

*Dr. G. E. Pelark*

SUBJECT: LABEL ANALYSIS TERMINOLOGY - (State of Virginia)

Enclosed is a copy of a reprint of Bulletin PL-12-A as used by the State of Virginia for identifying label analyses on Trade Sales Products. There are plans to update the bulletin and revisions should be ready by July, 1968 according to information from Virginia.

All states have various requirements for label analysis to be shown on paint products; however, for convenience The Glidden Company shows one analysis on consumer Trade Sales Products that are sold nationally, rather than providing separate labels for various states.

The bulletin is being sent so that you will be aware of the requirements and also, to assist those people involved in calculating analyses for the necessary products.

Any questions on labeling or labeling laws should be directed to Mr. T. M. Steppart who is in close contact with these requirements and in turn can obtain the information for you.

J. G. Kingston

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Encl.

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GLD006111

APPROVED LABELING TERMS

FOR LABEL ANALYSIS

PL-12-A Bulletin  
(12/5/67)

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF AGRICULTURE AND IMMIGRATION

RICHMOND, VIRGINIA

RICHARD D. CHUMNEY, COMMISSIONER

VIRGINIA PAINT LAW 1950

DIVISION OF TECHNICAL SERVICES ANNOUNCEMENT NO. PL-12-A  
(A Reprint of Division of Chemistry and Foods Announcement No. PL-12-A)

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COMMONWEALTH OF VIRGINIA  
DEPARTMENT OF AGRICULTURE & IMMIGRATION  
DIVISION OF TECHNICAL SERVICES  
14 STATE OFFICE BUILDING  
RICHMOND, VIRGINIA 23219

Division of Technical Services  
J. W. Midyette, Jr., Director

October 1, 1953

DIVISION OF TECHNICAL SERVICES ANNOUNCEMENT NO. PL-12-A

SUBJECT: Reprint of approved terms which became effective October 1, 1953  
and were published as Division of Chemistry and Foods Announcement No. PL-12-A.

In accordance with Section 59-61.2(4) of the Virginia Paint Law 1950 (Virginia Code 1950, Chapter 5, Sections 59-61.1 through 59-61.13 of Title 59), the following terms are approved for use in lieu of chemical \* names. The terms which are preceded by an asterisk must conform with the applicable American Society for Testing Materials Specifications. Other \* necessary clarification of terms will follow such terms and be set off by parenthesis.

The "Classification Code" on Organic Colors or Pigments (pp. 2, 3, & 4) refers to the groupings of the various colors (pp. 10 - 15).

J. W. Midyette, Jr.  
Director

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PIGMENTS

BLACK, BROWN & GRAY (except iron oxides)

- Amorphous Graphite (see Graphite below)
- \* Basic Sulfate Blue Lead
- \* Bone Black
- \* Carbon Black
- \* Dropblack (ASTM Boneblack)
- Graphite (natural allotropic carbon - may be produced synthetically)
- \* Lampblack
- Litharge (PbO)
- Mineral Black (a carbon black made from heavy black slate and containing approx. 43% fixed carbon, 38% volatile matter, & 19% ash.)
- \* Sublimed Blue Lead (ASTM Blue Lead, Basic Sulfate)
- Vegetable Black (produced by carbonization of vegetable matter.)

INORGANIC BLUE

- \* Chinese Blue (ASTM Iron Blue)
- \* Iron Blue
- \* Milori Blue (ASTM Iron Blue)
- \* Prussian Blue (ASTM Iron Blue)
- \* Ultramarine Blue

INORGANIC GREEN

- \* Chrome Green, C.P. (ASTM Pure Chrome Green)
- \* Chrome Green (ASTM Pure Chrome Green)
- \* Chromic Oxide Green (ASTM Chrome Oxide Green)
- \* Chrome Oxide Green
- Chromium Oxide, Hydrated - (approx.  $\text{Cr}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$ )
- \* Pure Chrome Green
- \* Reduced Chrome Green

INORGANIC ORANGE

- \* Chrome Orange
- \* Dark Chrome Orange (ASTM Yellow & Chrome Orange)
- \* Light Chrome Orange ( " " " " )
- Molybdate Orange (A mixture of Lead Chromate, Lead Molybdate and other Lead salts)

INORGANIC RED (except iron oxides)

- Cadmium Sulfoselenide - abby. Cadmium Sulfosel. (Cadmium Sulfide with selenium added in the process of manufacture to obtain shade.)
- Cadmium Sulfoselenide Lithopone - abby. - Cadmium Sulfosel. Lith. (Copper-precipitated product of Cadmium Sulfide & Barium Sulfate with selenium added in the process to obtain shade.)
- \* Red Lead

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INORGANIC YELLOW (except iron oxides)

Cadmium Lithopone (The coprecipitated product of Cadmium Sulfide & Barium Sulfate with or without small amounts of Zinc Sulfide precipitated in the process to obtain shade.)

- \* Chrome Yellow (ASTM Chrome Yellow & Chrome Orange)
- \* Lemon Chrome Yellow (ASTM Chrome Yellow & Chrome Orange)
- \* Medium Chrome Yellow (ASTM Chrome Yellow & Chrome Orange)
- \* Zinc Yellow

IRON OXIDES

- \* Black Synthetic Iron Oxide
- \* Brown Iron Oxide (See Iron Oxide)
- \* Burnt Umber
- \* Burnt Sienna
- \* Ferrite Yellow (ASTM Yellow Iron Oxide, Hydrated)
- \* French Ocher (ASTM Ocher)
- \* Indian Red (ASTM Red & Brown Iron Oxide - Class I)
- Iron Oxide (Other than CP - show percent ferric oxide and name and percent of extender)
- \* Iron Oxide, CP (ASTM Red & Brown Iron Oxide - Class I)
- \* Ocher
- \* Pure Iron Oxide (ASTM Red & Brown Iron Oxide - Class I)
- \* Sesquioxide of Iron (Ferric Oxide)
- \* Raw Sienna
- \* Raw Umber
- \* Red Iron Oxide, C.P. (ASTM Red & Brown Iron Oxide - Class I)
- \* Venetian Red (This should be broken down to show the percent Ferric Oxide.)
- \* Yellow Iron Oxide (ASTM Yellow Iron Oxide, Hydrated)

METALLIC

- \* Aluminum Paste - Extra Fine Lining
- \* Aluminum Paste - Standard Lining
- \* Aluminum Paste - Standard Fineness
- \* Aluminum Powder - Extra Fine Lining
- \* Aluminum Powder - Standard Lining
- \* Aluminum Powder - Standard Fineness
- \* Copper Powder
- \* Copper Bronze Powder (ASTM Copper Powder)
- \* Gold Bronze Powder
- Metallic Lead, Flaked (This shall contain a minimum of 90% metallic lead)
- \* Zinc Dust

ORGANIC BLUE & VIOLET

Classification Code

|                            |          |
|----------------------------|----------|
| Alizarine Blue -----       | VIII-A-1 |
| Anthraquinone Violet ----- | VIII-B-4 |
| Benzyl Violet -----        | IV-A-7   |
| Copper Phthl. Blue -----   | IX-A     |
| Crystal Violet -----       | IV-A-8   |
| Glacier Blue -----         | IV-A-5   |

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ORGANIC BLUE & VIOLET (cont.)

CLASSIFICATION CODE

|                          |          |
|--------------------------|----------|
| Indanthrene Blue -----   | VIII-B-3 |
| Methyl Violet -----      | IV-A-6   |
| Nigrosine-----           | X-C      |
| Peacock Blue Lake -----  | V-B      |
| Rhoduline Blue GG -----  | IV-A-2   |
| Phthl. Blue -----        | IX-D     |
| Victoria Blue -----      | IV-A-9   |
| Victoria Pure Blue ----- | IV-A-10  |

ORGANIC GREEN

|                                  |          |
|----------------------------------|----------|
| Acid Green Lake -----            | V-A      |
| Brilliant Green -----            | IV-A-3   |
| Copper Phthl. Green -----        | IX-B     |
| Copper Phthl. Bluish-Green ----- | IX-C     |
| Indanthrene Green -----          | VIII-B-3 |
| Malachite Green -----            | IV-A-1   |
| Pigment Green B -----            | I-A      |
| Victoria Green -----             | IV-A-9   |

ORGANIC RED, BROWN AND MAROON

|                                    |           |
|------------------------------------|-----------|
| Amaranth Maroon -----              | III-B-1-e |
| Alizarine Red -----                | VIII-A-1  |
| Anthosine Red -----                | III-B-2   |
| Arylide Maroon -----               | III-A-2-b |
| Arylide Red -----                  | III-A-2-b |
| Azo Bordeaux -----                 | III-B-1-c |
| BON Maroon -----                   | III-C-8   |
| BON Red-----                       | III-C-8   |
| Chlorinated Para -----             | III-A-1-c |
| 1.Chlorinated Para & Bon Maroon    |           |
| 1.Chlorinated Para & Lithol Rubine |           |
| Eosin Lake -----                   | VII-A-1   |
| Helio Bordeaux -----               | III-C-6   |
| Indanthrene Maroon -----           | VII-B-3   |
| Lithol Maroon -----                | III-C-1   |
| Lithol Red -----                   | III-C-1   |
| Lithol Rubine-----                 | III-C-2   |
| Madder Lake-----                   | VIII-A-1  |
| 1.Molybdate Orange & Bon Maroon    |           |
| Para Brown -----                   | III-A-1-c |
| Para Red -----                     | III-A-1-b |
| Pigment Scarlet -----              | III-B-1-d |
| Red Lake C -----                   | III-C-3   |
| Red Lake D -----                   | III-C-4   |
| Red Lake P -----                   | III-C-6   |
| Red Lake R -----                   | III-C-7   |
| Rhodamine B -----                  | IV-B-1    |
| Rhodamine GG -----                 | IV-B-2    |
| Scarlet Lake -----                 | III-B-1-b |
| Thioindigo Toner -----             | VI-A      |
| Toluidine Maroon -----             | III-A-2-a |

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ORGANIC RED, BROWN AND MAROON (cont.)

CLASSIFICATION CODE

|                      |           |
|----------------------|-----------|
| Toluidine Red -----  | III-A-1-a |
| Tuscan Red -----     | X-A       |
| Van Dyke Brown ----- | X-B       |

1. These are mechanical mixtures whose percentages vary somewhat with each batch to obtain the correct shade.

ORGANIC YELLOW & ORANGE

|                               |                   |
|-------------------------------|-------------------|
| Algol Yellow -----            | VIII-B-1          |
| Azo Nickel Yellow -----       | III-C-10          |
| Benzidine Yellow -----        | III-A-3-e         |
| Benzidine Orange -----        | III-A-4-c         |
| Chrome Yellow L -----         | III-A-4-b         |
| Dinitraniline Orange -----    | III-A-1-d         |
| Hansa Yellow -----            | III-A-3-a,b,c & d |
| Hansa Yellow R -----          | III-A-4-a         |
| Indanthrene Orange -----      | VIII-B-2          |
| Naphthol Yellow S -----       | II-A-1            |
| Orthonitraniline Orange ----- | III-A-1-f         |
| Permanent Orange -----        | III-A-1-d         |
| Persian Orange -----          | III-B-1-a         |
| Quinoline Yellow Lake -----   | VII-B-1           |
| Thioflavin -----              | IV-C-1            |
| Toluidine Yellow -----        | III-A-3-f         |
| Tartrazine Yellow -----       | III-B-f           |

WHITE (including extenders)

Alumina ( $Al_2O_3$ ) - The oxide of Aluminum that occurs in nature as Corundum)  
 Aluminum Hydrate ( $Al_2O_3 \cdot 3H_2O$  or  $Al_2O_3 \cdot H_2O$ )

- \* Barytes (ASTM Barium Sulfate Pigments)
- \* Basic Carbonate White Lead
- \* Basic Lead Carbonate (ASTM Basic Carbonate White Lead)
- \* Basic Lead Sulfate (ASTM Basic Sulfate White Lead)
- 1.) Basic Silicate White Lead (( $2PbSiO_3 \cdot Pb(OH)_2$ ))
- 1.) Basic Silicate White Lead (48% PbO Type)

By analysis:

|                          |     |
|--------------------------|-----|
| PbO                      | 48% |
| SiO <sub>2</sub> Maximum | 49% |
| Minimum                  | 44% |
| SO <sub>3</sub> Maximum  | 8%  |
| Minimum                  | 4%  |

- \* Basic Sulfate White Lead
- Bentonite Clay (A mineral pigment compound mainly of Silicon Dioxide & Aluminum Oxide)
- \* Blanc Fixe (ASTM Barium Sulfate Pigments)
- Calcium & Magnesium Carbonate
- China Clay (Chief constituent is Aluminum Silicate, also known as Kaolin & Porcelain Clay)

- 1.) These pigments may not be referred to as "White Lead"

WHITE (including extenders) cont.

- \* Diatomaceous Silica (See also Silicates)
- \* Diatomaceous Earth (ASTM Diatomaceous Silica - See also Silicates)  
Gypsum (A natural hydrated Calcium Sulfate -  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ )  
Leaded Zinc Oxide (The Percent of the Basic Sulfate White Lead shall  
be shown Ex: 35% Leaded Zinc Oxide)
- \* Lithopone (ASTM Zinc Sulfide Pigments)
- \* Mica (See also Silicates)  
Silica (Silicon Dioxide)  
Silicates (This term may be used to describe various silicates and  
combination of silicates as Aluminum & Magnesium Silicates,  
etc. It includes terms as China Clay, Diatomaceous  
Silica, Diatomaceous Earth, Kaolin, Mica, Porcelain  
Clay, Pyrophyllite, & Talc.)  
Slate Dust or Slate Flour (Composed mainly of Silicates, Iron Oxide,  
and Carbonaceous matter.)
- \* Titanated Lithopone (ASTM Zinc Sulfide Pigments)
- \* Titanium Barium (ASTM Titanium Dioxide Pigments)
- \* Titanium Calcium( " " " " )

VEHICLE INGREDIENTS

NATURAL RESINS & GUMS - The following terms may be used to designate the various natural resins & gums. Where there are subheadings, either the subheading or the main classification may be used:

Dammar  
East India

- a. Batu
- b. Black East India
- c. Pale East India

Copal

- a. Manila
  - (1) Melengkiet
  - (2) Loba
  - (3) Pontianak
  - (4) Boea
- b. Congo
- c. Kauri

Accroides  
Elemi  
Mastic  
Sandarac  
Rosin

Shellac (Not a true natural resin since it is not an exudation product of trees)

Natural Resins esterified with polyhydric alcohols such as glycerol may be labeled as: \*\*\*NAME OF RESIN\*\*\* ester (Ex. Copal ester). In cases where the natural resin ester is modified or the natural resin is modified and then esterified the name of the modifier must be given. (Ex. Rosin Copal Ester).

# OILS - The true name of the oils must be shown. The products obtained by various types of processing used with the oils may be described by the following terms preceeding the name of the oil: Boiled, Bleached, Blown, Bodied, Esterified, Fatty Acid, Heat Treated, Lined, Pentaerythritol Ester Of, Processed, Refined, Treated)

Castor Oil  
Chinawood Oil  
Coconut Oil  
Cottonseed Oil  
Dehydrated Caster Oil  
Fish Oil  
Hempseed Oil  
Linseed Oil  
Menhaden Oil

Oiticica Oil  
Perilla Oil  
Rapeseed Oil  
Safflower Oil  
Sardine Oil  
Soy Bean Oil  
Sunflower Oil  
Tall Oil  
Walnut Oil  
Tung Oil

# SYNTHETIC RESINS (see note p. 8)

- Acrylic Resin - (A synthetic resin made from derivatives of acrylic acid.)
- Alkyd Resin - (A synthetic resin made from polyhydric alcohols and polybasic acids or anhydrides of the saturated types (i.e. Phthalic, Succinic) and generally modified with resins, fatty oils or fatty acids. The name of the modifier must be shown. (See also "Polyester Resin").
- Butadiene-Styrene Resin - (A synthetic resin made from various ratios of Butadiene and Styrene or their homologues)
- Chlorinated Biphenyl - (See Chlorinated Resin)
- Chlorinated Paraffin - (A resin made by the reaction of Chlorine on Paraffin)
- Chlorinated Resin - (A synthetic resin derived from the introduction of chlorine into the molecules of hydrocarbons)
- Chlorinated Rubber - (A product formed by the chlorination of rubber containing about 65% chlorine)
- Coumarone-Indene Resin - (A synthetic resin derived from coal tar hydrocarbons produced in the coking of coal in by-product coke ovens)
- Ester Gum - (A resin made from rosin and a polyhydric alcohol, Ex.: Glycerol, pentaerythritol)
- Latex - (A water suspension of microscopic particles of natural or synthetic rubber. The percent of the latex solids and water must be shown)
- Maleic Ester Resin - (A synthetic resin made from maleic acid or maleic anhydride and a polyhydric alcohol)
- Maleic Resin - (A resin made from a natural resin and maleic anhydride or maleic acid)
- Melamine Resin - (A synthetic resin made from melamine and an aldehyde)
- Natural Rubber - (A high-molecular-weight hydro carbon, principally polyisoprene)
- Penta Maleic Resin - (A resin made from maleic acid or maleic anhydride and pentaerythritol)
- Penta Ester Gum - (A resin made from rosin and pentaerythritol; see Ester Gum)
- Penta Rosin Ester - (A resin made from rosin and Pentaerythritol; see Ester Gum)
- Petroleum Resin - (A synthetic resin produced by the polymerization of hydrocarbons of petroleum origin)
- Phenol Formaldehyde Resin - (See Phenolic Resin)
- Phenolic Resin - (A synthetic resin made from phenols and aldehydes)
- Phenolic Ether Resin - (A synthetic resin derived from an Epichlorohydrin Bisphenol Copolymer)
- Polyester Resin - (A synthetic resin made from polyhydric alcohols and polybasic acids or anhydrides of the unsaturated type, i.e. maleic, fumaric, & citraconic - see also Alkyd Resin)

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# SYNTHETIC RESINS continued

- Polystyrene - (See Styrene Resin)
- Processed Rosin - (Rosin that has been treated with heat or catalysts or both, with or without added chemical substances, so as to cause substantial change in the structure of the rosin acids, as isomerization, hydrogenation, dehydrogenation, or polymerization without substantial effect on the carboxyl group)
- Rosin Salts - (A resin obtained when rosin is fused with a metal salt to form the corresponding metallic resinates)
- Rubber Resin - (Resinous derivatives of natural and synthetic rubber)
- Silicone Resin - (A synthetic resin which is a compound chemically classed as organo-polysiloxanes)
- Styrene Copolymer - (See Styrene Resin)
- Styrene Resin - (A synthetic resin made from Vinyl Benzene)
- Terpene Resin - (A synthetic resin formed by the polymerization of terpenes, or polymerization of terpenes with other resin forming materials)
- Urea Resin - (A synthetic resin made from urea and an aldehyde)
- Vinyl Resin - (A synthetic resin made from vinyl compounds. This does not include the acrylics or styrenes)

(Modification of the above terms (Synthetic Resins), as defined, may be labeled by giving the name of the resin and the name of the modifier. For example: An "Alkyd Resin" modified with linseed oil may be labeled as "Linseed-Alkyd Resin". A "Phenolic Resin" modified with ester gum may be labeled as "Ester Gum-Phenolic Resin".)

# Note - Synthetic Resins modified with oil fatty acids may be labeled by giving the name of the resin preceded by the name of the oil from which the acids were obtained. Ex. "Soya Alkyd."

# SOLVENTS AND THINNERS

- Alcohol - (Organic Solvents characterized by the hydroxyl group (OH).)
- Aliphatic Hydrocarbons - (Straight chain hydrocarbons derived from paraffin base crude oil or the paraffin part of a mixed base crude oil)
- Aromatic Hydrocarbons - (Characterized by the benzene nucleus)
- Aromatic Solvents - {See Aromatic Hydrocarbons}
- Aromatic Thinners - { " " " }
- Coal Tar Thinners - (Aromatic Hydrocarbons derived from the condensed liquid from the destructive distillation of coal. Ex.: Hi-Flash Naphtha)
- Coal Tar Distillates - (See Coal Tar Thinners)
- Esters - (Chemical Compounds used as solvents having the general formula  $RCOOR'$ , where R & R' are the same or different alkyl groups)
- Hi-Flash Naphtha - (See Coal Tar Thinners)
- Kerosene - (A fraction derived from the distillation of petroleum with an average boiling range of 150 - 250 deg. C.)
- Ketones - (Chemical Compounds used as solvents characterized by the carbonyl (C:O) group, having the general formula  $RCOR'$  where R & R' are the same or different alkyl groups)
- \* Mineral Spirits - (ASTM Petroleum Spirits)
- \* Mineral Thinner - (ASTM Petroleum Spirits)
- Naphtha - (Petroleum Spirits of a relatively low boiling range. This term may be used to describe the different fractions such as V.M. & P Naphtha, Solvent Naphtha, etc.)
- \* Petroleum Distillate - (See ASTM Petroleum Spirits)
- \* Petroleum Spirits
- \* Petroleum Thinner - (ASTM Petroleum Spirits)
- Terpenes - (The name of the terpene in each instance must be shown. Ex.: Turpentine, Dipentene Pine Oil, etc.)
- \* Turpentine

# MISCELLANEOUS

- |                  |              |                                                                                                                                                                                                                             |
|------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Amino Acids      | Lecithin     | * Portland Cement                                                                                                                                                                                                           |
| Asbestos         | Paraffin Oil | Protein                                                                                                                                                                                                                     |
| Asphalt          | Paraffin Wax | Pumice                                                                                                                                                                                                                      |
| Asphalt          | Paris Green  | Starch                                                                                                                                                                                                                      |
| Asphaltic Oils   | Pine Oil     | Treated Starch                                                                                                                                                                                                              |
| Asphaltum        | Pine Tar     | Wurtzilite                                                                                                                                                                                                                  |
| Blown Asphalt    | Pitch        | Zein                                                                                                                                                                                                                        |
| Casein           |              |                                                                                                                                                                                                                             |
| Coal Tar         | Plasticizer  | - A definite synthetic organic chemical compound used to overcome brittleness or to develop flexibility. This term shall not be used in lieu of terms otherwise provided for in Division of Chemistry Announcement PL-12-A. |
| Copper Resinate  |              |                                                                                                                                                                                                                             |
| Cottonseed Pitch |              |                                                                                                                                                                                                                             |
| * Creosote       |              |                                                                                                                                                                                                                             |
| * Creosote Oil   |              |                                                                                                                                                                                                                             |
| Dextrine         |              |                                                                                                                                                                                                                             |
| Driers           |              |                                                                                                                                                                                                                             |
| Emery            |              |                                                                                                                                                                                                                             |
| Gilsonite        |              |                                                                                                                                                                                                                             |
| Glue             |              |                                                                                                                                                                                                                             |
| * Hydrated Lime  |              |                                                                                                                                                                                                                             |

GLD006123

CLASSIFICATION OF ORGANIC COLORS OR PIGMENTS

I. NITROSO GROUP: (-NO) group present. Preparation depends on reaction between phenols and nitrous acid.

A. Pigments made from Nitroso-b-naphthol reacted with iron salts and with or without precipitation on a suitable base such as Alumina Hydrate. (Pigment Green B)

II. NITRO GROUP: (-NO<sub>2</sub>) group present. No apparent chromophore group aside from the nitro group itself. However, there is probably an equilibrium between the nitro and orthoquinonoid structure with the latter being primarily responsible for the color.

A. Pigment made by nitrating 1-Naphthol-2, 4, 7-tri-sulfonic acid precipitated on a suitable base as alumina hydrate with a solution of BaCl<sub>2</sub>. (Naphthol Yellow S)

III. AZO GROUP: (-N=N-) "azo" group present. Fundamentally formed by the coupling of a diazonium salt with a phenolic or an amino compound.

A. The Pigment Type - Insoluble on formation and contains no salt forming groups.

1. No other distinguishing characteristics except as follows:

a. Made by coupling diazotized m-nitro-p-toluidine with alkaline b-Naphthol. (Toluidine Red)

b. Made by coupling diazotized p-Nitroaniline with alkaline b-Naphthol. (Para Red)

c. Made by coupling diazotized p-Nitroaniline with alkaline b-Naphthol and treating with copper salts. (Para Brown)

d. Made by coupling diazotized 2, 4-Dinitroaniline with b-Naphthol. (Dinitroaniline Orange or Permanent Orange.)

e. Made by coupling diazotized o-chloro-p-nitroaniline with b-Naphthol. (Chlorinated Paranitraniline)

f. Made by coupling diazotized o-nitroaniline with b-Naphthol. (Orthonitroaniline Orange)

2. Distinguished in that they are formed from a diazonium salt and Naphthol AS compounds or its homologues. Naphthol AS Compounds and its homologues are those formed by reaction of b-hydroxy naphthoic acid and an aryl amine.

a. Made by coupling diazotized m-nitro-p-toluidine & the m-nitroanilide of b-hydroxy naphthoic acid. (Toluidine Maroon)

b. All compounds under III-A-2 except III-A-2-a. (Arylide Red & Arylide Maroon)

3. Distinguished in that they are formed from a diazonium salt & Acetoacetic Arylides. Acetoacetic Arylides are formed from an amino compound and acetoacetic ester.

- a. Made by coupling diazotized m-nitro-p-toluidine with acetoacetanilide. (Hansa Yellow G)
- b. Made by coupling diazotized p-chloro-o-nitroaniline with acetoacetanilide. (Hansa Yellow 3G)
- c. Made by coupling diazotized o-nitroaniline with acetoacetanilide. (Hansa Yellow 5G)
- d. Made by coupling diazotized p-chloro-o-nitroaniline with acetoacet-o-chloroanilide. (Hansa Yellow 10G)
- e. Made by coupling tetrazo compounds of benzidine derivatives with acetoacetanilide or its derivatives. (Benzidine Yellow)
- f. Made by coupling diazotized o-tolidine and acetoacetic ester. (Tolidine Yellow)

4. Distinguished by the presence of the pyrazolone ring structure.

- a. Made by coupling 2, 5, -dichloroaniline with 1-phenyl-3-methyl-5pyrazolone. (Hansa Yellow R)
- b. Made by coupling o-toluidine with 1-phenyl-3methyl-5-pyrazolone. (Chrome Yellow L)
- c. Made by coupling dichlorobenzidine with Phenyl Methyl Pyrazolone. (Benzidine Orange)

B. The Soluble Azo Type - Usually contains a sulfonic acid group making the dyestuff soluble & permitting conversion to the insoluble heavy metal salt. Usually precipitated on a suitable base as alumina hydrate with solution of BaCl<sub>2</sub>.

1. No other distinguishing characteristics except as follows:

- a. Made by coupling diazotized Sulfanilic Acid with b-naphthol. (Persian Orange)
- b. Made by coupling diazotized m-xylidine with 2-naphthol-3, 6-disulfonic acid. (Scarlet Lake)
- c. Made by coupling diazotized a-naphthylamine with 2-naphthol-3-6disulfonic acid. (Azo Bordeaux)
- d. Made by coupling diazotized anthranilic acid with 2-naphthol-3-6-disulfonic acid. (Pigment Scarlet)
- e. Made by coupling diazotized naphthionic acid with 2-naphthol-3-6-disulfonic acid. (Amaranth Maroon)

f. Made by coupling diazotized aniline with 1-p-sulpho-phenyl-3-carboxy-5-pyrazolone. (Tartrazine Yellow)

2. Distinguished in that the dyestuff is an Anthosine type made by coupling diazo compounds with dichlorobenzoyl-K-acid. K-acid is: 1-amino-8-naphthol-4, 6-disulfonic acid. (Anthosine Red)

C. The Difficultly Soluble Azo Type - Usually contains a sulfonic acid group which, although the sodium salt of the dye is difficultly soluble, may be converted into a heavy metal salt making the group very insoluble to organic solvents & oils. The lithols & others in this group may be resinated or unresinated. Most of the pigments are in the form of Barium, Calcium, Strontium, Lead, Manganese, or Nickel products.

1. Made by coupling diazotized 2-naphthylamine-1-sulfonic acid with b-naphthol. (Lithol Red or Lithol Maroon)

2. Made by coupling diazotized p-toluidine-m-sulfonic acid with b-hydroxy naphthoic acid. (Lithol Rubine)

3. Made by coupling diazotized 2-chloro-5-toluidine-4-sulfonic acid with 2-naphthol. (Red Lake C)

4. Made by coupling diazotized Anthranilic acid with b-naphthol. (Red Lake D)

5. Made by coupling diazotized a-naphthylamine with 1-naphthol-5-sulfonic acid. (Helio Bordeaux)

6. Made by coupling diazotized p-nitroaniline-o-sulfonic acid with b-naphthol. (Red Lake P)

7. Made by coupling diazotized aniline with b-hydroxy naphthoic acid. (Red Lake R)

8. Made by the azo coupling of various aromatic amines with b-hydroxynaphthoic acid other than III-C-2, & III-C-7. (BON Red & BON Maroon)

9. Nickel complexes of azo compounds with pyridine or its derivatives as part of the color producing structure. (Azo Nickel Yellow)

IV. BASIC DYE GROUP: This group is characterized by the treatment of various Basic Dyes (fugitive to light) with Phosphotungstic, Phosphomolybdic, or phosphotungstomolyndic acids to make permanent toners and lakes. The basic dyes are synthetic organic coloring matters with amino or substituted amino group present.

A. Triphenylmethane Class

1. Made from dimethylaniline and benzaldehyde. Usually found in the oxalate form. (Malachite Green)

2. Made from o-chlorobenzaldehyde & dimethylaniline. (Rhoduline Blue 6G)
3. Made from diethylaniline & benzaldehyde. (Brilliant Green)
4. Made by heating aniline, o-toluidine, p-toluidine, & their hydrochlorides in nitrobenzene with iron & zinc chloride. Not a chemical individual. (Fuchsine)
5. Made from 2, 5-dichlorobenzaldehyde with mono-methyl-o-toluidine. (Glacier Blue)
6. Formed in the oxidation of dimethylaniline with Cupric chloride in a mixture of dimethylaniline, phenol, Sodium chloride & Copper Sulfate. (Methyl Violet)
7. Chiefly a mixture of the hydrochlorides of benzyl-penta-methyl-pararosaniline & hexamethyl-pararosaniline. (Benzyl Violet)
8. Formed in the reaction of the dichloride of Michler's Ketone with dimethylaniline. (Crystal Violet)
9. Formed in the reaction of Michler's Ketone with phenyl-a-naphthylamine. (Victoria Blue & Victoria Green)
10. Formed in the reaction of tetraethyl-diam'no-benzo-phenone with phenyl-a-naphthylamine. (Victoria Pure Blue)

B. Xanthene Class

1. Formed in the reaction of Diethyl-m-aminophenol with phthalic anhydride. (Rhodamine B)
2. Formed in the reaction of mono-ethyl-m-aminophenol with phthalic anhydride & then reacting with ethyl alcohol. (Rhodamine 6G)

C. Thiazine Class

1. Formed by heating p-toluidine with sulphur in the presence of lead oxide at high temperature. (Thioflavin)

V. ACID DYE GROUP: Made from dyestuff largely of the di- & tri- phenyl-methane classes. Contains amino or substituted amino groups & sulfonic acid groups. (Most contain more than one sulfonic acid group.)

- A. Made by condensing benzaldehyde with n-benzyl-n-ethyl aniline & then sulfonating and made into a lake. (Acid Green Lake)
- B. Made by condensing benzaldehyde-o-sulfonic acid with n-benzyl-n-ethylaniline & then sulfonating, oxidizing & converting to the ammonium salt and made into a lake. (Peacock Blue Lake)

VI. INDIGOID GROUP: Bear a structure similar to indigo.

A. The nitrogens in the indigoid structure replaced by sulphur.  
(Thioindigo Toner)

VII. XANTHENE DYE GROUP: Characterized by the Quinonoid structure.

A. Acid Type

1. Made by brominating the condensation reaction between phthalic anhydride & resorcinol (Eosin Dye) & ppt. on Alumina hydrate with Lead Nitrate. (Eosin Lake)

B. Quinoline Type

1. Made from reaction of quinaldine with phthalic anhydride, addition of sulfonic acid group, & precipitation as the Barium Lake. (Quinoline Yellow Lake)

VIII. ANTHRAQUINONE GROUP: Characterized by the anthraquinone structure.

A. Non-Complex Quinones - (Consists of only one molecule of anthraquinone or its derivatives)

1. Made from 2-anthraquinonesulfonic acid by fusion with caustic soda. Metallic salts give various colors. (Alizarine or Madder Red & Blue)

B. Complex Ring Quinones - In most cases consisting of 2 molecules of anthraquinone or its derivatives, linked together through nitrogen or carbon.

1. Made by heating a-amino-anthraquinone with benzoyl-chloride. (Algol Yellow)

2. Made by the condensation of a-aminoanthraquinone & b-chloroanthraquinone. (Indanthrene Orange)

3. Made by heating b-aminoanthraquinone or its derivatives with caustic potash. (Indanthrene Blue, Green, Violet)

4. Derived from Benzanthrone (Anthraquinone Violet)

IX. PHTHALOCYANINE GROUP: Based structually on tetra-benzo-tetra-aza-porphin.

A. Made by the introduction of Copper into the basic structure in place of the internal hydrogens attached to nitrogen. (Copper Phthalocyanine Blue)

B. Made by the introduction of chlorine into the benzene rings of Copper Phthalocyanine Blue. (Copper Phthalocyanine Green)

C. Made by sulfonating the benzene rings of Copper Phthalocyanine Blue. (Copper Phthalocyanine Bluish-Green)

D. No metal introduced in place of the internal hydrogens.  
(Phthalocyanine Blue)

X. MISCELLANEOUS:

A. A mixture in varying amounts of an organic color and Iron Oxide with Barium Sulfate often added to obtain the correct shade.  
(Tuscan Red)

B. Pigment of organic origin resulting from decomposition of vegetation, containing approximately 64% organic matter; 28% water; & aluminum oxide, iron oxide, calcium oxide, &/or alkali salts. (Van Dyke Brown)

C. A spirit soluble aniline blue-black dye. (Nigrosine)