG, GNX, GRNT	B	608
Euchrysine NX, RT, RRD	B	608
Euchrysine 3R, 3 RX	B	603
Excelsior Black	AW	A600
Excelsior Lake Scarlet (V.M.)	C	A375
Excelsior Scarlet G	M	U434
Excelsior Scarlet 3 R	M	U435
Export Blue 1504	B	U137
Fast Acid Blue	...	562
Fast Acid Blue B	By	562
Fast Acid Blue 3 B	Q	562d
Fast Acid Blue R	M	584
Fast Acid Blue RH	H	584a
Fast Acid Eosine G	M	581
Fast Acid Fuchsine B	By	41
Fast Acid Green RH	H	503a
Fast Acid Magenta G	M	581a
Fast Acid Marine Blue HBBX	B	U138
Fast Acid Navy Blue GRI	I	U665
Fast Acid Phloxine A	M	581
Fast Acid Red A	M	581b
Fast Acid Red EB, EGG	L	67a
Fast Acid Red RH	H	67a
Fast Acid Violet	AW, C	580a

Name	Manufacturer	Serial No
Acid Violet		582
Acid Violet A 2 R	M	582
Acid Violet B	By	582
Acid Violet B	M	580
Acid Violet 3 B	K	U353
Acid Violet 10 B	By	528
Acid Violet 5RR	B	U139
Acid Violet R	K	U353
Acid Violet R, RBE	M	580a
Acid Violet RGE	M	582
Acid Violet RX	H	580a
Acid Violet 416	K	U353
Acid Yellow (V M)	C	23a
Acid Yellow RBE	M	U136
Acid Yellow RH	H	137a
Black	G	U622
Black	L	658
Black B	B	740
Black BS	B	741
Black N	B	160
Blue	tM	699
Blue A0000	GrE	699b
Blue B	A	697
Blue B	AW	699
Blue BB	G	U623
Blue 3 BB	GrE	699b
Blue O	M	699
Blue R	B K	699
Blue RD	A	619
Blue Z	G	U624
Blue 62105	A	649
Bordeaux B	BK	230a
Bordeaux G	BK	230a
Brilliant Acid Carmine	GrE	66e
Brilliant Black 12349	I	U666
Brown	A	172
Brown	By	213
Brown 3 B	A	172
Brown G	A	212
Brown GS	G	U625
Brown N	B	160
Brown O	M	211
Chrome Black	AW	U578
Chrome Black	H	275a
Chrome Black K	BK	U481
Chrome Blue FR	Q	U501
Cotton Blue 6 GO	I	U515
Cotton Yellow	WD	U511
Direct Yellow 22090	S	301b
Cosine L	B	500b
Garnet 5 B	AW	U577
Gray B	GrL	681
Gray RGB	GG	681
Green B	tM	U529
Green CR	By	523
Green bluish	By	523
Cne Blue 1	AW	U582
ene Green GG	AW	U583
ene Violet B	AW	U584
ene Violet R	AW	U585
ene Yellow	AW	U586
Leather Yellow 26855	By	U239
Light Green	By	523a
Light Orange G	By	38
Light Yellow G, 2 G, GGN	By	19
Light Yellow 3 G	B	U140
Light Yellow RG	By	19a
Mordant Black FH	M	275
Mordant Blue B	Lov	U737
Mordant Blue B	M	A430
Mordant Blue R	M	A431

Name	Manufacturer	Serial No
Fast Mordant Yellow	Var	294
Fast Mordant Yellow G	B	294
Fast Navy Blue	K	649
Fast Navy Blue A	GiE	649
Fast Navy Blue BNNOO, RZOO	GrE	649
Fast Neutral Violet B	C	678
Fast Orange I G	I	35
Fast Orange O	M	148
Fast Paper Yellow G	CG	U492
Fast Purple	AW	U580
Fast Pink BN GN	I	694
Fast Pink for silk	DH	694
Fast Ponceau L	By	A265
Fast Printing Green	K	2
Fast Printing Yellow R	By	U240
Fast Red A	Var	161
Fast Red A	B	A77
Fast Red	Var	168
Fast Red	Var	161
Fast Red A	WB	166
Fast Red ANSX	B	A78
Fast Red AV	B By	161
Fast Red B	B eto	112
Fast Red BN	B	112
Fast Red BT	By etc	111
Fast Red CJ	B	163
Fast Red D	Var	166
Fast Red IBS	B	A79
Fast Red NS	By	168
Fast Red O	M	161
Fast Red S	Sch	161
Fast Red VR	By	164
Fast Russian Green	WD	U515
Fast Sulfur Blue A R	AW	649
Fast Scarlet B	B	U141
Fast Scarlet B	K	248
Fast Scarlet BX	B	U142
Fast Scarlet BXG	B	U143
Fast Straw Yellow V	AW	A601
Fast Sulfon Black		264
Fast Sulfon Black F	S	264
Fast Sulfon Violet 5 BS	S	182
Fast Sulfon Violet 4 R	S	182
Fast Toluylene Red	GrI	358a
Fast Victoria Violet S 4 B	GoL	61d
Fast Violet R	AW	A602
Fast Wool Blue I	AW	U581
Fast Wool Scarlet 4 R	BK	U582
Fast Yellow	Var	137
Fast Yellow FY	Lov	137
Fast Yellow GR	CM	137
Fast Yellow N	P	150
Fast Yellow R	K BK	149
Fast Yellow S	C	137
Fast Yellow Y	B	149
Fast Yellow 95	Q	137
Fast Violet		626
Flavazine I 3 GL	M	20a
Flavazine L	M	19
Flavazine S	M	20
Flavazine T	M	20a
Flavinduline II O	B	608
Flavophosphine G 4 G, R	M	609d
Flavopurpurin		785
Fluorescein	Var	585
Formyl Violet (V M)	C	530
Fuchsine	P	U595
French Blue	Q	U502
French Red	P etc	U593
Fuchsine	Var	512
Fuchsine ASV	P	512
Fuchsine B	tM	512

Name	Manufacturer	Serial No
Fuchsine I	GrE	512
Fuchsine MB	tM	512
Fuchsine NB	Sch	513
Fuchsine S	B	524
Fuchsine TR	Sch	512
Fulling Orange 16700	I	250a
Fur Black DM	By	U241
Fur Gray 27903	By	U242
Furreine DB	I	923
Fuscamine		923
Gallamine Blue	G By	637
Gallamine Violet R B	DH	639
Gallazine A	DH	645
Gallazol Blue 4 G	G	U626
Gallcine	By etc	509
Galleine JRG paste	G	509
Galleine SR SW W	B	509
Gallocyanine	Var	626
Gallocyanine D	B	626
Gallocyanine DH	I	626
Gallocyanine I	B	626
Gallocyanine MS	DH	628
Galloflavine W	B	772
Gallo Green DH	DH	629
Gallophenin P	By	628a
Gallo Violet D	By	U243
Gallo Violet DF	By	U244
Gallo Sky Blue B		641
Gambine Y	H	2
Geranine 2B G	By	118
Geranium B	S	512
Gentiana Violet B	A	U4
Gentianine A	G	6796
Glacier Blue	I	501
Gloria Black N	By	U245
Glycine Corinth	Ki	310
Glycine Red	Ki	309
Golden Brown	A	288
Golden Orange	By	145
Gray NO	S	698a
Gray Blue 0095	K	U357
Green A	H	490a
Green BX	AW	U387
Green G	K	U394
Green HD	H	490a
Green PLX	B	4
Green VGW	B	U144
Green 21	S	U707
Green 241	O	U803
Green 15825	H	490a
Green Crystals DIIa	K	U396
Green Crystals D	CM	495
Green Crystals I	H	490
Green Crystals M	tM	495
Green Crystals X	K	U396
Green Crystals YD	H	495
Green Crystals IIa	K	U396
Green residue	K	U395
Green residue D	K	U395
Grela Red R	GrE	U507
Guernsey Blue O	M	539
Guinea Black 3 BL	A	U5
Guinea Bordeaux B	A	U6
Guinea Bordeaux 6 B	A	U7
Guinea Bordeaux BL	A	U8
Guinea Brown R	A	U9
Guinea Brown 2 R	A	U10
Guinea Carmine B	A	A22
Guinea Carmine D	A	A23
Guinea Cyanine LB	A	U11
Guinea Cyanine LG	A	U12
Guinea Cyanine LR	A	U13
Guinea Fast Green B	A	503
Guinea Fast Green 3 B	A	U15
Guinea Fast Green 2 G	A	U16
Guinea Fast Red BL	A	U17
Guinea Fast Red 4 BL	A	U18
Guinea Fast Red 2 R	A	U19
Guinea Fast Violet AL	A	U20
Guinea Fast Violet 10 B	A	U21
Guinea Green	Var	502
Guinea Green B G	A	502
Guinea Green 2 G	A	505
Guinea Red 4 R	A	A24
Guinea Violet	Var	530
Guinea Violet 4 B 6 B	A	530a
Guinea Violet S 4 B	A	530
Half Wool Blue 3 R	By	U246
Half Wool Green 63816	L	U519
Half Wool Green 63816 N 5	L	U520
Hansa Green G	M	U437
Hansa Rubine G	M	U438
Hansa Rubine O	M	U439
Hansa Yellow G	M	28
Hansa Yellow 5 G	M	U441
Hansa Yellow R	M	U442
Hat Black (V M)	C	A376
Hat Black A 4 AN	GrE	U508
Hat Black B	A	U22
Hat Black L, S	GrE	U508
Havana Brown S	C	U287
Helianthine	B	138
Helianthine G GG GTF, R	G	141
Heligoland Black BH	G	436
Heligoland Black FFNX	G	436
Heligoland Blue 6 B	G	424
Heligoland Blue RW	G	A453
Helindone Black RRG	M	921
Helindone Blue BB	M	880
Helindone Blue 3 GN	M	896
Helindone Blue 3 R	M	890a
Helindone Brown	M	904a
Helindone Brown AN	M	873
Helindone Brown CR	M	904a
Helindone Brown G	M	904
Helindone Brown 3 GN	M	836
Helindone Brown 2 R	M	902
Helindone Brown 5 R	M	903
Helindone Fast Scarlet C	M	907
Helindone Fast Scarlet R RC	M	915
Helindone Gray 2 B BR	M	921
Helindone Green G	M	892
Helindone Printing Black 2 RG	M	921a
Helindone Orange D	M	914
Helindone Orange GRN	M	835
Helindone Orange R	M	913
Helindone Pink	M	910
Helindone Pink AN, BN	M	910
Helindone Red B	M	917
Helindone Red 3 B	M	918
Helindone Scarlet S	M	916
Helindone Violet	M	920
Helindone Violet B BB	M	920
Helindone Violet D	M	808
Helindone Violet R	M	920
Helindone Yellow CG	M	810a
Helindone Yellow GG vat	M	810
Helindone Yellow 3 GN	M	810
Helindone Yellow RN	M	810a
Helio Bordeaux BL	By	A266
Helio Fast Blue BL	By	858
Helio Fast Red	By	73
Helio Fast Red RL TRL	By	73
Helio Fast Ruberine RL	By	A268
Helio Fast Violet AL	By	A269

Name	Manufacturer	Serial No
Helio Fast Yellow 8 GL	By	A270
Helio Red RM	By	A271
Helio Red RMT	By	A272
Heliotrope 2 B	A L By	321
Hessian Brilliant Purple	L	502
Hessian Brown BBN	L	489
Hessian Fast Red F	L	313
Hessian Purple N	By I	301
Hessian Yellow	L	305
Hoffmans Violet	P	511
Homophosphine G	L	100
Homophosphine OO	L	609
Hydranthrene Brilliant Copper D		813
Hydranthrene Dark Blue		763
Hydranthrene Olive R		791
Hydranthrene Yellow AG AR		849
Hydrazine Yellow OO	GrF	A102
Hydrazine Yellow SO	Grl	A103
Hydrazol Black	AW	A603
Hydrazol Black R	AW	A604
Hydrazol Chrome Black CB	AW	A605
Hydrazol Chrome Black DB	AW	A606
Hydron Blue (V M)	C	718
Hydron Blue G R		718
Hydron Brown (V M)	C	718a
Hydron Olive G	C	718b
Hydron Violet	C	718c
Hydron Yellow G	C	718d
Hyhdine Ponceau 2 R	G	U627
Hyhdine Ponceau 2 R	tM	U532
Immedial Black (V M)	C	724
Immedial Blue (V M)	C	724a
Immedial Bordeaux G	C	731
Immedial Brilliant Black B	C	720
Immedial Brilliant Carbon F, FG	C	720
Immedial Brilliant Green G	C	869
Immedial Brown (V M)	C	725
Immedial Carbon (V M)	C	720
Immedial Cutch	C	870
Immedial Cutch (V M)	C	871
Immedial Dark Brown (V M)	C	725
Immedial Dark Green B	C	873
Immedial Deep Green G	C	874
Immedial Direct Blue (V M)	C	875
Immedial Green (V M)	C	746
Immedial Green Blue	C	746
Immedial Indogene (V M)	C	876
Immedial Indone (V M)	C	733
Immedial Indone Violet B	C	733a
Immedial Khaki	C	877
Immedial Maroon B	C	739
Immedial New Blue G	C	878
Immedial Olive (V M)	C	879
Immedial Orange C, N	C	711
Immedial Purple C	C	880
Immedial Sky Blue	C	728
Immedial Violet C	C	881
Immedial Yellow (V M)	C	710
Immedial Yellow Olive (V M)	C	882
Imperial Green GI	By	A273
Imperial Scarlet 3 B	By	247
Imperial Yellow R	By	7b
Indalizarin I J R	DH	633
Indalizarin Green	DH	634
Indamine 3 R	CG	704
Indamine 6 R	CG	705
Indamine Blue	M	696
Indanthrene ..	B	837
Indanthrene NN	B	873a
Indanthrene Black	B	768a
Indanthrene Black B BB	B	768a
Indanthrene Blue 3 G	B	840
Indanthrene Blue GC	B	843
Indanthrene Blue GCD	B	842
Indanthrene Blue GGS GGSI	B	841
Indanthrene Blue GG SF	B	841
Indanthrene Blue 3 GP	B	840
Indanthrene Blue R	B	837
Indanthrene Blue RS	B	838
Indanthrene Blue WB	B	850
Indanthrene Blue WR	B	850a
Indanthrene Blue Green B	B	765a
Indanthrene Bordeaux B	B	828
Indanthrene Bordeaux B extra	B	827
Indanthrene Brown	B	867
Indanthrene Brown B	B	867
Indanthrene Claret B	B	828
Indanthrene Claret B extra	B	827
Indanthrene Copper R	B	813
Indanthrene Dark Blue BD	B	763
Indanthrene Dark Blue BO	B	763
Indanthrene Dark Blue BF	B	846
Indanthrene Fast Blue RR	B	837a
Indanthrene Gold Orange G	B	760
Indanthrene Gold Orange R	B	761
Indanthrene Gold Orange RS	B	761
Indanthrene Gold Orange 2 RT	B	761
Indanthrene Gray B BP	B	848
Indanthrene Green B	B	775
Indanthrene Maroon R	B	845
Indanthrene Olive G	B	791
Indanthrene Orange RF	B	812
Indanthrene Pink B	B	873b
Indanthrene Red BN	B	831
Indanthrene Red G	B	826
Indanthrene Red R	B	830
Indanthrene Red Brown R	B	873c
Indanthrene Red Violet RRN	B	873d
Indanthrene Scarlet G, GS	B	762
Indanthrene Violet B	B	768
Indanthrene Violet R	B	766
Indanthrene Violet RN	B	832
Indanthrene Violet RR	B	767
Indanthrene Violet RT	B	764
Indanthrene Violet Yellow G P	B	849a
Indanthrene Yellow G GP	B	849
Indazine M	C	689
Indazurine B	I	414
Indazurine BB	I	429
Indazurine GM	I	427
Indazurine 5 GM	I	430
Indazurine RM	I	396
Indazurine 3S	I	399
India Rose 17285	I	U667
Indian Red	G	U628
Indian Yellow (V M)	C	141b
Indian Yellow G GN	By	141
Indian Yellow R	By	140
Indigene R	AW	697
Indigene Blue BB	I	A701
Indigene Blue R	I	A702
Indigo	Var	874
Indigo paste	Var	874
Indigo powder	Var	874
Indigo solution	M	874
Indigo TBP	By	874
Indigo G	B	888

Name	Manufacturer	Serial No.
Indigo 7 G	By	874
Indigo KB paste	K	881
Indigo KG	K	883
Indigo MLB	M	874
Indigo MLB 2 B	M	880
Indigo MLB 4 B	M	881
Indigo MLB 5 B	M	882
Indigo MLB 6 B	M	883
Indigo MLBR, MLBRR	M	879
Indigo MLBT	M	888
Indigo MLB Vat I	M	876
Indigo NC	By	874
Indigo RB	B	880
Indigo T	...	888
Indigo Acid Blue A	Q	545
Indigo Blue N	C	874
Indigo Blue 275	CJ	874
Indigo Carmine Blue BG	A	U23
Indigo Extract A, AN 4	B	877
Indigo Salt T	K	875
Indigo Yellow 3 G	I	889
Indigo White	B	876
Indigotine	Var	877
Indigotine P	B	878
Indigotine 500	A	877
Indo Carbon	C	748
Indochromine	...	667
Indochromine RR, T	S	667
Indochromine Black EXD	S	667a
Indochromogen S		666
Indocyanine B, 2 RF	A	705a
Indocyanine B	G	699c
Indoine	WD	126
Indoine Blue	Sch	126
Indoine Blue R	B	126
Indophenol	DH	619
Indo Violet BF	A	U24
Induline	Var	699
Induline	Var	697
Induline B	By	699
Induline 2 B	CJ	699
Induline BA	P	697
Induline DB, N	tM	699
Induline NN	B	699
Induline NBL	By	699
Induline RN	K	699
Induline S	I	697
Induline WLX	B	699
Induline 1768, 1778	K	699
Induline 10350	I	697
Induline 38724, 38725	H	699
Induline Black base 5789	K	700
Induline Red (V. M.)	K	699a
Induline Scarlet (Iris Blue)	B	671
Induline Spirit Soluble	Var	697
Induline Water Soluble	Var	699
Ingrain Black	H	A759
Ingrain Black 4 B	H	A758
Ink Blue BJTBNOO	GrE	U509
Ink Blue BJTNO	GrE	U509
Ink Blue BNOO	GrE	U509
Intensive Blue B	By	562
Iris Blue	B	648
Irisamine	C	576
Irisamine G	C	576
Irisamine G ex	S	576
Isamine Blue (V. M.)	C	U288
Isodiphenyl Black R	G	437
Isopurpurin	...	784
Italian Green	...	709
Janus Brown B	M	435
Janus Gray B	M	128
Janus Red B	M	240
Janus Yellow	...	221
Janus Yellow G	M	222
Japan Black	B	U145
Japan Black B	B	U146
Japan Black M	B	U148
Japan Black MBG	B	U149
Japan Black MF	B	U150
Jasmine	G	U629
Jasmine high conc	G	140
Jaune Métanile Bromé	P	135
Jet Black APX	B	U151
Jet Black R	By	262
Jet Black RR	B	U152
Jute Black B	By	U153
Jute Black I	tM	U533
Jute Black RNT	B	U153
Jute Coal Black S	By	U154
Katigene Black (V. M.)	By	720
Katigene Black Brown BW	By	S39
Katigene Black Brown GN	By	S40
Katigene Black Brown R	By	S41
Katigene Blue Black 4 BPA	By	720
Katigene Brilliant Black B, FG	By	720
Katigene Brilliant Green 3 G	By	S43
Katigene Brown 2 R	By	S45
Katigene Brown V	By	S46
Katigene Chrome Blue 5 G	By	S47
Katigene Cutch B	By	S48
Katigene Deep Black B	By	720
Katigene Direct Blue B	By	S49
Katigene Direct Blue RF	By	S50
Katigene Green	By	746
Katigene Green 2 B, 4 B, 2 G, MK	By	746
Katigene Indigo	By	S51
Katigene Indigo B	By	S52
Katigene Indigo G	By	S53
Katigene Indigo 3 GT	By	S54
Katigene Khaki G	By	S55
Katigene Olive GN	By	S56
Katigene Olive Brown R	By	S57
Katigene Red Brown R	By	S58
Katigene Red Brown 3 R	By	S59
Katigene Violet B	By	S60
Katigene Violet 3 R	By	S61
Katigene Yellow G	By	S62
Katigene Yellow GG	By	S63
Katigene Yellow GR	By	S64
Katigene Yellow Brown GG	By	S65
Katigene Yellow Brown GR	By	S66
Katigene Yellow Brown 9 R	By	S67
Katigene Yellow Brown RL	By	S68
Ketone Blue 4 BN	M	547
Ketone Fast Violet 10 B	I	528
Kiton Blue N	I	U668
Kiton Blue V	I	543
Kiton Fast Green V	I	504
Kiton Fast Orange G	I	U669
Kiton Red 6 B	I	U672
Kiton Red G	I	U673
Kiton Fast Violet 10 B	I	528
Kiton Violet 12 B	I	U674
Kiton Fast Yellow 3 G	I	U670
Kiton Fast Yellow R	I	U671
Kiton Yellow G	I	U675
Kiton Yellow GG	I	U676
Kraft Brown L	B	U155
Kraft Brown basic YZ	B	U155
Kryogene Black BNX	B	755
Kryogene Black TBO, TG	B	720
Kryogene Black TGE, TGO	B	720
Kryogene Black TGO	B	756

Name	Manufacturer	Serial No
Kryogene Blue BNO	B	753
Kryogene Brown A	B	743
Kryogene Brown A, G	B	750
Kryogene Brown GX	B	750
Kryogene Brown R B, RBNXX	B	751
Kryogene Brown RXX	B	751a
Kryogene Direct Blue B	B	753
Kryogene Direct Blue 3 B	B	754
Kryogene Direct Blue BNAGX	B	753
Kryogene Direct Blue G, GO	B	752
Kryogene Green GX	B	754a
Kryogene Pure Blue R	B	729
Kryogene Red Brown GRXX	B	751b
Kryogene Violet 3 RX	B	754b
Kryogene Yellow		712
Kryogene Yellow G, GG	B	712
Kryogene Yellow R	B	716
Lacquer Black R	A	U25
Lake Black C	C	U289
Lake Black P	G	U630
Lake Blue ABII	M	U143
Lake Blue ABOII	M	U114
Lake Blue AV	M	U115
Lake Blue AVO	M	U146
Lake Blue I	B	U156
Lake Blue RT	BK	U153
Lake Bordeaux B	M	179
Lake Purple 3 P	B	U157
Lake Red	Var	153
Lake Red C	M	153
Lake Red D	M	200
Lake Red P	M	132
Lake Scarlet	C	A377
Lake Scarlet Red D	M	A435
Lake Yellow 28227	By	U247
Lanacyl Blue B BB	C	187
Lanacyl Violet B BT	C	186
Lanafuchsine (V M)	C	64
Leather Black (V M)	C	U200
Leather Black BO	B	U158
Leather Black CR	B	U159
Leather Black I	I	U677
Leather Black	K	U358
Leather Black R	tM	U535
Leather Black T	M	U147
Leather Black 3553	GrD	U511
Leather Brown	GrD	208
Leather Brown	K	U351
Leather Brown GG	By	U218
Leather Brown I X	Lev	283a
Leather Brown R	I	283a
Leather Flavine 9118	I	600g
Leather Flavine 9118 ..	S	600g
Leather Gold 5902	BK	U481
Leather Olive 71930	A	U26
Leather Orange	Sch	211
Leather Orange B	Lev	U738
Leather Orange BY	Lev	U739
Leather Red O	M	U148
Leather Yellow A	GrD	606
Leather Yellow I G FU	Q	606
Leather Yellow G	Var	606
Leather Yellow 2 G 3 G	CG	606
Leather Yellow GC GS, M	GrD	606
Leather Yellow GN	AW	606
Leather Yellow NL	BK	606
Leather Yellow O	M	606
Leather Yellow P	tM	606
Leather Yellow R FG	Q	606
Leather Yellow 1BR	tM	606
Leather Yellow 582Sa	L	606
Lemon Yellow R	K	U360
Leuco Gallo Thionine DH	DH	664
Leucol Dark Green B	By	866
Leucol Brown B	By	872
Light Blue	tM	521
Light Blue G	tM	539
Light Blue Superfine Spirit Soluble	M	520
Light Green A ex conc	tM	503
Light Green 2 A	tM	518
Light Green 2 G conc	B	505
Light Green SF	B	504
Light Green SF	B	505
Light Green SF Bluish	B	504
Light Green SF Yellowish	B	505
Light Green SF Yellowish	Q	505
Light Green SL	B	505
Light Green Yellowish		505
Lilac PC	DH	U599
Lilac PC	G	U631
Liquid Oil Black N	tM	U536
Lissome Green	H	566
Lithol Claret B	B	A80
Lithol Fast Orange R	B	A82
Lithol Fast Scarlet B G RN	B	73a
Lithol Fast Scarlet R	B	73
Lithol Red 3 B GG, 3 G	B	173a
Lithol Red R	B	173
Lithol Red RG RS	B	173a
Lithol Rubine B BN G RG	B	152
Magenta	Var	512
Magenta A	B	512
Magenta AB	B	512
Magenta B	C	512
Magenta I ABS	H	512
Magenta L, S	B	512
Magenta IP	tM	512
Magenta (acetate)	B	512
Magenta crystals	Var	512
Magenta crystals 3	tM	512
Magenta crystals II	tM	512
Malachite Green	Var	495
Malachite Green (V M)	Var	495
Malachite Green Base	Var	495
Marine Blue B	I	537
Marine Blue RR	tM	U537
Maroon	By	512
Maroon Conclu	Q	512
Mars Red AX GX	B	163
Martius Yellow	A BK	6
Martius Yellow 741	G	6
Martius Yellow 6749	BK	6
Mauve	P etc	688
Melanogene Blue	M	715
Melanthorine BII	I	333
Melanthorine III	I	333c
Melanthorine RO	I	328
Melanthorine 11818, 12760	I	333c
Melanthorine Black BII	I	333
Meldola's Blue		649
Meldola's Blue 3 R	S	649
Melogene Blue BII	S	438
Mercerine Wool Scarlet 5 B	II	U756
Mercerol Brown 3 R	II	U754
Mercerol Orange 2 R	II	U755
Meridian Black AL	S	U708
Meridian Black AN	S	U709
Metachrome Blue B	A	U27
Metachrome Blue G	A	U28
Metachrome Blue Black 2 B	A	U29
Metachrome Blue Black 2 BX	A	U30
Metachrome Bordeaux R	A	92
Metachrome Brown B	A	89

Name	Manufacturer	Serial No
Metachrome Brown BL	A	U31
Metachrome Brown BRL	A	U32
Metachrome Olive B	A	A25
Metachrome Olive Brown G	A	A26
Metachrome Orange R	A	58
Metachrome Orange 3 R	A	U33
Metachrome Red G	A	U34
Metachrome Violet B	A	U35
Metachrome Violet 2 R	A	U36
Metachrome Yellow RA	A	A27
Metamine Brown	S	U710
Metanil Yellow	Var	134
Metanil Yellow (V M)	Var	134
Metanil Yellow Brominated	P	135
Metanil Red 3 B	By	A274
Meta-Nitraniline Orange	M	46
Meta-phenylene Blue B 2 B	C	691
Meta-phenylene Blue R	C	690
Methyl Alkali Blue	B etc	535
Methyl Alkali Blue Pure	I	535
Methyl Blue	tM	537
Methyl Blue	A C	538
Methyl Blue MBS	GrE	537
Methyl Blue for silk	GrE M	537
Methyl Eosine	B	588
Methyl Gallus Blue	G	U632
Methyl Green	P etc	519
Methyl Indone B	C	127
Methyl Lyons Blue	G	537
Methyl Orange	tM etc	138
Methyl Silk Blue (new)	G	537
Methyl Soluble Blue 3 S	B etc	U160
Methyl Violet	Var	515
Methyl Violet B	Var	515
Methyl Violet BB	Var	515
Methyl Violet 3 B	tM	515
Methyl Violet 4 B	M tM	515
Methyl Violet 5 B	By, etc	517
Methyl Violet 5 B	tM	515
Methyl Violet 6 B	B	517
Methyl Violet 6 B	M	515
Methyl Violet 7 B	By tM	517
Methyl Violet base 7 B	BK	517
Methyl Violet B BBM	M	515
Methyl Violet 3 BHN	tM	515
Methyl Violet BIA 2 BIA	tM	515
Methyl Violet 2 BP 3 BIA, 5 BIA	tM	515
Methyl Violet 2 BN 6 BN	tM	515
Methyl Violet 4 BOOATN	GrE	515
Methyl Violet DB	tM	515
Methyl Violet IB IBA	By	515
Methyl Violet N, NY 147	B	515
Methyl Violet R 3 R	M, tM	515
Methyl Violet 5 R	Var	515
Methyl Violet 5 RA	tM	515
Methyl Violet RIA	tM	515
Methyl Violet 5 RO	B	515
Methyl Violet 129	K	515
Methyl Violet base	B	515
Methyl Violet base BB	K	515
Methyl Violet base 74418	H	515
Methylene Blue	Var	659
Methylene Blue AN, BB	B	663
Methylene Blue B	Var	659
Methylene Blue 2 B	Var	659
Methylene Blue BA	tM	659
Methylene Blue BEX	B	659
Methylene Blue 2 BD	A	659
Methylene Blue BG	B	659
Methylene Blue BG	tM	659
Methylene Blue BGN	B	659
Methylene Blue BX	A	659
Methylene Blue D	I	659
Methylene Blue DBBM, DDBM	M	659
Methylene Blue FKII	K	659
Methylene Blue G	I	659
Methylene Blue HGG	B	659
Methylene Blue L	K	659
Methylene Blue MD	B	659
Methylene Blue MDX	B	659
Methylene Blue MEDZ	M	659
Methylene Blue MNX	B	663
Methylene Blue 3 R	M	659
Methylene Blue S	CR	659
Methylene Blue VN	B	663
Methylene Blue 15746	P	659
Methylene Blue 52067	tM	659
Methylene Gray ND O	M	681
Methylene Green	K S	660
Methylene Green B BX	B	660
Methylene Green BX	K	660
Methylene Green G	S	660
Methylene Green N, O	M	660
Methylene Green P	G I	660
Methylene Green 1 W	G	660
Methylene Green 247	K	660
Methylene Heliotrope O	M	687
Methylene SZO	DH	659
Methylene Violet	Var	680
Methylene Violet B	DH	680
Methylene Violet BN	M	680
Methylene Violet 2 R	H	680
Methylene Violet 3 RA	K	680
Methylene Yellow H	M	618
Mikado Brown 2 B M	L	11
Mikado Golden Yellow 6 G S G	L	10
Mikado Orange (V M)	L etc	11
Mikado Orange 4 RC	A	11
Mikado Orange 4 RO	A, L	11
Mikado Yellow		10
Milling Blue	K	693
Milling Blue BC	K	693
Milling Blue GR	A	U 37
Milling Blue 2 R	M	A436
Milling Blue 5 R	A	U38
Milling Brown G	L	U521
Milling Brown BW	L	503
Milling Green DB DS	AW	523b
Milling Orange	WD	250
Milling Orange G	A	U39
Milling Orange G	By	A275
Milling Orange JN	WD	250
Milling Orange RO	L	58
Milling Orange 88	WD	250
Milling Red	A	U40
Milling Red G	C	293
Milling Red 4 BA	A	493
Milling Red 6 BA	A	U41
Milling Red GA	A	U42
Milling Red R	WD	298
Milling Scarlet B G	M	400b
Milling Scarlet BS	ClCo	484
Milling Scarlet 4 R	M	400
Milling Yellow (V M)	C	A378
Milling Yellow 3 G	A	U43
Milling Yellow GA	A	U44
Milling Yellow 3 GO	CV	177
Milling Yellow H HG, H 3G	M	177c
Mimosa	G	198
Mimosa C R Z 2	G	198
Mineral Blue	C	U291
Modern Azurine DH	DH	640
Modern Blue	DH	629

Name	Manufacturer	Serial No
Modern Cyanine	DH	627
Modern Violet	DH	635
Modern Violet N	DH	624
Monochrome Black I	By	U249
Monochrome Black Blue G	By	U250
Monochrome Blue 5 R	By	U251
Monochrome Brown BX	By	U252
Monochrome Brown G	By	U253
Monochrome Brown V	By	U254
Mordant Blue 13707	I	A703
Mordant Yellow GD, GS, R	B	177
Mordant Yellow GTS	B	48
Mordant Yellow O	M	177
Mordant Yellow 3 R	B	58
Muscarine	DH	655
Nako Blue Black B	M	923a
Nako Black DBB O	M	923a
Nako Brown B DR, 3 GA	M	923a
Nako Brown 3 GN P, RH	M	923a
Nako Gray B 6 B	M	923a
Nako Yellow O	M	923a
Nankin	tM	606g
Naphthalene Acid Black 4 B	By	258
Naphthalene Black D	H	U758
Naphthalene Black 12 B	H	217
Naphthalene Blue B	M	A437
Naphthalene Blue DL	M	A438
Naphthalene Green	M	564
Naphthalene Green V	M I	564
Naphthamine Black RE	K	335
Naphthamine Blue (V M)	K	338
Naphthamine Blue 2 B 3 B	K	338
Naphthamine Brilliant Blue G	K	379a
Naphthamine Brilliant Blue 3	K	379a
Naphthamine Brown	K	477a
Naphthamine Brown 4 G	K	477
Naphthamine Deep Black HW	K	335a
Naphthamine Direct Black (V M)	K	458
Naphthamine Direct Blue BXR	K	A399
Naphthamine Direct Blue ER	K	A399
Naphthamine Direct Blue 2 R 3 R	K	A399
Naphthamine Direct Blue 3092	K	A399
Naphthamine Direct Green AG	K	A400
Naphthamine Fast Black (V M)	K	U362
Naphthamine Fast Black KS	K	U361
Naphthamine Fast Bordeaux BG	K	U363
Naphthamine Fast Scarlet (V M)	K	U364
Naphthamine Green (V M)	K	A401
Naphthamine Orango (V M)	K	A402
Naphthamine Red 3605 H	K	343
Naphthamine Scarlet	K	U365
Naphthamine Violet BE	K	320
Naphthamine Violet R	K	327b
Naphthamine Yellow (V M)	K	9a
Naphthamine Yellow R, X	K	9a
Naphthazine Blue	WD	692
Naphthazine Navy Blue 150	WD	692a
Naphthazurine B BA	GrE	383
Naphthazurine 3703	K	383
Naphthochrome Violet R	I	U678
Naphthoform Black 3930	K	U366
Naphthogene Blue B	A	A28
Naphthogene Blue 2 R	A	A29
Naphthogene Blue 4 R	A	A30
Naphthogene Blue 6 R	A	A31
Naphthogene Indigo Blue R	A	U45
Naphthogene Pure Blue 4 B	A	U46
Naphthol Black (V M)	C	272a
Naphthol Black (V M)	K	269a
Naphthol Black A	K	269a
Naphthol Black B	C	272
Naphthol Black 2 B	By	269d
Naphthol Black 3 B	CV	272a
Naphthol Black 6 B	C K	269
Naphthol Black BR	tM	269
Naphthol Black CR, MB, N, IR	K	269a
Naphthol Black greenish	K	296a
Naphthol Blue	C	A379
Naphthol Blue 2 R	tM	649
Naphthol Blue Black (V M)	Var	217
Naphthol Blue Black M	By	217
Naphthol Blue Black 6 B	BK	217
Naphthol Dark Green G	C	U292
Naphthol Green	tM	4
Naphthol Green B	By, C	4
Naphthol Orange	Var	144
Naphthol Pink		98
Naphthol Red (V M)	C	168
Naphthol Red GR	B	166
Naphthol Red S	B	168
Naphthol Yellow	I	7
Naphthol Yellow S	Var	7
Naphthol Yellow SL	B By	7
Naphthol Yellow SLC SLZ	M	7
Naphthylamine Black D	C, K	206
Naphthylamine Black (V M)	C, K	266
Naphthylamine Black 4 AN, 4 B	By	217d
Naphthylamine Black 10 B	By	217
Naphthylamine Black 4 BK	By	217d
Naphthylamine Red 3 BM	B	168a
Naphthylamine Black B 2 N	K	266a
Naphthylamine Black 6 BN	By	217d
Naphthylamine Black BOO	K	266a
Naphthylamine Black 4 BX	B	266a
Naphthylamine Black CSR CSB	By	217d
Naphthylamine Black I	By	217d
Naphthylamine Black NA	K	266a
Naphthylamine Black NSBN	K	266a
Naphthylamine Black SX	B	266a
Naphthylamine Black 2002, 2003	K	266a
Naphthyl amine Blue Black	C	A380
Naphthylamine Blue 2 B	K	338
Naphthylamine Blue 3 B	K	338
Naphthyl amine Brown	B	160
Naphthylamine Green I	By	A27b
Naphthylamine Sky Bl (DD	NT	A530
Naphthylamine Yellow	K	6
Naphthyl Blue Black N	C	265
Naphthylene Violet	C	432
Navy Blue	C	A381
Navy Blue D	I S	537a
Navy Blue F.	AW	537
Navy Blue GR, 5 R	CV	537a
Navy Blue 17184..	K	U367
Navy Blue SM	P	537a
Navy Blue T	AW	537
Neotolyl Black B	M	U450
Neotolyl Black BB	M	U451
Neotolyl Black 4 B	M	U452
Neotolyl Black TL	M	U453

Name	Manufacturer	Serial No
Neotolyl Black VL	M	U454
Neptune Blue B	B	545
Neptune Blue BG, BGN, BGX	B	543
Neptune Blue BR BTE R	B	545a
Neptune Blue BXX	B	545
Neptune Brown RX	B	U161
Neptune Green	B	503
Neptune Green SAX SBL SGX	B	503
Nerazine (V M)	C	U293
Nerol B	A	A32
Nerol 2 B	A	A33
Nerol BL	A	A34
Nerol 2 BL	A	A35
Nerol VL	A	A36
Neutral Blue	C	676
Neutral Blue R	AW	676
Neutral Blue 3 R	M	U455
Neutral Gray		221
Neutral Gray G	A	241
Neutral Red	C	670
Neutral Violet	C	669
Neutral Violet O	M	U456
New Acid Chrome Black R	AW	A607
New Chrome Black PK	CV	275a
New Blue B G	C etc	650
New Blue R	Var	649
New Blue RR RG	B	649
New Claret B	B	A83
New Claret P	B	A8o
New Claret R	B	A86
New Coccine	A	169
New Direct Blue S	K	U368
New Ethyl Blue BS	M	U457
New Ethyl Blue RS	M	U458
New Fast Blue F H	By	652
New Fast Blue R RS	I	652a
New Fast Gray	By	681
New Fast Green 2 B	I	497
New Fast Pink F	By	652
New Fast Straw Yellow	AW	A608
New Fuchsine O	M	513
New Fuchsine S	GrE	513
New Magenta O	GrE	513
New Magenta O	M	512
New Methylene Blue (V M)	C	663
New Methylene Blue F	By	663
New Methylene Blue GG	C	651
New Methylene Blue NNX	B	663
New Nigrosine	AW	700
New Patent Blue B	By	563
New Patent Blue GA	By	545b
New Phosphine G	C	75
New Polychromine FB	G	616
New Toluylene Brown OO	GrE	A465
New Toluylene Brown O	GrE	A464
New Toluylene Brown R	GrE	A466
New Victoria Black B	By	262
New Victoria Blue B	By	558
New Yellow for Cotton	WD	304
Niagara Black Blue R	Sch	441
Niagara Blue B 2 B	Sch	337
Niagara Blue 4 B	Sch	426
Niagara Blue 6 B	Sch	424
Niagara Blue BR	Sch	386
Niagara Blue GW, HW RW	Sch	336
Niagara Blue R	Sch	326
Niagara Fast Red FD	Sch	343
Niagara Violet 2 B	Sch	326
Niagara Violet 3 R	Sch	327
Nicholson Blue 4 B	P	536
Night Blue	B, I S	o60
Night Green A	tM	503
Nigramine	CG	682
Nigrophor	B	218
Nigrosine	Var	698
Nigrosine	Var	700
Nigrosine (V M)	Var	698
Nigrosine (V M)	Var	700
Nigrosine spirit soluble	Var	698
Nigrosine water soluble	Var	700
Nigrosines from aniline (indulines)	Sch	699
Nigrosines from nitrobenzol	Sch	700
Nile Blue A B, R	B	653
Nile Blue 2 B	B	654
m Nitraniline Orange	M	46
Nitro Azomine Green F	CV	A730
Nitrophenine	ClCo	51
Nitrosamine Pink BXF	B	98
Nitroso Blue MR	M	647
Nitrosamine Red	B	56
Nyanza Black B	A	245
Oil Black (V M)	CJ	U495
Oil Black (V M)	K	U369
Oil Black 6 B	B	U163
Oil Black 6 G	B	U164
Oil Black HG	B	U165
Oil Black 11410 39694	H	U759
Oil Blue	B	U166
Oil Blue Black 114	K	U370
Oil Brown BG	K	U371
Oil Color Brown	H	U760
Oil Color Canary	H	U761
Oil Color Yellow	H	U762
Oil Orange	Var	36
Oil Orange (V M)	K	U372
Oil Orange AR	K	U372
Oil Orange LG	I	36a
Oil Orange R	B	U167
Oil Orange 3 R	B	U168
Oil Orange 2311	Sch	36
Oil Red (V M)	K	U373
Oil Red B	B	U169
Oil Red G	B	U170
Oil Red 7327	CJ	U496
Oil Yellow	Var	32
Oil Yellow (V M)	K	U374
Oil Yellow A	Sch	31
Oil Yellow G	B	U171
Oil Yellow R	B	U172
Oil Yellow 2338	Sch	36a
Oil Yellow 2625	Sch	32
Oil Yellow 2681	Sch	68
Oil Yellow 7869	I	32a
Old Gold	Q	US04
Oleate Green O	Q	US05
Omega Chrome Cyanine R	S	U711
Omega Chrome Red B	S	U712
Omega Chrome Black PV	S	85
Opal Blue	M	521
Opaline Blue R	I	U679
Orange A	Sch	11o
Orange D	B	37a
Orange G	Var	38
Orange G	K	139a
Orange 2 G	H	38
Orange GC	K	139a
Orange GD	L	144a
Orange GRX	B	37
Orange GS	H	139
Orange GT	By	70
Orange N	I	139
Orange NA	GrE	79a
Orange PC	DH	145a

Name	Manufacturer	Serial No
Orange R	Var	151
Orange 2 R	K	139a
Orange RO	B	151a
Orange RO	By	A277
Orange S	B	144
Orange T	K tM	151
Orange TA	A etc	311
Orange X	H	37a
Orange I	Var	141
Orange II	Var	115
Orange III	P	47
Orange IV	Var	139
Orange 13	S	58c
Orange 14	S	58c
Orange 67 (V M)	C	38
Orange 227	Q	36b
Orange 23981	S	58c
Orange Crystals	AW	38
Orange Crystals 2 G	WD	38
Orange Red pure	A	174
Orchil RCEP	A	U18
Orchil OPAG	A	U47
Orchil RPH	A	U49
Orlol Yellow	G	199
Orlol Yellow EC	G	199
Orseilline BV	By	253
Ortho Black 3 B	A	A37
Ortho Cyanine B	A	A38
Ortho Cyanine 6 G	A	A39
Oxamine Acid Brown G	B	A87
Oxamine Black A	B	A88
Oxamine Black BB	B	A89
Oxamine Black BHN BHX	B	333
Oxamine Black BBNX	B	A90
Oxamine Black BRTX	B	A91
Oxamine Black RN	B	A92
Oxamine Blue	B	421
Oxamine Blue A AX	B	410
Oxamine Blue B	B	421
Oxamine Bluo 3 B, BG GNX, 3 R	B	421a
Oxamine Blue 4 R	B	385
Oxamine Brilliant Red BX	B	A93
Oxamine Brilliant Violet RX	B	A94
Oxamine Brown A	B	A95
Oxamine Brown G	B	A96
Oxamine Brown 3 G	B	A97
Oxamine Brown GR	B	A98
Oxamine Brown GX	B	A99
Oxamine Brown 3 GX	B	A100
Oxamine Brown R, RG	B	344
Oxamine Claret B	B	A101
Oxamine Copper Blue RR	B	A102
Oxamine Copper Blue RRX	B	A103
Oxamine Dark Blue BGX	B	A105
Oxamine Dark Blue BGL	B	A104
Oxamine Dark Blue BRRX	B	A107
Oxamine Dark Blue R	B	A106
Oxamine Dark Brown G	B	A108
Oxamine Dark Brown R	B	A109
Oxamine Fast Blue 6 VX	B	A110
Oxamine Fast Blue RR	B	A111
Oxamine Fast Pink BX	B	A112
Oxamine Fast Red F	B	343
Oxamine Green C	B	475
Oxamine Green B, BX	B	474
Oxamine Green G, GX	B	475
Oxamine Light Blue B	B	A113
Oxamine Light Blue GX	B	A114
Oxamine Light Brown G	B	A115
Oxamine Light Brown R	B	A116
Oxamine Light Green B	B	A117
Oxamine Light Green G	B	A118
Oxamine Light Green 3 G	B	A119
Oxamine Maroon	B	345
Oxamine Pure Blue 6 B, 6 BO 6 BXX	B	424
Oxamine Red	B	346
Oxamine Red 3 B BNX	B	346
Oxamine Violet	B	326
Oxamine Yellow A	B	A120
Oxamine Yellow 3 G	B	A121
Oxy Acid Red 6 BO	GrL	U112
Oxy Chloranol Blue B	H	A760
Oxy Diamine Black (V M)	C	A382
Oxy Diamine Blue (V M)	C	A383
Oxy Diamine Brown (V M)	C	A384
Oxy Diamine Carbon (V M)	C	A385
Oxy Diamine Orange (V M)	C	362
Oxy Diamine Red S	C	A386
Oxy Diamine Violet (V M)	C	326
Oxy Diamine Yellow	C	198
Oxy Diaminogen (V M)	C	A387
Oxychrome Black I	GrL	A467
Oxychrome Blue Black BGO	GrL	A468
Oxychrome Brown V	GrL	A469
Oxychrome Brown VA	GrL	A470
Oxychrome Brown VN	GrL	A471
Oxychrome Yellow D	GrL	A472
Oxychrome Yellow DG	GrL	A473
Oxychrome Yellow 2 G	GrL	A474
Oxyphenine A C, GG, R	ClCo	617
Pacific Blue	H	540
Palatine Black A 4 B	B	220
Palatine Black 3 GX MZ SF STM	B	220
Palatine Chrome Black	B	288
Palatine Chrome Black 6 B 6 BX	B	181
Palatine Chrome Black T	B	288
Palatine Chrome Black S	B	289
Palatine Chrome Blue BB	B	A122
Palatine Chrome Blue W 2 B	B	A123
Palatine Chrome Brown 5 G	B	154a
Palatine Chrome Brown GGTX	B	154a
Palatine Chrome Brown GGX, R	B	154a
Palatine Chrome Brown W	B	154
Palatine Chrome Brown WN	B	154
Palatine Chrome Brown WNR	B	154
Palatine Chrome Brown WNRTX	B	154
Palatine Chrome Green G	B	A124
Palatine Chrome Green GX	B	A125
Palatine Chrome Red B	B	202
Palatine Chrome Red R	B	A126
Palatine Chrome Violet	B	156
Palatine Light Yellow R	B	A127
Palatine Orange R	B	A128
Palatine Red A	B	109
Palatine Scarlet A	B	81
Palatine Scarlet G 3 R 4 R	B	81a
Palatinito	B	U173
Panama Black 3 G, R	Sch	436
Paper Blue 6 G	Sch	537
Paper Blue MD	M	U459
Paper Blue TRR	B	U174
Paper Blue 33598	S	U713
Paper Blues green shades	Sch	537
Paper Blues red shades	Sch	537
Paper Brown BB	B	U175
Paper Brown BT	B	U176
Paper Brown RT	B	U177
Paper Fast Bordeaux B	By	U255

Name	Manufacturer	Serial No.
Paper Green D	K	U375
Paper Orange CR	K	U376
Paper Orange residue	K	U377
Paper Red O	WD	307
Paper Scarlet (V.M.)	K	U378
Paper Yellow	Var	303
Paper Yellow	WD	303a
Paper Yellow G, GGX, RRX	B	303a
Paper Yellow 3 GX	B	303
Paper Yellow 3 RXX	B	303a
Para Black B	By	A278
Para Blue	CG	702
Para Brilliant Orange G	By	A282
Para Brown GK	By	A279
Para Brown RK	By	A280
Para Brown SC	By	A281
Para Diamine Black (V.M.)	C	A388
Para Green 2 BL	By	A283
Para-Fuchsine	Var	511
Para Magenta	H	511
Para Orange G	By	A284
Para Yellow	AW	U588
Paramine	B	U178
Paranitraniline Red	Var	56
Paraphenylene Blue R	WD	701
Paraphenylene Violet	WD	695
Paraphosphine (V. M.)	C	U294
Para Red	Var	56
Paratol Chrome Yellow L	M	U460
Paratol Fast Yellow G	M	U461
Paratol Lake Red KP	M	U462
Paratol Lake Red LC	M	U463
Paratol Lake Red LP	M	U464
Paratol Scarlet 3 B, 3 BX	M	U465
Parazole Brown RK	K	U379
Paris Violet	P	515
Paris Violet 3 B, 6 B, 3 BA	P	515
Paris Violet 4 BA, 4 R, 90	P	515
Patent Alizarin Black DEB, DFF, DFFA	M	807a
Patent Black (V. M.)	C	U295
Patent Blue	...	543
Patent Blue A	Var	545
Patent Blue AE	M	545
Patent Blue B	A, M	543
Patent Blue L, LE, NO	M	543
Patent Blue V	Var	543
Patent Blue V new	M	543
Patent Blue J 3, JI, WE	M	543a
Patent Marine Blue	M	543
Patent Marine Blue LER	M	543b
Patent Phosphine G, GG, M, R	I	606
Patent Phosphine 19332	I	606c
Pegu Brown G	L	A511
Peri Wool Blue B	C	87
Permanent Blue GR	CG	U493
Permanent Orange R	A	131
Permanent Red	A	152
Permanent Red B, 2 B, R, 4 R	A	152a
Permanent Red 4 B	A	152
Persian Red RD	B	U179
Phenamine Blue G	B	A129
Phenanthrene Chrome Blue	I	U680
Phenochrome Yellow	K	U380
Phenocyanine TC, R, VS	DH	642
Phenocyanine TV	DH	643
Phenylamine Black 4 B	By	A285
Phenyl Crimson S	CV	A731
Phenylene Black	P	267
Phenylene Blue	BK	649
Philadelphia Yellow 2 G	A	606
Phloxine	DH,M	593
Phloxine B, GA, HM	M	596
Phloxine P	B	593
Phoenix Brown D	A	U58
Phosphine (V. M.)	Var	606
Phosphine A	GrE	606
Phosphine AR, GG	tM	606
Phosphine G	S	606
Phosphine GO	K	606
Phosphine LM, O	M	606
Phosphine LB, PHLB	GrE	606
Phosphine 3 R	A	606
Phosphine RS	H	606
Phosphine 12901	P	606
Picric Acid	...	5
Pigment Black	B	U180
Pigment Black BP	B	U181
Pigment Chlorine	M	8
Pigment Chrome Yellow L	M	21
Pigment Fast Red HL	M	73
Pigment Fast Yellow G	M	28
Pigment Fast Yellow R	M	24
Pigment Orange R	M	72
Pigment Purple A	M	93
Pigment Scarlet G	M	201
Pigment Scarlet 3 B	M	202
Pinachrome	M	613a
Pinacyanol	M	U466
Pink	K	U381
Pink B	I	U681
Pink M	H	U763
Pink Color	Q	U806
Pluto Black A	By	A286
Pluto Black BS	By	A287
Pluto Black CF	By	A288
Pluto Black F	By	A289
Pluto Black G	By	A290
Pluto Black SS	By	A291
Pluto Brown GG	By	A292
Pluto Brown NB	By	A293
Pluto Brown R	By	A294
Pluto Milling Black B	By	A295
Pluto Orange G	By	392
Plutoform Black 3 GL	By	A296
Polar Orange GS	G	U633
Polar Red 3 B	G	U635
Polar Red G	G	U636
Polar Red R	G	U637
Polar Red RS	G	U638
Polar Yellow G	G	U639
Polar Yellow 2 G	G	U640
Polar Yellow R	G	U641
Polar Orange RC	G	U634
Polychromine AC	G	616
Polychromine B	G	13
Polyphenyl Black BVC	G	A650
Polyphenyl Black GNC	G	A651
Polyphenyl Blue GC	G	A652
Polyphenyl Blue GF	G	A653
Polyphenyl Brilliant Blue 3 G	G	A654
Polyphenyl Fast Red BC	G	A655
Polyphenyl Orange RC	G	A656
Polyphenyl Yellow 3 GC	G	A657
Ponceau (V. M.)	K	83a
Ponceau BO	A	227
Ponceau G	M	39
Ponceau 4 GB	A, etc.	37
Ponceau K	I	175a
Ponceau R, 2 R	I	82
Ponceau 3 R	Var	83
Ponceau 4 R	Var	83
Ponceau 4 R	P	169
Ponceau 5 R	M, K	228

Name	Manufacturer	Serial No
Ponceau 6 R	B, M	170
Ponceau 3 RB	A	247
Ponceau 4 RB	A	249
Ponceau 6 RB	A	255
Ponceau 10 RB	A	259
Ponceau RL, 2 RL, 3 RL, 2 RLH	A	82a
Ponceau 2 RL	By	82
Ponceau S	A	247a
Ponceau SPJ	P	109b
Ponceau S 2 R	B	82
Ponceau W 3 R	P	109b
Ponceau X	BK	82b
Ponceau 12402	I	175n
Ponceau for Silk	P, K	175
Ponceau (free from arsenic)	WD	82c
Potting Black B	I	184
Prague Alizarin Yellow G	I	49
Primal Black	A	U59
Primazine Yellow G	B	A130
Primuline	Var	616
Primuline A	B, M	616
Primuline (V M)	Var	616
Primuline Yellow	AW, By	616a
Printing Black for Wool	B	776
Printing Blue for Wool	B	742
Printing Yellow (greenish)	K	U382
Prune 516	Lev	636
Prune pure	S	636
Pure Blue AI	I	539
Pure Blue DS DSG	H	539
Pure Blue RT	BK	539
Pure Soluble Blue	C	539
Pure Yellow DG	K	U383
Purpurin (synthetic)	B	783
Pyramidol Brown BG	TA	317
Pyramidol Brown T	TA	376
Pyramine Orange 2 GX	B	302a
Pyramine Orange 3 G	B	306
Pyramine Orange R	B	360
Pyramine Orange RR	B	314
Pyramine Orange RT	B	362
Pyramine Yellow GXS, GXSC	B	304
Pyramine Yellow GXSP	B	304
Pyramine Yellow R, RX	B	101
Pyrazole Orange G	S	302
Pyrazole Orange R	S	A722
Pyrogallol-cy amine sulphonic acids	DH	623
Pyrogene Black G	I	730
Pyrogene Blue	I C	726
Pyrogene Blue RR, 2 RN	I	726
Pyrogene Blue Green B	I	746
Pyrogene Brown D	I	S155
Pyrogene Brown G	I	S156
Pyrogene Brown GX	I	S157
Pyrogene Brown OR	I	S158
Pyrogene Brown ORR	I	S159
Pyrogene Brown 4 R	I	S160
Pyrogene Cutch DR	I	S161
Pyrogene Cutch 2 GO	I	S162
Pyrogene Cutch 2 R	I	S163
Pyrogene Dark Green B	I	746
Pyrogene Drop Black C, D G	I	720
Pyrogene Direct Blue	I	726
Pyrogene Direct Blue green shade	I	726
Pyrogene Direct Blue, red shade	I	726
Pyrogene Direct Blue RL	I	726
Pyrogene Green G	I	746
Pyrogene Green 2 G	I	709
Pyrogene Green 3 G	I	746
Pyrogene Indigo	I	735
Pyrogene Indigo CL 5 G GL	I	735
Pyrogene Indigo R RR	I	735
Pyrogene Olive 3 G	I	746
Pyrogene Orange R	I	S164
Pyrogene Yellow M O 3 R	I	731
Pyrol Brown G	L	S135
Pyrol Brown 69181	L	S136
Pyrol Brown (yellowish)	L	S135
Pyromine G	I, By	568
Pyrophosphine C	WD	U547
Quercitron Substitute V	B	U184
Quercitron Substitute WBL	B	U183
Quinoline Blue	G	611
Quinoline Red	A	610
Quinoline Yellow	A	612
Quinoline Yellow	AW	613
Quinoline Yellow	B	612
Quinoline Yellow	By	613
Quinoline Yellow	C	613
Quinoline Yellow	I	613
Quinoline Yellow	M	613
Quinoline Yellow	S	612
Quinoline Yellow KT N	By	613
Quinoline Yellow O	M	613
Quinoline Yellow P	B	612
Quinoline Yellow 9272	I	612
Quinoline Yellow, spirit soluble	Var	612
Quinoline Yellow water soluble	Var	613
Radial Yellow G	B	30
Rapid Filter Green I	M	U167
Rapid Filter Red I	M	U168
Raven Black 31588	H	U764
Red (V M)	CJ	U497
Red PC	DH	U600
Red PC	G	U642
Red 2 S	P	483a
Red Blue BSR	GIE	U513
Red Brown	S	106c
Red Coralline		556
Red for Leather O	M	U469
Red for Leather R	A	U60
Red Lake RL	By	U256
Red Lake RMT	By	U257
Red Violet	tM	514
Red Violet 5 R	B	514
Red Violet 5 RS	B	525
Reddish Brown	K	U384
Renol Black BHN	tM	462b
Renol Black ST ST	tM	462b
Renol Blue B	tM	410
Renol Bordeaux	tM	A517
Renol Brilliant Yellow	tM	303
Renol Brown MB, RA	tM	344
Renol Dark Green NOONG	tM	A518
Renol Fast Red 4 B	tM	A519
Renol Green B	tM	475
Renol Light Blue A	tM	A520
Renol Light Blue G	G	AG58
Renol Light Blue G	tM	A521
Renol Orange 3 AP	G tM	302a
Renol Red	tM	A522
Renol Yellow 3 R	tM	9
Renolamine Black BHN	G tM	333
Resoflavin W	B	771
Resorcin Blue	M	647
Resorcin Brown	Var	211
Resorcin Brown G	G	211
Resorcin Brown QV	G	211
Resorcin Dark Brown	BK	213

Name	Manufacturer	Serial No.
Resorcin Yellow	Sch	143
Rheonine	B	607
Rheonine AL, GD	B	607
Rhine Blue	Q	631
Rhodamine AL	B	572a
Rhodamine B	Var	573
Rhodamine 3 B	I, B	574
Rhodamine BN	Q	573
Rhodamine BSP	M	573
Rhodamine G	Var	572
Rhodamine 3 G	B	576
Rhodamine 5 G	By	576a
Rhodamine 5 G	S	572a
Rhodamine 6 G	Var	571
Rhodamine 12 GF	I	578
Rhodamine 6 GN	B	571
Rhodamine S	B, By	570
Rhodamine S	I	570
Rhodamine SP	B	570
Rhodamine R	I	572a
Rhodamine 6302	Q	572a
Rhodamine Scarlet G	By	576b
Rhodine 2 G	I	577
Rhodine 12 GM	I	575
Rhoduline Blue 6 G	By	U258
Rhoduline Heliotrope 3 B	By	U259
Rhoduline Orange N, NO	By	603a
Rhoduline Red B, G	By	684
Rhoduline Violet	By	684
Rhoduline Yellow 6 G	By	618a
Roccelline	C, FA	161
Roccelline FS	H	161
Roccelline MB	tM	161
Roccelline S	G, tM	161
Rosanthrene AWL	I	A704
Rosanthrene B	I	A705
Rosanthrene CB	I	A706
Rosanthrene R	I	A707
Rosanthrene Bordeaux B	I	A708
Rosanthrene Orange 16754	I	A709
Rosanthrene Violet SR	I	A710
Rosazeine B	M	573
Rosazeine B 5	M	U471
Rosazeine 6 G	M	U472
Rosazurine B	A, By	372
Rosazurine G	A, By	371
Rose (V. M.)	CJ	U498
Rose Bengal	Var	595
Rose Bengal	G, M	597
Rose Bengal B	B, L	597
Rose Bengal B	K, M	597
Rose Bengal N	C	595
Rose Bengal NTO	B	595
Rose Magdala	DH	694
Roseine B	S	512
Rosinduline	K	674
Rosinduline 2 B	K	673
Rosinduline G	K	675
Rosinduline 2 G	K	674
Rosolane	P	688
Rosolane B, O	M	687
Rosolane O, T, R	M	687
Rosophenine 4 B	ClCo	483
Rosophenine 10 B	ClCo	194
Rosophenine SG	ClCo	195
Rubine	A	512
Rubine N	A	512
Rubine N	B	U189
Rubramine	CG	703
Russian Leather Red R	A	512
Russian Red	C	512
Saba Phosphine G, GG	S	606
Safranine	Var	679
Safranine (V. M.)	Var	679
Safranine B	Var	679
Safranine 6 B	Sch	680
Safranine FF	By	679
Safranine F	K	679
Safranine FB	B	679
Safranine MN	B	683
Safranine O	M	679
Safranine T, TK	B	679
Safranine Y	Sch	679
Safranine Z	...	679
Safranine 1081	K	679
Safranine bluish	K	680
Safranine (blue shade)	L	679
St. Denis Black B	P	718
St. Denis Red	P	483
Salicine Black (V. M.)	K	181b
Salicine Black K, LR, S	K	181b
Salicine Black U, UL	K	181
Salicine Blue B	K	A403
Salicine Bordeaux R	K	A404
Salicine Brown (V. M.)	K	A405
Salicine Dark Green CS	K	276
Salicine Green CP	K	A407
Salicine Orange 2 R	K	A408
Salicine Orange 2541, 2542	K	A409
Salicine Red B	K	A410
Salicine Red G	K	A411
Salicine Violet R	K	A412
Salicine Yellow (V. M.)	K	177b
Salmon Red	A	120
Scarlet	CDCo	174
Scarlet (V. M.)	C	247
Scarlet AB	GrE	A475
Scarlet 6 B	GrE	A476
Scarlet BN	B	A131
Scarlet C	Q	196a
Scarlet EC	C	247
Scarlet GA	B	A132
Scarlet GRCL, M	M	174a
Scarlet GX	K	U385
Scarlet 15 N	B	A133
Scarlet P	K	U385
Scarlet PO, 2 PR	K	U385
Scarlet R, 2 R	M	174a
Scarlet R, 2 R	Var	82
Scarlet 2 R	K	U385
Scarlet 2 R	tM	176
Scarlet 3 R, 6 R, 2 RCL, 3 RCL	M	174a
Scarlet 3 R	B	83
Scarlet 4 R	Q	83
Scarlet 4 R	P, tM	176a
Scarlet 6 R crystals	BK	223b
Scarlet RD	H	82d
Scarlet 4 RI, 2 RII	AW	106b
Scarlet 4 RZ	M	174a
Scarlet S 2 R	B	A134
Scarlet S 3 R	B	A135
Scarlet 2 SRM	B	A136
Scarlet X, XX	K	U385
Scarlet 50	H	169
Scarlet 231, 243	CJ	76a
Scarlet 1610	K	U385
Scarlet 7214	B	A137
Scarlet 53446	A	U61
Scarlet (yellow shade) 17413	B	A138
Scarlet (yellow shade) 24211	B	A139
Scarlet for silk S	P	247c
Scarlet residue	K	U385
Seal Brown W	P	U594
Sella Brilliant Yellow P	G	U643
Sella Flavine G	G	U644

Name	Manufacturer	Serial No.
Sepia Black FW, 14998	I	U682
Serge Blue	A	539
Setocyanine O	G	500
Setoglaucine O	G	496
Setoquline	G	500
Silk Blue	tM	539a
Silk Blue B	B	537
Silk Blue B	BK	559
Silk Blue B	Q	539
Silk Blue BJBNOO	GrE	539a
Silk Blue BS3BB, BT5BOO BTR	GrE	539a
Silk Blue BTB, BTR	GrE	539a
Silk Blue 4 R	Q	539
Silk Blue 4	By	537
Silk Blue 5770	BK	559
Silk Gray CB, 281	K	U386
Silk Wool Black 3 B	M	U473
Silk Yellow N	BK	613
Silk Yellow N	Q	U811
Silver Gray N	C	700
Silver Gray P	A	700
Sirius Yellow G	B	758
Sitara Fast Red RL	tM	56
Sitara Orange I	tM	A523
Sky Blue FFO	S	424
Solamine Blue B	A	A44
Solamine Red	A	A44a
Solfigene Blue Green B	I	U684
Solfigene Blue Green 10444	I	U683
Solfigene Cutch	I	U685
Solfigene Cyanine	I	U686
Solfigene Deep Black (V.M.)	I	U688
Solfigene Deep Black 14717	I	U687
Solfigene Green GG	I	U689
Solid Blue (V. M.)	C	U200
Solid Blue 3 R	S	699
Solid Blue RX	Q	699
Solid Blue SBAOOOO	GrE	699
Solid Blue SBSOOO	GrE	699
Solid Blue Base SBXBX	GrE	699
Solid Brown	Q	U812
Solid Brown KF	Q	U813
Solid Brown O	M	U474
Solid Green (V. M.)	C	495
Solid Green 3 G	Q	499
Solid Green O	M	1
Solid Red B	Q	U814
Solid Yellow G	Q	137
Soluble Blue	ByCo	537
Soluble Blue	Var	539
Soluble Blue	H&M	537
Soluble Blue (V. M.)	Var	539
Soluble Blue AOOOO	GrE	539
Soluble Blue B, BCBII	CG	539
Soluble Blue BLSE, 3 BS	P	539
Soluble Blue BS 3B B, BSJ	GrE	539
Soluble Blue C 2, C 3, C 5, CX	K	539
Soluble Blue ELOOO	GrE	539
Soluble Blue HA, 1N, 4 R, TB, TL	B	539
Soluble Blue 5 R	tM	539
Soluble Blue RM	M	539
Soluble Blue base SBXR	GrE	539
Soluble Blue crystals	tM	539
Soluble Blue (greenest shade)	tM	539
Soluble Navy Blue	G	539c
Sorbin Red	B	64
Sorbin Red X	B	64
Special Blue G	B	U190
Special Phosphine G	S	606
Spirit Black	G	U645
Spirit Black (V. M.)	CJ	U499
Spirit Blue	Var	521
Spirit Blue BVE	P	521
Spirit Blue R	M	521
Spirit Blue, green shades	Sch	521
Spirit Blue, red shades	Sch	521
Spirit Nigrosine	WD	698
Spirit Nigrosine LM, P	H	698
Spirit Yellow	L, tM	31
Spirit Yellow R	K	68
Stanley Red	ClCo	193
Steam Green G	B	U191
Stilbene Yellow	Var	10
Stilbene Yellow 3 G	ClCo	10
Stilbene Yellow 3 G	ClR	10
Stilbene Yellow 2 GP, 3 GPX, GX	B	10
Stilbene Yellow RX	B	10a
Stilbene Yellow 5912	B	10b
Straw Blue G	By	U260
Sudan G, 2 G	A	35
Sudan R	A	93
Sudan I	A	36
Sudan II	A	76
Sudan III	A, etc.	223
Sudan IV	A, etc.	232
Sudan Brown	A	105
Sudan Brown S	Sch	105
Sulfamine Brown A	WD	107
Sulfamine Brown B	WD	116
Sulfaniline Brown O, R	K	708
Sulfine Blue B	CG	S125
Sulfine Blue RR	CG	S126
Sulfine Brown	...	707
Sulfine Brown	CG	737
Sulfine Brown B, G	CG	737
Sulfo Blacks B, 2 B	H	744
Sulfo Green B, C	NF	U550
Sulfo Rhodamine B	M	579
Sulfo Rosazeine B	M	U475
Sulfo Rosazeine G	M	U476
Sulfogene Brown G, D	I	757
Sulfoline G	AW	U589
Sulfoline G	K	U387
Sulfoline R	AW	U590
Sulfon Acid Black N 2 B	By	U261
Sulfon Acid Blue B	By	189
Sulfon Acid Blue R	By	188
Sulfon Acid Green B	By	U262
Sulfon Black 3 B	By	256
Sulfon Black G	By	242
Sulfon Blue R	By	188
Sulfon Orange G, 5 G	By	A297
Sulfon Violet R	By	A298
Sulfon Yellow 5 G, R	By	A299
Sulfonazurine	By	361
Sulfoncyanine	Var	257
Sulfoncyanine BB, GR, 5 R, SR	B	257a
Sulfoncyanine G, GR, 5 R, 5 RT	By	257
Sulfoncyanine Black B, 2 B	By	265
Sulfoncyanine Black BB, GR	B	265a
Sulfur Black	Var	720
Sulfur Black	WD	721
Sulfur Black	A	720
Sulfur Black A, AW, AWL	A	720
Sulfur Black B, 2 B, 4 B	A	720
Sulfur Black 2 B, BR, BRH, GF	K	720
Sulfur Black FAG, FT	A	720
Sulfur Black H, JBL	A	720

Name	Manufacturer	Serial No.
Sulfur Black KCB, MA	K	720
Sulfur Black T, TFA, TG	A	720
Sulfur Black TR	Lev	720
Sulfur Black TS, 5274, 5276	K	720
Sulfur Black 5285, 5289	K	720
Sulfur Black 108583	A	720
Sulfur Black Brown N	A	S1
Sulfur Black Brown NR	A	S2
Sulfur Blue B	A	S3
Sulfur Blue BE	BK	S123
Sulfur Blue BG, CHL	K	S83
Sulfur Blue D	A	S4
Sulfur Blue G	K	S83
Sulfur Blue L	A	S6
Sulfur Blue PR	A	S7
Sulfur Blue R	A	S8
Sulfur Blue 2 R	A	S9
Sulfur Blue 4 R	A	S10
Sulfur Blue RR	BK	S124
Sulfur Blue U	K	S83
Sulfur Brilliant Green GK	A	S11
Sulfur Bronze 136	Lev	S168
Sulfur Bronze 158	Lev	S169
Sulfur Brown CL 4 R	A	S12
Sulfur Brown G	A	S13
Sulfur Brown 2 G	A	S14
Sulfur Brown 6 G	A	S15
Sulfur Brown M	I	S165
Sulfur Brown O	A	S16
Sulfur Brown OB	A	S17
Sulfur Brown 527	Lev	S170
Sulfur Brown 731	Lev	S171
Sulfur Brown (bluish)	K	S84
Sulfur Brown (reddish)	K	S84
Sulfur Catechu G	A	S18
Sulfur Catechu R	A	S19
Sulfur Corinth B	A	S20
Sulfur Corinth CLB	A	S21
Sulfur Green 2 BK	A	S22
Sulfur Green 4 BK	A	S23
Sulfur Green G	A	S24
Sulfur Green 4 GK	A	S25
Sulfur Green 309	Lev	S172
Sulfur Green 330	Lev	S173
Sulfur Indigo BA	A	S26
Sulfur Indigo CL	A	S28
Sulfur Indigo CLGG	A	S29
Sulfur Indigo Blue RCL	K	S85
Sulfur Indigo Blue 827	K	S85
Sulfur Olive	S	S167
Sulfur Olive B	A	S30
Sulfur Red Brown 2 RK	A	S31
Sulfur Red Brown 6 RK	A	S32
Sulfur Violet R	A	S33
Sulfur Violet Y	A	S34
Sulfur Yellow ES	K	U388
Sulfur Yellow G	S	712
Sulfur Yellow G	A	S35
Sulfur Yellow G	K	U388
Sulfur Yellow 4 G	A	S36
Sulfur Yellow I	A	S37
Sulfur Yellow R	A	S38
Sulfur Yellow R	I	S166
Sultan 5 B	H	363
Sultan 10 B	H	405
Sultan Orange DS	H	304d
Sultan Yellow H	H	304
Sun Yellow	Var	9
Sun Yellow G, GS, RR	S	9
Sun Yellow 3 GC	G	9
Supramine Brown R	By	U263
Supramine Yellow R	By	U264
Tabora Black X	A	A45
Tannin Heliotrope	C	685
Tannin Orange R	C	74
Tannin Orange R	S	606
Tartrazine	Var	23
Tartrazine G, X, XX	B	23
Terra Cotta FC	G	209
Terra Cotta 2 RN, RGN	G	58
Tetracyanol A	C	545
Tetracyanol SFV	C	543
Thiazine Blue	G	A659
Thiazine Brown R	B	U192
Thiazine Red G	B	197
Thiazine Red R	B	194
Thiazine Yellow G, 3 G, GL	By	198
Thiazol Yellow G	S	198
Thiazol Yellow GR	BD	198
Thiazol Yellow R, RH	By	51
Thiocarbone NNG	C	720
Thiocarmine R	C	662
Thio Catechine	P	715
Thio Cotton Black	WD	721
Thioflavine (V, M.)	C	618
Thioflavine OIO	K	615
Thioflavine S	S, C	615
Thioflavine T	C	618
Thioflavine 654	K	615
Thiogene Black BB, 5 B	M	720
Thiogene Black M, MA, MM	M	720
Thiogene Black ML, MZ	M	720
Thiogene Blue RL	M	S99
Thiogene Blue R	M	S97
Thiogene Blue 2 R	M	S98
Thiogene Cyanine B	M	S107
Thiogene Cyanine G	M	S108
Thiogene Dark Red G	M	S109
Thiogene Deep Blue BR	M	S111
Thiogene Deep Blue	M	S110
Thiogene Green BL	M	S112
Thiogene Green G	M	S113
Thiogene Green GG	M	S114
Thiogene Green GL	M	S115
Thiogene Khaki N	M	S116
Thiogene New Blue JL	M	S117
Thiogene Olive Green GGN	M	S118
Thiogene Orange R	M	S119
Thiogene Violet V	M	S120
Thiogene Yellow GG	M	S121
Thiogene Yellow 5 G	M	S122
Thiogene Brown G	M	S100
Thiogene Brown GG	M	S102
Thiogene Brown GC	M	S101
Thiogene Brown GR	M	S103
Thiogene Brown G 2 R	M	S104
Thiogene Brown R	M	S105
Thiogene Brown S	M	S106
Thio Indigo Brown G	K	904
Thio Indigo Brown 2 R	K	902
Thio Indigo Orange R	K	913
Thio Indigo Pink 247, 2475	K	910
Thio Indigo Pink Rose BW	K	910
Thio Indigo Red B	K	912
Thio Indigo Red 3 B	K	918
Thio Indigo Rose AN, BN	K	910
Thio Indigo Scarlet G	K	906
Thio Indigo Scarlet R	K	905
Thio Indigo Scarlet S, 6086	K	916
Thio Indigo Violet 2 B	K	920
Thio Indigo Violet K	I, K	900
Thio Indigo Yellow 3 GN	K	913a
Thional Black G	S	719
Thional Brilliant Green 29	S	746
Thional Brown	S	747

Name	Manufacturer	Serial No.
Thional Brown G	S	747
Thional Dark Green GN	S	746
Thional Green	S	746
Thional Green GG	S	746
Thional Red Brown	S	747
Thion Black (V. M.)	K	720
Thion Blue B	K	736
Thion Brown (V. M.)	K	S86
Thion Dark Blue BO	K	S87
Thion Direct Blue	K	736a
Thionine Blue GO	A, M	661
Thionine Blue OO, 3 O	A	661
Thion Green 2 G	K	S88
Thion Green 829	K	S89
Thion Navy Blue (V. M.)	K	S90
Thionol Black	Lev	719
Thionol Black S, XX	Lev	720
Thionol Yellow GR	Lev	198
Thion Orange (V. M.)	K	S91
Thion Purple O	K	S92
Thion Violet	K	S93
Thion Violet Black	K	720
Thion Yellow (V. M.)	K	S96
Thion Yellow 2 G	K	S94
Thion Yellow 5 G	K	S95
Thiophenol Black T	I	720
Thiophor Black WLN	CJ	720
Thiophor Blue B	CJ	S127
Thiophor Bronze 5 G	CJ	713
Thiophor Dark Brown B	CJ	S128
Thiophor Deep Green CG	CJ	S129
Thiophor Indigo CJ	CJ	731
Thiophor Khaki	CJ	S130
Thiophor Orange O	CJ	S131
Thiophor Yellow R	CJ	S132
Thiophor Yellow Bronze G	CJ	714
Thiophor Yellow Olive	CJ	S132a
Thio Vesuvine BB	Q	U815
Thioxine Black ABOOOO	GrE	720
Thioxine Black ABBOOOO	GrE	720
Thioxine Black 3 BOOO	GrE	720
Thioxine Black GB, 1151, 3705	GrE	720
Thioxine Brown 5 G	GrE	S133
Thioxine Brown 2 GR	GrE	S134
Titan Como 2 B	H	A761
Titan Como R	H	A762
Titan Fast Black B	H	A763
Titan Orange	H	A764
Titan Red	H	196
Titan Scarlet Y	H	196
Titan Yellow G, Y	H, BD	198
Tolamine Violet	I	U690
Tolane Red B, G	K	43
Toluidine Blue	B, M	659a
Toluylene Black GOO	GrE	A477
Toluylene Brown G	GrE	285
Toluylene Brown R	GrE	488
Toluylene Fast Brown 2 R	By	U266
Toluylene Fast Brown 3 G	By	U265
Toluylene Fast Orange GL	By	392d
Toluylene Orange	Var	392
Toluylene Orange G	Var	392
Toluylene Orange GOO	GrE,S	392
Toluylene Orange R	M	287
Toluylene Orange RR	GrE	287
Toluylene Red OO, RT	GrE	358
Toluylene Yellow	GrE	286
Toluylene Yellow OO	GrE	286
Tolyl Black B, BB, BG	M	265
Tolyl Blue 5 R	M	257
Tolyl Blue SB	M	189
Tolyl Blue SR	M	188
Tolyl Blue ST, 7656	M	257b
Tonka Brown GS	I	U691
Triazol Blue B	GrE	A478
Triazol Blue BOO	GrE	A479
Triazol Blue BBOO	GrE	A480
Triazol Blue 4 BOO	GrE	A481
Triazol Blue R	GrE	A482
Triazol Blue 3242	GrE	A483
Triazol Bordeaux B	GrE	A484
Triazol Brown GOOA	GrE	A485
Triazol Brown GOOO	GrE	A486
Triazol Brown HRO	GrE	A487
Triazol Brown SOOO	GrE	A488
Triazol Dark Blue BHOOO	GrE	A490
Triazol Dark Blue BHPOOOO	GrE	A491
Triazol Dark Blue BHTOOO	GrE	A492
Triazol Dark Blue BOO	GrE	A489
Triazol Dark Blue 3 G	GrE	A493
Triazol Dark Blue ROO	GrE	A494
Triazol Fast Red L	GrE	343
Triazol Fast Yellow 2 GOOOO	GrE	617
Triazol Green B	GrE	474
Triazol Green BPOO	GrE	A495
Triazol Green GPOO	GrE	A496
Triazol Pure Blue 3 B	GrE	A497
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Victoria Brilliant Blue B	M	559b
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Victoria Green BF	B	497a
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