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see "Monsanto Magazine"
June, 1942 - last page

0683738

MONSANTO CHEMICALS

26th Edition

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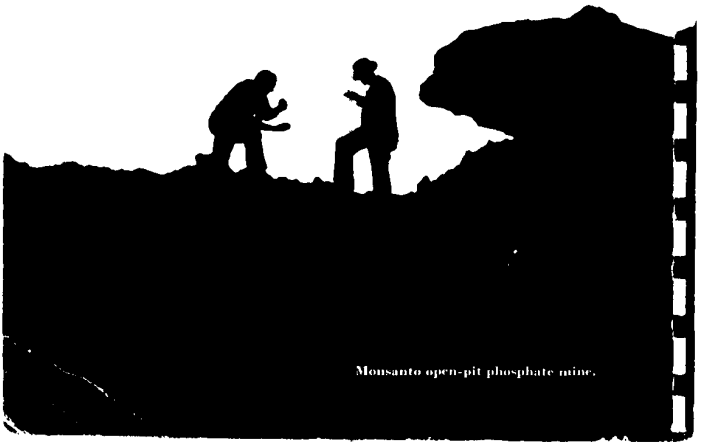

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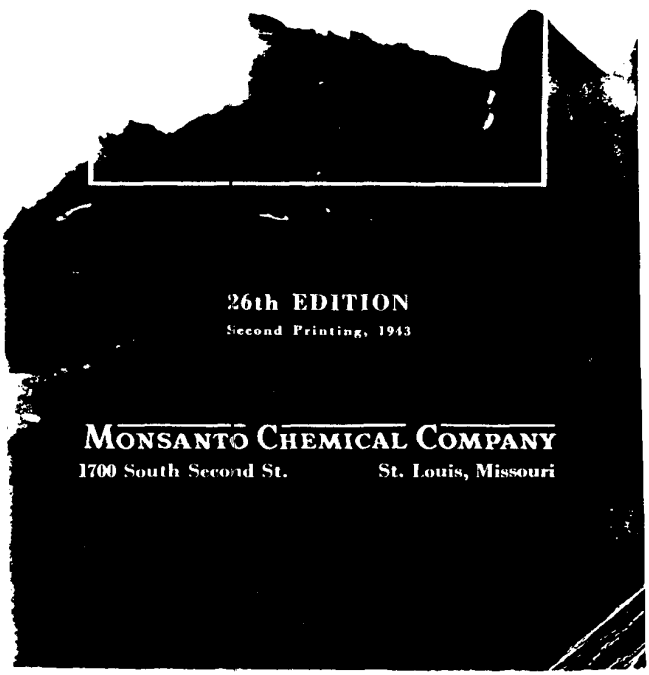
MONSANTO CHEMICALS



26th EDITION

Second Printing, 1943

MONSANTO CHEMICAL COMPANY
1700 South Second St. St. Louis, Missouri

District Offices

AKRON, OHIO
2nd National Building
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BIRMINGHAM, ALA.
Brown Marx Building
Telephone: 7-0877

BOSTON, MASS.
Everett Station
Telephone: EVEre t 5010

CHARLOTTE, N. C.
Johnston Building
Telephone: 2-3454

CHICAGO, ILL.
Tribune Tower
Telephone: WHitehall 6750

DETROIT, MICH.
427 Fisher Building
Telephone: TRinity 2-5728

LONDON, ENGLAND
Victoria Station House

LOS ANGELES, CALIF.
605 West Olympic Blvd.
Telephone: MIchigan 6048

MONTREAL, CANADA
378 St. Paul Street West
Telephone: MArket 1236

NEW YORK, N. Y.
30 Rockefeller Plaza
Telephone: CIrcle 7-0170

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100 Bush Street
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183 Front Street East
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MELBOURNE, AUSTRALIA
Somerville Road
Braybrook W. 19

MANCHESTER, ENGLAND
King's House
King's Street West

Works

ANNISTON, ALABAMA
CARONDELET, MISSOURI
CAMDEN, NEW JERSEY
DAYTON, OHIO
EVERETT, MASS.
KARNACK, TEXAS
MONSANTO, ILLINOIS
MONSANTO, TENNESSEE
NITRO, WEST VIRGINA
NORFOLK, VIRGINIA
TEXAS CITY, TEXAS
TRENTON, MICHIGAN
SPRINGFIELD, MASS.
ST. LOUIS, MISSOURI
MONTREAL, CANADA
RUABON, N. WALES
SUNDERLAND, ENGLAND
MELBOURNE, AUSTRALIA

Divisions and Associated Companies

MERRIMAC DIVISION, Everett Station, Boston, Mass.

ORGANIC CHEMICALS DIVISION, 1700 S. Second St., St. Louis, Mo.

PHOSPHATE DIVISION, 1700 S. Second St., St. Louis, Mo.

PLASTICS DIVISION, Springfield, Mass.

TEXAS DIVISION, Karnack, Texas.

RUBBER SERVICE DEPARTMENT, 2nd National Building, Akron, Ohio.

CENTRAL RESEARCH DEPARTMENT, Dayton, Ohio.

NEW ENGLAND ALCOHOL COMPANY, Everett Station, Boston, Mass.

SHAWINIGAN RESINS CORPORATION, Springfield, Mass.

MONSANTO (CANADA), LTD., 378 St. Paul St. West, Montreal, Quebec.

MONSANTO CHEMICALS LTD., Victoria Station House, Victoria St., London, S. W. 1, England.

MONSANTO (AUSTRALIA) PTY. LTD., Somerville Road, Braybrook W. 19, Melbourne, N. S. W., Australia.

Cable Address

"Monsanto" St. Louis
Codes: ABC, 6th and 7th
Acme, Bentley's and Bentley's Second

CONTENTS

HOW TO USE THIS BOOK

This is an entirely new book, designed to bring together in the most convenient and useful form possible, sufficient information on all Monsanto products to serve as a buying guide and to enable users of chemicals to determine whether a material unfamiliar to them is of sufficient interest to merit further consideration. Those desiring more detailed information on specific products are referred to the Monsanto literature listed on page 145 or to their nearest Monsanto district office. Locations of these offices are given on page 2.

All products are listed alphabetically in the main section of the book according to their common chemical names or Monsanto trade names. Where a product has more than one common name, or both a trade name and a chemical name, it has been attempted to list all of these along with proper cross references, thus making the book self-indexing and eliminating the trouble of referring to an index first and then to a given page number.

To assist users of chemicals in acquainting themselves with the Monsanto products applicable in their particular industry, a classification of products according to industries is given on page 11. This classification should not be considered final or complete. New uses for Monsanto chemicals and plastics are opening up daily, some in fields entirely unsuspected a short time before. Likewise, no product should be considered as limited to the uses mentioned in this book.

The general data section beginning on page 149 contains a variety of physical and chemical information which will be useful in connection with certain products described in the alphabetical section. Specific reference to this data is made under products to which any of it applies.

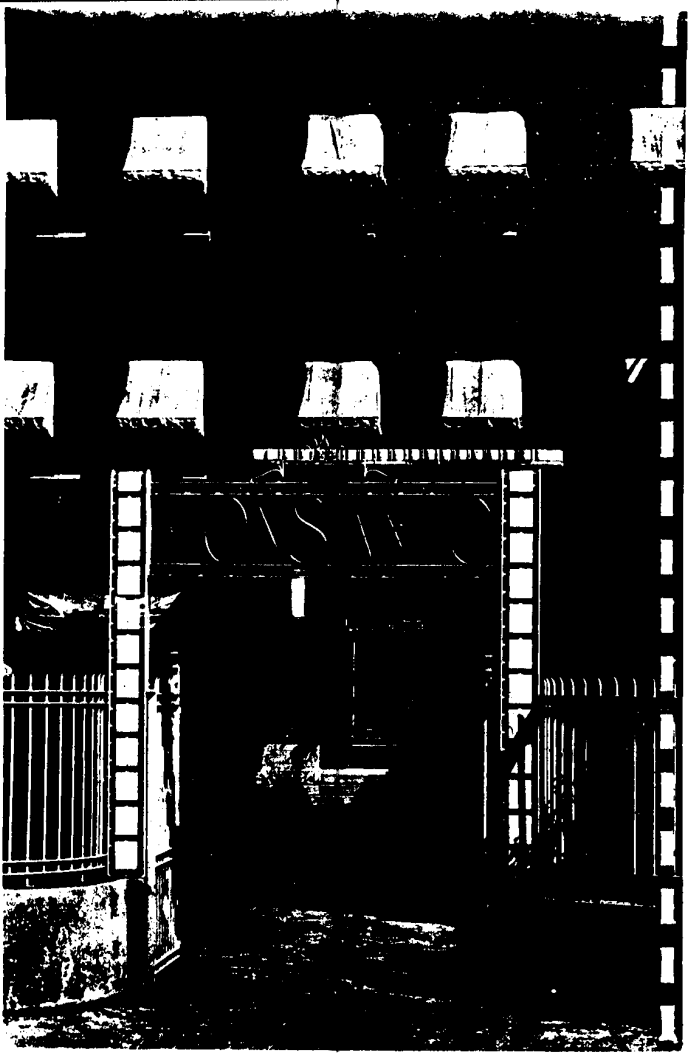
If as you use this book suggestions come to mind as to how it might be made more helpful we would appreciate your passing them along to us. In this way we will be able to make our next edition even more useful to you and the many other users of Monsanto products.

A WORD ABOUT CONTAINERS

Because of the rapid changes taking place in the availability of containers at the time this book was compiled, no attempt was made to include container data of any kind. Users of Monsanto products may rest assured, however, that at all times their orders will be shipped in the highest quality and most satisfactory containers available. For current container information write your nearest Monsanto district office.

* * *

CAUTION: The products described in this book are primarily for manufacturing use. They should not be used on the human body, either internally or externally, until their safety for the use intended is clearly established, and then not unless under competent direction.



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MONSANTO — The Organization

Monsanto Chemical Company, founded in 1901 by John Francis Queeny and given his wife's maiden name, today is one of the major American producers of chemicals and plastics. Stemming from broadly diversified chemical raw materials such as coal tar, petroleum, phosphorus, cellulose, salt and sulfur, Monsanto products number in the hundreds and find use in virtually every branch of manufacturing industry.

The company's five divisions and Canadian affiliate operate fourteen plants in North America, and subsidiary companies operate three overseas. Four government plants are in operation or under construction.

ORGANIC CHEMICALS DIVISION

The Organic Chemicals Division is the lineal descendent of the original Monsanto works. To considerable extent, the division's products, too, derive from the research program begun in the first days. The original Monsanto product, saccharin, is now one of many made and sold by the division. Others fall in a wide variety of classifications including pharmaceuticals, drug intermediates, dye intermediates, petroleum additives, flavorings, plasticizers, resins, insecticides and heavy chemicals.

The division's largest plant is on the site of the original works at St. Louis. Here are manufactured the fine chemicals, many derived from coal tar, that established Monsanto's early reputation, as well as numerous other classes of products. Across the Mississippi River from St. Louis, in Monsanto, Illinois, the Organic Chemicals Division operates a large plant producing heavy chemicals and organic intermediates.

At Norfolk, Virginia, the division operates a plant manufacturing intermediates.

Rubber Service Department

Monsanto's Rubber Service Department, part of the Organic Chemicals Division, specializes in supplying the needs of one industry. It provides the rubber industry with many chemicals such as accelerators, antioxidants, mold lubricants, pigments, colors, preservatives, softeners and plasticizers. A modern laboratory is maintained for solving compounding problems. The facilities of this laboratory and the help of its trained and experienced staff is available without cost to users of Rubber Service materials.

The Rubber Service headquarters are at Akron, Ohio, in the

heart of the rubber manufacturing district. The plant is at Nitro, West Virginia.

MERRIMAC DIVISION

Monsanto's Merrimac Division, headquartered at Everett Station, Boston, manufactures a diversified line of heavy and industrial chemicals. Included among its products are acids, lacquers, alcohol, solvents, intermediates, tanning chemicals, commercial gases and lampblack.

The division operates three plants, the largest being at Everett Station, Boston. Adjoining this are the facilities of the New England Alcohol Company, a partly owned subsidiary of Monsanto. At Camden, New Jersey, Monsanto lampblack is manufactured.

Some of the products of the Merrimac Division duplicate those made at other plants of the company and thus provide an eastern source of supply for Monsanto customers.

PHOSPHATE DIVISION

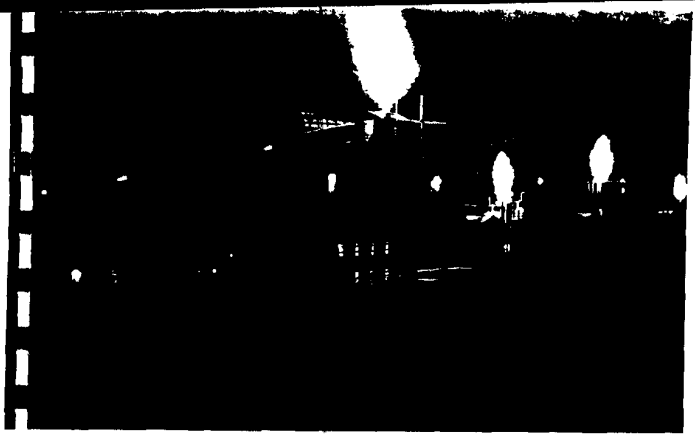
The phosphates and other compounds of phosphorus are, as a class, increasing in importance. They are finding use in such varied fields as medicinals, water treatment, dentifrices, soaps, metal treatment, and foods.

Operations of Monsanto's Phosphate Division are based on the production of elemental phosphorus at Monsanto, Tennessee. At this location, phosphate earth is dug from large open pit mines and charged into huge electric furnaces where the phosphorus is freed in elemental form.

From elemental phosphorus comes phosphoric acid, the parent of the large family of phosphates which are made in the division's other plants at Anniston, Alabama, Carondelet, Missouri, and Trenton, Michigan. At Anniston, in addition to phosphates, those products of the division not derived from phosphorus, such as diphenyl, Aroclors, Santowax, calcium carbide and aluminous abrasives are made. Headquarters for the division are at St. Louis.

PLASTICS DIVISION

Monsanto's Plastics Division has attained a leading position in the new and growing plastics industry. The development of new plastics and their application is a continuing and accelerating process, a fact



Monsanto, Tennessee, phosphorus furnace plant at night

which guides the policies of the division from research through production to sales and advertising.

Monsanto's plastics operations are consolidated at Springfield, Massachusetts. As a result of a construction program begun in 1938 there have been several major additions at Springfield, including a plant for the production of Resinox phenol-formaldehyde resins and molding materials, and the plant of the Shawinigan Resins Corporation, a Monsanto affiliate manufacturing vinyl resins.

TEXAS DIVISION

In 1941 Monsanto was requested by the Rubber Reserve Company, a government agency, to design, construct and operate a plant to manufacture an important raw material for synthetic rubber. The same year, at the request of the Ordnance Department of the United States Army, the company contracted to operate a major plant for the manufacture of munitions. The Texas Division was created to operate these two plants. The division makes no products for general sale.

CENTRAL RESEARCH DEPARTMENT

Research at Monsanto is both a divisional and a centralized function. Each division maintains its own research laboratories—Organic

Chemicals Division at St. Louis and Nitro, Phosphate Division at Anniston and Carondelet, Plastics Division at Springfield, and Merrimac Division at Everett. In each, the reasearch function is kept separate from other laboratory operations, such as analytical control and testing.

The work of the divisional research laboratories is supplemented and augmented by the Central Research Department at Dayton, Ohio. It is here that much of the fundamental research of the company is carried out. The Central Research laboratories are equipped with the latest type of research aids, including such equipment as the electron microscope and X-ray. The department carries on special investigations in cooperation with the operating divisions and also carries out studies of an exploratory nature that may not be related to the company's present products.

TECHNICAL SERVICE

Each of the Monsanto divisions maintains a technical service staff comprised of qualified personnel who are experienced in the chemical problems and requirements of a wide variety of industries. Industrial users of chemicals are invited to make use of these men. Their function is to provide sound technical counsel on problems relating to the use of chemicals.

Plant of the Shawinigan Resins Corporation, a Monsanto affiliate

SOME INDUSTRIES SERVED BY MONSANTO AND PRODUCTS SUPPLIED

AGRICULTURAL
Abrasives
Calcium Phosphate, Di
Calcium Sulfate
Ferric Chloride
Ferrophosphorus
Lacquers
Muriatic Acid
Nitre Cake
Nitric Acid
Phosilage
Phosphoric Acid
Plastics
Sodium Sulfate
Sulfur
Sulfuric Acid
Wetting Agents (Santomerse)

APPLIANCES
Abrasives
Cresol
Ferric Chloride
Lacquers
Lampblack
Maleic Anhydride
Muriatic Acid
Nitric Acid
Phosphoric Acid
Phthalic Anhydride
Plastics
Solvents
Sulfuric Acid

AUTOMOTIVE
Abrasives
Acetic Acid
Alcohol
Aluminum Sulfate
Amyl Acetate
Aroclors (Chlorinated Diphenyl)
Battery Acid
Benzene
Butyl Acetate
Butyl Alcohol
Caustic Soda
Chlorine
Cresol
Diacetone Alcohol
Dibutyl Phthalate
Diethyl Phthalate
Ethyl Acetate
Ferric Chloride
Ferrophosphorus
Lacquers
Muriatic Acid
Nitric Acid
Phenol
Phosphoric Acid
Phthalic Anhydride
Plastics
Rubber Accelerators
Rubber Anti-Oxidants
Santicizer 9
Sodium Acetate
Sodium Phosphates
Sodium Sulfate
Sulfur
Sulfuric Acid
Tanning Chemicals
Thinners
Tricresyl Phosphate

AVIATION
Abrasives
Alcohol
Amyl Acetate
Butyl Acetate
Ethyl Acetate
Finishes
Lacquers
Phosphoric Acid
Plastics
Primers
Solvents
Sulfuric Acid
Surfacers
Thinners

CARPET and RUGS
Acetic Acid
Aluminum Sulfate
Glauber's Salt
Lacquers
Latex Accelerators
Nitre Cake
Sodium Biaulfite, Anhydrous
Sodium Phosphate, Tri
Sodium Pyrophosphate, Tetra
Sodium Sulfate, Anhydrous
Sulfuric Acid
Wetting Agent (Santomerse)

CERAMICS
Abrasives
Bone Ash
Muriatic Acid
Phosphoric Acid
Salt Cake
Sodium Pyrophosphate, Tetra
Sulfuric Acid
Wetting Agent (Santomerse)

CHEMICAL PROCESS
Acetic Acid
para-Acetyl-Amino-Benzenesulfonechloride
Alcohol
Aluminum Sulfate
Ammonia, Aqua
Amyl Acetate
ortho-Anisidine
Butyl Acetate
Calcium Pyrophosphate
Caustic Soda
Chlorine
meta-Cresol
ortho-Cresol
para-Cresol
Cresylic Acid
Diacetone Alcohol
Dinitrochlorobenzene
Ethyl Acetate
Mersol (Solvent)
Methyl Salicylate
Mixed Acid
Monochlorobenzene
Monsanto Salt
Muriatic Acid
Nitric Acid
ortho-Nitroaniline
para-Nitroaniline
ortho-Nitroanisole
Nitrocellulose Solution
ortho-Nitrochlorobenzene
para-Nitrochlorobenzene
para-Phenetidin
Phenol
Phosphoric Acid
Phosphorus Oxychloride
Phosphorus Trichloride
Phthalic Anhydride
Piperidine
Pyridine
Salicylic Acid

Salt Cake
Sodium Aluminate
Sodium Bisulfite
Sodium Pyrophosphate, Tetra
Sodium Sulfite
Solvents
Sulfuric Acid
Sulfuryl Chloride
Thiourea
Tricresyl Phosphate
para-Toluenesulfonamide
para-Toluenesulfonchloride
Wetting Agents

COSMETICS AND PERFUMES

Alcohol
Benzoic Acid
Benzyl Chloride
Calcium Phosphate, Di
Calcium Phosphate, Tri
Caustic Soda
Coumarin
meta-Cresol
Diethyl Phthalate
Manicure Lacquer
Manicure Lacquer Remover
Methyl Salicylate
Phosphoric Acid
Phthalic Anhydride
Potassium Pyrophosphate, Tetra
Salicylic Acid
Vuepak
Wetting Agent

DAIRY PRODUCTS

Ammonia, Anhydrous
Ammonium Phosphate, Mono
Coumarin
Ethavan
Merelor (Sodium Hypochlorite)
Santamine
Sodium Acid Pyrophosphate
Sodium Phosphate, Di
Sodium Phosphate, Tri
Sodium Pyrophosphate, Tetra
Sulfuric Acid
Vanillin

DENTAL PRODUCTS

Alcohol
Benzoic Acid
Calcium Phosphate, Di
Calcium Phosphate, Tri
Calcium Pyrophosphate
Crysalba
Methyl Salicylate
Plastics
Phosphoric Acid
Saccharin
Sodium Benzoate

DYESTUFF MANUFACTURE

Acetic Acid
Aluminum Sulfate
ortho-Aminodiphenyl
Aniline Oil
ortho-Anisidine
para-Anisidine
Benzotrichloride
Benzoyl Chloride
Benzyl Chloride
ortho-Chloroaniline
meta-Chloroaniline
para-Chloroaniline
para-Chloro-meta-Cresol
ortho-Chlorophenol
para-Chlorophenol
Chlorosulfonic Acid
ortho-Chloro-para-Toluene-Sodium Sulfonate (Monsanto Salt)
ortho-Cresol
para-Cresol
Cyclohexylamine
Dichloroaniline
ortho-Dichlorobenzene
Dichlorophenol
Dinitroaniline
Dinitrochlorobenzene
Glauber's Salt
H Acid
Mixed Acid
Monochlorobenzene
Monsanto Salt
Nitre Cake
ortho-Nitroaniline
para-Nitroaniline
ortho-Nitroanisole
ortho-Nitrochlorobenzene
meta-Nitrochlorobenzene
para-Nitrochlorobenzene
Nitrodichlorobenzene
ortho-Nitrophenol
para-Nitrophenol
Oil of Vitriol
ortho-Phenetidin
para-Phenetidin
Phenol
Phosphoric Acid
Phosphorus Oxychloride
Phosphorus Trichloride
Phthalic Anhydride
Sodium Acetate
Sodium Acid Pyrophosphate
Sodium Bisulfite
Sodium Sulfate
Sulfuryl Chloride
Thiourea
para-Toluenesulfonamide
para-Toluenesulfonchloride
para-Toluenesulfonic Acid
Wetting and Spreading Agents (Areskap, Aresket, Aresklene, Santomerse)

ELECTRICAL

Aroclors
Cable Dope
Lacquers
Lampblack
Nitric Acid
Phosphoric Acid
Plastics
Sulfuric Acid

ENGRAVING

Acetic Acid
Nitric Acid
Perchloride of Iron
Plastics
Sulfuric Acid
Wetting Agent (Santomerse)

FLORISTS AND FRUIT GROWERS

Ammonia, Anhydrous
ortho-Dichlorobenzene
para-Dichlorobenzene
Muriatic Acid
Sodium Phosphate, Tri
Vuepak
Wetting Agent (Santomerse)

FOOD

Ammonium Benzoate
Benzoic Acid U. S. P.
Calcium Phosphates
Calcium Pyrophosphate
Calcium Sulfate
Coumarin Monsanto
Dry Ice
Ethavan
Ferric Phosphate
Methyl Salicylate
Muriatic Acid
Phosphoric Acid
Phosphoric Acid Paste
Saccharin Monsanto
Sodium Acid Pyrophosphate
Sodium Benzoate U.S.P.

Sodium Bisulfate
Sodium Phosphate, Di
Sodium Phosphate, Mono
Sodium Phosphate, Tri
Vanillin Monsanto

GLASS AND VITREOUS WARE

Abrasives
Bone Ash
Chlorine
Muriatic Acid
Plastics
Salt Cake
Wetting Agent (Santomerse)

INSECTICIDES

Cresol
Dibutyl Phthalate
ortho-Dichlorobenzene
para-Dichlorobenzene
Methyl Salicylate
Sulfur
Trichlorobenzene
Wetting Agent (Santomerse)

LAUNDRY

Chloramine T
Chlorine
Merclor (Sodium Hypochlorite)
Sodium Bisulfate
Sodium Bisulfite
Sodium Phosphate, Tri
Sodium Pyrophosphate, Tetra
Wetting Agent (Santomerse)

LEATHER AND TANNING

Aluminum Sulfate
Ammonia, Aqua
Belt Cement
Caustic Soda
para-Chloro-meta-Cresol
para-Chloro-meta-Xylenol
ortho-Dichlorobenzene
Dopes
Glauber's Salt
Lacquers
Lampblack
Merclor (Sodium Hypochlorite)
Mertanol (Syntan)
Muriatic Acid
Permanol
Phenol
Salicylic Acid
Santotan (Basic Chrome Sulfate)
Sodium Bisulfate
Sodium Bisulfite, Anhydrous
Sodium Phosphate, Di
Sodium Sulfhydrate
Sodium Sulfide
Sulfuric Acid
Wetting and Spreading Agents, (Areskap, Aresket, Aresklene, Santomerse)

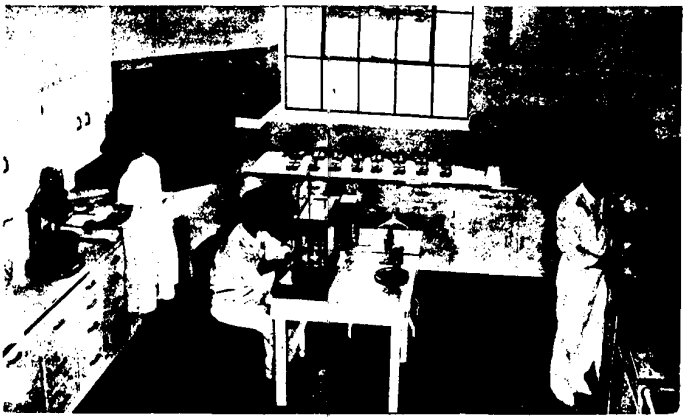
LUMBER

Lacquers
Permasan
Santobrite
Santophen 20

METALS

Abrasives
Ammonia, Aqua
Bone Ash
C. P. Acids
Caustic Soda
Cresylic Acid
Ferrisul (Ferric Sulfate)
Ferrophosphorus
Hibitite
Inhibited Acids
Mixed Acid
Muriatic Acid
Nitric Acid
Phosphoric Acid
Sodium Phosphate, Di
Sodium Phosphate, Tri
Sodium Pyrophosphate, Tetra
Sulfuric Acid
Wetting Agent (Santomerse)
Zinc Chloride Solutions

New baking laboratory at Carondelet for research and testing of phosphates for food products.



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Inspecting safety valves on the electrolytic chlorine cells at Monsanto, Illinois.

MINING

Abrasives
Bone Ash
C. P. Acids
Flotation Agents (Xanthates)
Nitre Cake
Sodium Sulfide
Sodium Sulfite

OIL REFINING

Caustic Soda
Chlorine
Cresols
Muriatic Acid
Phenol
Phosphoric Acid
Santolubes
Santopoid
Santopour
Sulfuric Acid

PACKAGING

Cast Phenolic Resin
Cellulose Acetate
Cellulose Nitrate
Lacquers
Polystyrene
Santicizer-8
Vuepak

PAINT, VARNISH AND LACQUER

Amyl Acetate
Antioxidants
Benzoic Acid
Butyl Acetate
Cotton Solutions
Diacetone Alcohol
Dibutyl Phthalate
Diethyl Phthalate
Dimethyl Phthalate
Ethyl Acetate
Lampblack
Maleic Anhydride
Mertee (Chlorinated Rubber Base Paint)
Monochlorobenzene
Paint Anti-Skinning Materials
Phenol
Phthalic Anhydride
Resins
Santicizers (Phthalyl Glycollates and other Plasticizers)
Santolites (Resins)
Santomask (Deodorant)
Solvent Alcohol (Mersol)
Thinners
Tricresyl Phosphate
Triphenyl Phosphate

PAPER

Alcohol
Aluminum Sulfate, Commercial and Iron Free
Ammonia, Anhydrous
Ammonia, Aqua
Benzoic Acid
Bone Ash
C. P. Acids
Chlorine
Coumarin
Dibutyl Phthalate
Ferric Sulfate
Ferrisul
Lacquers
Muriatic Acid

Salt Cake
Santicizers
Santobrite
Santolites
Santosite
Sodium Aluminate
Sodium Bisulfate
Sodium Bisulfite
Sodium Hypochlorite
Sodium Phosphate, Tri
Sodium Sulfide
Sodium Sulfite
Sulfuric Acid
Tricresyl Phosphate
Wetting Agents

PHARMACEUTICAL

Acetanilid U. S. P.
Acetophenetidin U. S. P.
Acetyl Salicylic Acid (Aspirin)
Benzoic Acid U. S. P.
Caffeine U. S. P.
Calcium Phosphate, Di
Chloral Hydrate U. S. P.
Chloramine-T U. S. P.
Dichloramine-T N. F.
Glycerophosphates
Magnesium Phosphates.
Methyl Salicylate U.S.P.
Phenol U. S. P.
Phenolphthalein U. S. P.
Phosphoric Acid
Potassium Ammonium Phosphate
Potassium Phosphate, Mono
Saccharin U. S. P.
Salicylates
Salol
Sodium Benzoate U. S. P.
Sulfanilamide U. S. P.

PLASTICS AND SYNTHETIC RESINS

Ammonia, Aqua
Benzoic Acid, Technical
Cast Phenolic Resin
Cellulose Acetate
Cellulose Nitrate
Cresols
Dibutyl Phthalate
Diethyl Phthalate
Dimethyl Phthalate
Maleic Anhydride
Monsanto Plastics
Phenol
Phthalic Anhydride
Polystyrene
Polyvinyl Acetals
Resinox (Phenol-Formaldehyde)
Santicizers (Specialty plasticizers)
Santolites (Synthetic resins)
Thiourea
Tricresyl Phosphate
Triphenyl Phosphate
Vuepak

POWER AND POWER PLANTS

Aluminum Sulfate
Chlorine
ortho-Dichlorobenzene
Ferrisul
Santobrite
Santophen
Santosite
Sodium Aluminate
Sodium Phosphates
Sodium Sulfate

PRINTING INKS

Aluminum Chloride
Aluminum Sulfate
Antioxidants
Anti-Skinning Agents
Aroclors
Coumarin
Lampblack
Methyl Salicylate
Nitrate of Iron
Phenol
Santocel
Santomask
Sodium Aluminate

RUBBER

Accelerators
Antioxidants
Caustic Soda
Cycline Oil
Piperidine
Santobrite
Sodium Sulfite
Softeners
Sulfur
Sulfuric Acid

SOAPS AND DETERGENTS

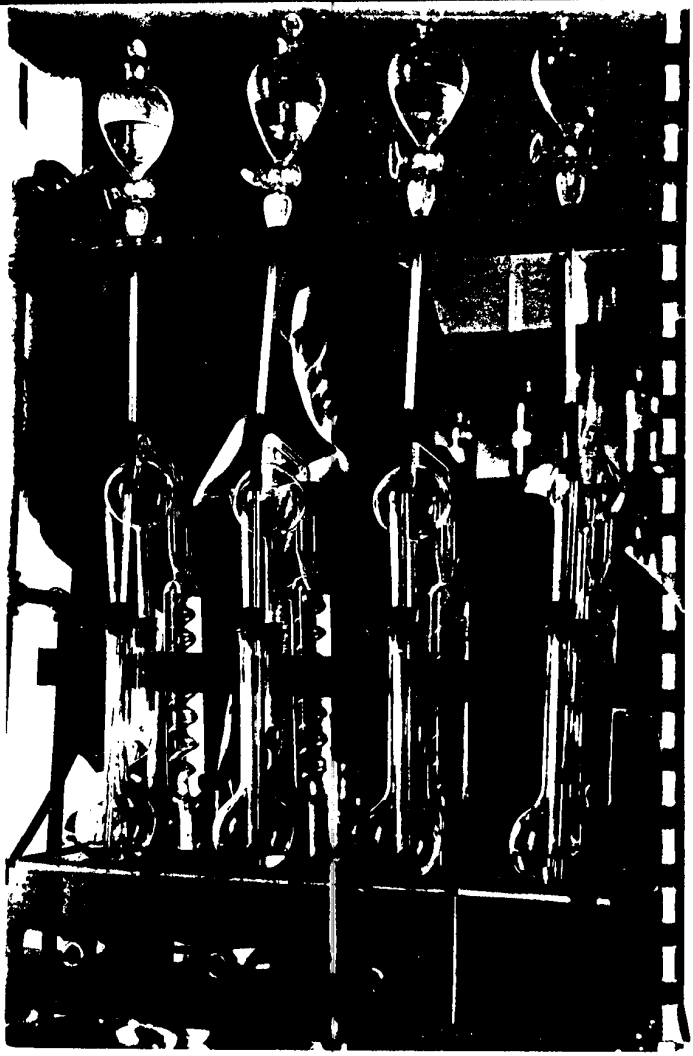
Antioxidants
C. P. Acids
Calcium Sulfate
Caustic Soda
Chlorosulfonic Acid
Coumarin
Cresol
Phenol
Soda Ash
Sodium Phosphate, Di
Sodium Phosphate, Tri
Sodium Pyrophosphate, Tetra
Sopanox
Sulfuric Acid
Wetting Agent (Santomerse)

TEXTILES

Acetic Acid
Alcohol
Aluminum Chloride
Ammonium Phosphate, Mono
Ammonia
Amyl Acetate
Butyl Acetate
Calcium Phosphate, Tri
Calcium Sulfate
Caustic Soda
Chlorine
Cresol
Dibutyl Phthalate
Ethyl Acetate
Ferric Sulfate
Glauber's Salt
Lacquers
Merclor
Mixed Acid
Nitrate of Iron
Nitre Cake
Oil of Vitriol
Plasticizers
Potassium Pyrophosphate, Tetra
Santobrite
Santophen 20
Sodium Acetate
Sodium Acid Pyrophosphate
Sodium Bisulfite
Sodium Phosphate, Di
Sodium Phosphate, Tri
Sodium Pyrophosphate, Tetra
Sodium Sulfate
Sodium Sulfite
Sopet
Sulfuric Acid
Tricresyl Phosphate
Wetting Agent (Santomerse)

WATER TREATMENT

Aluminum Sulfate
Ammonia, Aqua
Chlorine
Ferrisul (Ferric Sulfate)
Santobrite
Santosite (Reducing Agent)
Sodium Aluminate
Sodium Hypochlorite
Sodium Phosphate, Di
Sodium Phosphate, Tri
Sodium Sulfate



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MONSANTO PRODUCTS

ABRASIVES (See Aluminum Oxide Abrasive Grain).

ACCELERATORS, RUBBER

See individual accelerators below for specifications and properties.

R.R. Classification: Rubber Accelerators NOIBN.

Available Literature:
"Monsanto Chemicals for the Rubber Industry," 42 pages.
"Latex Compounding," 36 pages.
"Rubber Compounding for the Wire Industry," 18 pages.
"Santocure—An Accelerator for Rubber Vulcanization," 52 pages.

"A-10"

Specifications: Condensation product of aniline and formaldehyde. It is neither methylene dianilide nor formaldehyde aniline, but probably a mixture in which the latter product predominates. White or yellowish tinted powder; 95 per cent through 200 mesh and 99 per cent through 100 mesh; loss on heating less than 5.0 per cent when heated for two hours at 105°C.; m.p., begins to soften at 120°C.; sp. g. 1.17; uncombined reagents, no excess of free aniline and not more than traces of formaldehyde.

"A-19"

Specifications: Formaldehyde derivative of a condensation product of aniline and acetaldehyde, of complex chemical composition. Brown resinous powder; m.p. between 75°C. and 85°C.; sp. g 1.17.

"A-32"

Specifications: Reaction product of butyraldehyde and butylidene aniline. The chemical structure of such products is necessarily complex. Red yellow to orange brown oily liquid, slightly turbid when cold; sp. g. 0.98; flash point 80°C.; soluble in benzene, chloroform, acetone and solvent naphtha.

"A-46"

Specifications: Light tan powder; constant composition blend of Santocure and El Sixty.

"A-77"

Specifications: Condensation product of acetaldehyde and aniline by a special Monsanto process. Such products, known as aldehyde derivatives of Schiff's bases, are of complex chemical composition. Free flowing reddish brown liquid; sp. g. 1.01; flash point 55°C.; soluble in benzene, chloroform and acetone; partly soluble in alcohol and gasoline.

"A-100"

Specifications: Aldehyde derivative of a Schiff's base made with the use of both butyraldehyde and acetaldehyde. Dark reddish brown oily liquid; sp. g. 1.04; flash point 85°C.; soluble in benzene, chloroform, acetone and solvent naphtha.

"BUTASAN" (Zinc Salt of Dibutyl Dithiocarbamic Acid)

Specifications: Cream colored powder; sp.g., 1.24; melting point, 106°C.; cure at temperatures below 100°C.

General Information: 0.5% to 1% on rubber weight used in latex, cements, for dipped goods, adhesives, coatings, etc.

DPG (Diphenylguanidine)

Specifications: White powder, not darker than the approved color standard; no residue on 100 mesh screen; m. p. not less than 146°C.; sp. g. 1.19; strength, 99.0% min. of DPG by acidimetric titration; soluble in alcohol, benzene, chloroform and ether; very slightly soluble in water.

"EL SIXTY" (Dibenzothiazyldimethylthiol urea)

Specifications: A light cream colored powder; 99.5% min. through 200 mesh, no coarse particles; m.p. 220°C. min.; sp. g. 1.29; very slightly soluble in acetone, alcohol and chloroform; slightly soluble in hot pyridine or orthodichlorbenzene.

"ETHASAN" (Zinc Salt of Diethyl Dithiocarbamic Acid)

Specifications: White powder; sp.g , 1.5; melting point, 173°C.

General Information: 0.5% to 1% on rubber weight used in latex.

"GUANTAL"

Specifications: Ester formed by reacting two molecules of diphenylguanidine and one molecule of phthalic acid; contains one-half mole of water of crystallization. White powder ranging from blue white to faint gray; 99.5% min. through 200 mesh, no coarse particles; m. p. 178°C. min.; sp. g. 1.20; soluble in alcohol; insoluble in benzene and gasoline.

"METHASAN" (Zinc Salt of Dimethyl Dithiocarbamic Acid)

Specifications: White powder; sp.g., 2.00; melting point, 249°C.; cures at temperatures below 100°C.

General Information: 0.5 to 1% on rubber weight used in latex and cements.

PIP-PIP (Piperidine-pentamethylene Dithiocarbamate)

Specifications: Fluffy, cream colored powder; 98.0% min. through 200 mesh and 99.5 per cent through 100 mesh; m.p. over 160°C. at time of shipment. Decomposes slowly in the presence of water and during storage with a corresponding drop in melting point. Sp. g. 1.13; soluble in alcohol and solvents containing water.

"R-2" CRYSTALS

Specifications: Reaction product of carbon bisulfide with methylene dipiperidine. Light brown coarse crystalline solid; sp. g. 1.11; m. p. between 50°C. and 60°C.

"SANTOCURE"

Specifications: Condensation product of mercaptobenzothiazole with cyclohexylamine. Light tan or buff colored powder; 99.5% min. through 200 mesh; m.p. 90°C. min.; sp. g. 1.27.

Available Literature: 52-page booklet, "Santocure—An Accelerator for Rubber Vulcanization."

"TACKOL"

Specifications: Standardized, uniform blend of resins and oils. Viscous brown liquid. Odor is distinctive coumarone-like; sp. g. 1.05; flash point 160°C.

General Information: Used as a softener or tack producer in rubber.

Available Literature: 42-page booklet: "Monsanto Chemicals for the Rubber Industry."

THIOCARBANILIDE

Specifications: White powder, not darker than the approved color standard; 99.0% min. through 100 mesh, no coarse particles; m. p. not less than 148°C.; sp. g. 1.32; insoluble in water and many other common solvents; soluble in alcohol.

"THIURAD" (Tetramethyl Thiuram Disulfide)

Specifications: Sp.g., 1.29; melting point, 146 - 148°C.; color, white; odor, none; soluble in carbon bisulfide, benzene and chloroform; insoluble in water, dilute caustic and gasoline.

"UREKA"

Specifications: Constant composition blend of diphenylguanidine and 2, 4-dinitrophenyl thiobenzothiazole. Uniform light yellow powder; 99.5% min. through 200 mesh, no coarse particles; m. p. between 117°C. and 127°C.; sp. g. 1.25; soluble in alcohol and chloroform.

"UREKA BLEND B"

Specifications: A blend similar to "Ureka" with a portion of the "DPG" replaced by "Guantal." Yellow to brownish powder; 99.5% min. through 200 mesh, no coarse particles; m.p. 130°C. min.; sp. g. 1.33.

"UREKA C" (Benzothiazylthiobenzoate)

Specifications: An acyl-thiazole powder in which the acidic hydrogen atom of mercaptobenzothiazole has been replaced by a benzoyl group. A pale ivory or yellowish powder; 100 per cent through 30 mesh; m.p. not less than 115°C.; sp. g. 1.43; soluble in chloroform and benzene; slightly soluble in alcohol.

ACETANILID, U.S.P.

Mol. Wt. 135.16

Standard Forms: Crystals, powder.

(Continued)

Specifications: White crystals or powder; ash 0.05% max.; conforms to U.S.P. tests for carbonizable impurities and heavy metals; solubility in ethyl alcohol 95%, complete; m.p. 114.0°C. min.; no crystals retained on 14 mesh; 3.0% max. powder retained on 80 mesh.

R.R. Classification: Acetanilid.

General Information: Pharmaceutical product.

ACETIC ACID

CH_3COOH

Grades: 56% $C_2H_4O_2$; sp.g. 1.067; freezing point —8.0°F.
70% $C_2H_4O_2$; sp.g. 1.074; freezing point +0.6°F.
80% $C_2H_4O_2$; sp.g. 1.076; freezing point +17.4°F.
84% $C_2H_4O_2$; sp.g. 1.075; freezing point +27.3°F.
Glacial: 99% $C_2H_4O_2$; sp g. 1.0576; freezing point +58.3°F.

R.R. Classification: Acetic Acid.

General Information: Used in dyeing where a weak acid is required in the dye bath; in the manufacture of acetate solvents; manufacture of cellulose acetate; and in the formation of other acetates, such as aluminum, lead, sodium, and ammonium acetate. Also used in manufacture of fish glue; as an antichlor; coagulation of rubber latex; destruction of fungi; disinfectant in gelatine; pickling foodstuffs; giving added detergency and firmness to soap; stabilizing olive oil; protecting seedlings from injury due to root rot and damping off; hardening and developing solutions for photographic films. (*See table in general data section*)

ACETONE C. P.

Typical Analysis: Water white liquid; non-volatile matter, not more than 0.001 gram when 100 cc. are evaporated and heated to constant weight at 100°C. to 110°C.; water solubility, miscible with distilled water in all proportions; dryness, no turbidity when one volume is mixed with 19 volumes of 60°Bé. gasoline at 20°C.; sp. g., 0.791 to 0.793 at 20°C., 20°C.; acidity, less than 0.002%, calculated as CO_2.; purity, 99-100% dimethyl ketone; potassium permanganate test, color of added potassium permanganate retained at least two hours when 1 cc. of a 0.1% solution is added to 100 cc. of Acetone; chlorides, none; iron, none; odor, mild—non-residual; flash point, —18°C. (—0.4°F.); wt. per U.S. gal., 6.59 lbs. at 68°F.

R.R. Classification: Acetone.

General Information: Acetone is faster drying than ethyl acetate and a more active solvent. It is an important constituent of quick-drying water proof cements; an active solvent for cellulose acetate; a good dye solvent; resin solvent used extensively in paint removers and cleaners and for various extraction processes.

ACETOPHENETIDIN, U.S.P.

Mol. Wt. 179.11

Standard Forms: Crystals; powder.

Specifications: White crystals or crystalline powder; Solubility in ethyl alcohol 95% (1:15), complete; m.p. 135.0°C. min.; ash .05% max. No crystals retained on 14 mesh screen; 5% powder retained on 100 mesh.

R.R. Classification: Chemicals NOIBN.

General Information: Pharmaceutical product.

para-ACETYL-AMINO-BENZENESULFONECHLORIDE

Mol. Wt. 233.59

Standard Form: Crystals.

Characteristics: Light tan to brownish powder or fine crystals; assay, 97.5% min.

R.R. Classification: Chemicals NOIBN.

General Information: Used as an intermediate in the manufacture of sulfa drugs.

ACETYL SALICYLIC ACID, U.S.P.
(Also known as Aspirin)

Mol. Wt. 180.06

Standard Forms: Crystals, 20 mesh
Crystals, 40 mesh
Powder, 80 mesh

Specifications: White crystals or powder; assay 99.5% min.; solubility in ethyl alcohol 95% (1:5), complete; solubility in 10% Na_2CO_3(1:20), complete; ash, 0.05% max.; conforms to U.S.P. test for heavy metals, carbonizable impurities, resinous products, chloride, sulfate, and free salicylic acid.

(*Continued*)

MESH:

	20-mesh	*40-mesh*	*80-mesh*
Retained on—			
20 mesh screen	Trace max.		
30 mesh screen	5.0% min.		
	10.0% min.		
40 mesh screen		Trace max.	
45 mesh screen	45.0% min.		
	60.0% max.		
50 mesh screen		10.0% min.	
		20.0% max.	
		20.0% max.	none
60 mesh screen	70.0% min.		
	85.0% max.		
80 mesh screen		45.0% min.	
		60.0% max.	2.0% max.
Thru—			
100 mesh screen	10.0% max.		
140 mesh screen		25.0% max.	

R.R. Classification: Acetyl Salicylic Acid.

General Information: Pharmaceutical product.

ACETYL SALICYLIC ACID, Starch Granulations

Standard Forms:
10%, 12-50 mesh, white
16%, 12-50 mesh, white
20%, 12-50 mesh, white
10%, 12-50 mesh, pink
10%, 20 mesh, pink
10%, 12-50 mesh, green
10%, 20 mesh, green

Specifications: (Made with Acetyl Salicylic Acid U.S.P.) White, pink or green granules. Assay: starch granulation 10%, 90.0% min. - 91.0% max.; starch granulation 16%, 84.0% min. - 85.0% max.; starch granulation 20%, 80.0% min. - 81.0% max. Free salicylic acid conforms to U.S.P. test on Acetyl Salicylic Acid.

MESH:

	12-50 mesh	*20-mesh*
Retained on—		
12 mesh screen	Trace, max.	
14 mesh screen	5.0% min.	
	15.0% max.	
16 mesh screen	20.0% min.	
	35.0% max.	
20 mesh screen	60.0% min.	
	75.0% max.	Trace, max.
Thru—		
40 mesh screen	10.0% max.	

(*Continued*)

R.R. Classification: Acetyl Salicylic Acid.

General Information: Pharmaceutical product.

ACID CALCIUM PHOSPHATE (See Calcium Phosphate, Mono).

AIRCRAFT FINISHES

Commercial Finishes:

Aircraft finishes include protective and decorative coatings for every part of the aircraft structure, such as fabric dopes (clear and colors) for wings, control surfaces and fusilage; primers, surfacers and lacquers for aluminum and dural sheet; flame-proof dopes for interiors, thinners, cleaning solvents. Properties of the commercial finishes in application conform to the best modern plant practice, and properties in service meet the severe requirements of resistance to stress, sea water corrosion, weather, gas and oil. Monsanto finishes have for years been accepted as standard by manufacturers and airlines.

CODE NO.	TYPE OF PRODUCT
	For Fabric—Dopes
L-3901	Clear Nitrate Dope (high solids)
L-1031	Clear Nitrate Dope (medium solids)
L-2194	Clear Nitrate Dope (comm. grade)
L-760	Fully Pigmented Dopes—all colors; non-bleeding reds; max. resistance to fading and chalking.
L-3193	Interior Fire-Resistant Clear Dope
L-3195	Interior Fire-Resistant Pigmented Dopes—all colors.
L-2591	Finish Reclaimer (Rejuvenator) for Nitrate Dope
	For Metal—Primers, Surfacers, and Lacquers
R-4017	Yellow 728 Zinc Chromate—Fast Drying.
R-4063 Gray	578 Synthetic Primer Surfaces—Slow Drying.
R-3552 Gray	423 Lacquer and Dope Surfacer.
L-2939	Clear Aluminum Vehicle.
R-3785	Fully Pigmented Lacquers—all colors (except light shades); non-bleeding reds; max. resistance to fading.
	Thinners (Reducers)—All Types
L-1518	Standard lacquer and dope thinner.
L-1087	Retarder (anti-blush)
L-2680	Brush wash for general cleaning.
L-3196	For fire-resistant (acetate).
L-1034	Wax-free remover (dope and lacquer).

(*Continued*)

U. S. Army and Navy Specification Finishes:

Camouflage finishes for combat aircraft were added to the Monsanto line early in the Defense Program. These finishes are in addition to the original U. S. Army and U. S. Navy specification materials of which Monsanto has long been an approved supplier. Finishes under the new combined Army and Navy specifications (AN-TT) are now available.

Metal Surfaces

AN-TT-P-656	Zinc Chromate Primer.
AN-TT-L-51	Gloss Lacquer Colors.
AN-TT-D-551	Clear Aluminum Bronze Vehicle.
14105	Army Camouflage Colored Lacquers.
M-185A	Navy Camouflage Colored Lacquers.

Fabric Surfaces

AN-TT-D-514	Clear Dope.
AN-TT-D-556	Semi-Pigmented Colored Dopes.
AN-TT-D-554	Fully-Pigmented Colored Dopes.
14106	Army Camouflage Colored Dopes.
M-498	Navy Camouflage Colored Dopes.

Thinners

AN-TT-T-256	For use with above lacquers.
AN-TT-T-258	Blush Retarder for above lacquers.

R.R. Classification: Lacquer.

ALCOHOL (See Ethyl Alcohol).

ALKYL PHOSPHORIC ACIDS

Properties:

Amyl Phosphoric Acid (from Pentasol): fluorescent reddish amber liquid; sp.g., 1.33 at 25°C.; alkyl acid content, approx. 99%.*

n-Butyl Phosphoric Acid: fluorescent reddish amber liquid; sp.g., 1.24 at 25°C.; alkyl acid content, approx. 99%.*

Ethyl Phosphoric Acid: pale straw colored liquid; sp.g., 1.33 at 25°C.; alkyl acid content, approx. 97%.*

Methyl Phosphoric Acid: pale straw colored liquid; sp.g., 1.439 at 25°C.; alkyl acid content, approx. 97%.*

n-Propyl Phosphoric Acid: reddish amber liquid; sp.g., 1.30 at 25°C.; alkyl acid content, approx. 97%.*

* Balance of assay is ortho-phosphoric acid and unconverted alcohol.

R.R. Classification: Phosphoric Acid.

(*Continued*)

General Information: The Alkyl Phosphoric Acids are mobile liquids which can be neutralized with alkalis and amines with resultant water-soluble salts.

The methyl, ethyl and propyl phosphoric acids are water-soluble, but the butyl and amyl acids are not. The salts of all are water-soluble. The methyl and ethyl phosphoric acids and their salts are very hygroscopic (amine, sodium and potassium salts) whereas the propyl, butyl and amyl acids are not hygroscopic and their salts only slightly so.

Alkyl Phosphoric Acids are used in textile and paper processing compounds; as catalysts in urea resin formation; as polymerizing agents for resins and oils.

ALUM (See Aluminum Sulfate).

ALUMINUM CHLORIDE

Al_2Cl_6 Mol. Wt. 266.7

Standard Forms: Liquid, 32° Bé., 50% Al_2Cl_6 +12 H_2O approx.; crystals,* 97% Al_2Cl_6 +12H_2O approx.

Typical Analysis: Neutral salt, low in iron content. Solutions have an acid reaction but contain no free acid. Typical analysis as follows:

	Crystal	Liquid
$Al_2Cl_6 \cdot 12\ H_2O$	97.2%	50.3%
Al_2O_3	20.5	10.6
Cl	42.7	22.1
Fe	.003-.005	.005

R.R. Classifications: Aluminum Chloride Dry or Aluminum Chloride Liquid.

General Information: Used in carbonizing fine wool such as piece goods, raw stock or shoddy, resulting in an exceptionally white, lofty wool. Also in carbonizing colored goods where it has very little stripping action. Used in soap manufacture for treatment of glycerin lyes where chloride of alumina is more desirable than sulphate. (*See table in general data section*)

* Crystals: Resale product.

ALUMINUM OXIDE ABRASIVE GRAIN

(Also known as fused aluminum oxide; artificial corundum.)

Specifications: Fused aluminum oxide containing 95-99% Al_2O_3; hardness 9.6, Moh's scale.

R.R. Classifications: Abrasive flour or grain.

General Information: Coarse to flour grades are available for grinding wheels, polishing, refractory purposes, and for anti-slip or tread use.

ALUMINUM SULFATE, COMMERCIAL

$Al_2(SO_4)_3$. 14.5 H_2O

Standard Form: Fine to lump.

Typical Analysis: Al_2O_3, 17.2%; FeO, 0.35%; Fe_2O_3, 0.01%.

R.R. Classification: Aluminum Sulfate.

General Information: Used in paper sizing and water treatment. Monsanto also provides a slab form (6"x6"x18") for stock solutions; this form contains 15.5 - 16.0% Al_2O_3. *(See table in general data section)*

ALUMINUM SULFATE, IRON FREE

$Al_2(SO_4)_3$. 14.5 H_2O

Standard Form: Fine to lump.

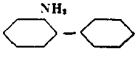
Typical Analysis: Al_2O_3, 17.2%; Fe_2O_3, 0.01%.

R.R. Classification: Aluminum Sulfate.

General Information: Used in sizing fine papers; manufacture of satin white and dry colors; tanning white leathers; dyeing operations.

ortho-AMINODIPHENYL, TECHNICAL

(Also known as 2-aminobipbenyl.)



Mol. Wt. 169.10

Standard Form: Fused solid.

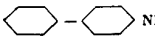
Specifications: Purplish crystalline mass; crystallizing point 47.0°C. min.; assay 94.5% min. Distillation range: first drop, 295.0°C. min.; 95% (1-96 ml), 8.0°C. max.; dry point, 310.0°C. max.

R.R. Classification: Dye Intermediate.

General Information: Used as an intermediate in dyestuff synthesis; in the production of resins; in the production of varnishes; in the synthesis of rubber products; as a solvent. *CAUTION: This product is toxic. Avoid breathing its vapors and avoid contact with the skin.*

para-AMINODIPHENYL, TECHNICAL

(Also known as 4-aminobiphenyl.)



Mol. Wt. 169.10

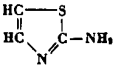
Standard Form: Fused solid.

Specifications: Yellowish brown crystalline mass; crystallizing point 50.5°C. min. Distillation range: First drop, 325.0°C. min.; 95% (1-96 ml), 8.0°C. max.; dry point, 340°C. max.

R.R. Classification: Dye Intermediate.

General Information: Used as an intermediate in dyestuff synthesis; in the production of resins; in the production of varnishes; as a solvent. *CAUTION: This product is toxic. Avoid breathing its vapors and avoid contact with the skin.*

2-AMINOTHIAZOLE



Mol. Wt. 100.14

Standard Form: Crystals

Characteristics: *Light brown crystals.*

R.R. Classification: Chemicals NOIBN.

General Information: Used as an intermediate in organic synthesis.

AMMONIA, ANHYDROUS

Properties: At normal temperatures and pressures Ammonia Anhydrous is a colorless gas, 0.597 times as heavy as air. It is readily condensed by the application of pressure below 268°F. to a colorless liquid weighing 5.33 lbs. per gal., and having a boiling point of −28°F.

R.R. Classification: Anhydrous Ammonia.

General Information: Ammonia Anhydrous is used in refrigeration; as a condensing agent in the formation of phenolformaldehyde resins; in water treatment in connection with chlorine; partial neutralization of phosphate fertilizer; in vulcanization of rubber; nitriding of steel; as a neutralizing agent after carbonizing; neutralizing excess carbon dioxide in water supplies; neutralizing and deodorizing rubber goods which have been cured with sulfur chloride; neutralizing petroleum stocks before cracking; as a relatively inexpensive source of hydrogen or nitrogen; and as a solvent. (*See table in general data section*)

Available Literature: Leaflet: "Monsanto Ammonia for Refrigeration."

AMMONIA, AQUA

NH_4OH Mol. Wt. 35.05

Standard Forms: Commercial Aqua Ammonia 16°, 18°, 20°, 26° Bé.

Properties: Pungent, water white liquid; wt. per gal. 7.48 lbs. (26°).

R.R. Classification: Ammonia Aqua.

General Information: Uses—1. Partial neutralization of phosphate fertilizers. 2. General household cleaning purposes. 3. As a condensing agent in the formation of phenol-formaldehyde resins. 4. As an antichlor. 5. After carbonizing, as a neutralizing agent. 6. Neutralization of excess carbon dioxide in water supplies. 7. Neutralizing and deodorizing rubber goods which have been cured with sulphur chloride. 8. Neutralizing goods which have been dyed with aniline black. 9. Preserving rubber latex. 10. Neutralizing oil before cracking. 11. Silk degumming. 12. Manufacture of cuprammonium silk. 13. As a solvent. 14. As a dehairing agent for hides. 15. For reeling silk. 16. As a penetrant in wetting back crusted tanned leather. 17. As a penetrant for driving in fat liquor in leather making. (*See table in general data section*)

AMMONIUM BENZOATE

Mol. Wt. 139.15

Standard Form: Powder.

Specifications: Fine white crystalline powder; assay 98.0% min.; solution in water (1:10) clear.

R.R. Classification: Chemicals NOIBN.

General Information: Used as a preservative.

AMMONIUM ETHYL PHOSPHATE

(Mixture of mono- and diethyl ammonium phosphates).

Standard Form: 75% solution in water.

Properties: Water-white to yellow-tinged liquid of ammoniacal odor; sp. g. 1.23 at 25°C.; wt. per gal. 10.37 lbs.; pH 75% sol.; 7.0 - 7.2; viscosity at 25°C., 60 centipoises. Chemical constitution: 67% mono ethyl ammonium phosphate;

(*Continued*)

53% di ethyl ammonium phosphate. In thin film is liquid at relative humidities above 40%; not stable to heat; when subjected to elevated temperatures for any length of time as a solution or while on any article, will liberate ammonia with a reduction in pH; at temperatures below 15°C. crystals will form in the solution and will dissolve with a rise in temperature or on dilution.

R.R. Classification: Ammonium Phosphate.

General Information: Used as flame proofing agent for paper, textiles, wood and other combustible materials.

AMMONIUM HYDROXIDE C. P.

NH_4OH Mol. Wt. 35.06

Specifications: Colorless liquid, free from suspended matter; strength (NH_3) 28.0% min.; non-volatile matter 0.005% max.; carbon dioxide (CO_2) 0.002% max.; total sulphur (as SO_4) 0.0003% max.; chloride (Cl) 0.00005% max.; pyridine, to pass A.C.S. test; substances reducing ($KMnO_4$), to pass A.C.S. test; iron 0.0001% max.; heavy metals (as lead) 0.0005%.

R.R. Classification: Chemicals, Ammonia.

General Information: Laboratory reagent.

AMMONIUM PHOSPHATE, DI

(Also known as diammonium hydrogen phosphate, secondary ammonium phosphate, and ammonium phosphate di-basic.)

$(NH_4)_2HPO_4$ Mol. Wt. 132.068

Grades: Food (meets all U. S. Pure Food Law requirements); special grades supplied on request.

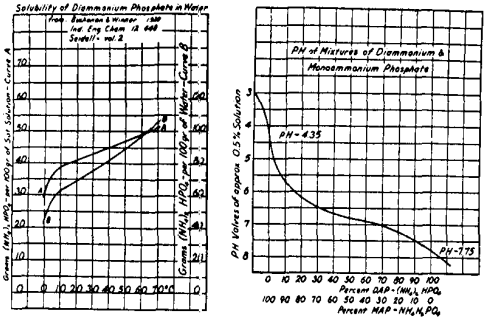
Properties: White crystalline material, stable in air and very soluble in water; pH value of 1% solution, 7.75. At temperatures above 70°C. aqueous solutions lose ammonia readily.

Dissociation Pressure: According to Britzke and Dumajew (Gmelin's Handbuch der anorganische Chemie, Ammoniak, p.423) and Warren (JACS 49, 1904, *1927*):

Temp. °C.	98	111	125	135	147
p NH_3 in mm. Hg.	3.2	10.7	26.0	55.2	123.4

R.R. Classification: Phosphate of Ammonia.

General Information: Used as a fire retardant in fire-proofing and as a yeast food by yeast producers and breweries.



AMMONIUM PHOSPHATE, MONO

(Also known as ammonium acid phosphate, primary ammonium phosphate, ammonium dihydrogen phosphate, ammonium phosphate mono-basic, ammonium biphosphate).

$NH_4H_2PO_4$ Mol. Wt. 115.04

Grades: Food grade meets all U.S. Pure Food Law requirements. Special grades will be supplied on request.

Properties: A white crystalline material, stable in air and soluble in hot and cold water; pH of 1% solution, 4.7.

R.R. Classification: Phosphate of Ammonia.

General Information: Used as a retardant in fireproofing and paper specialties, for special medicinal purposes, in the production of woven belting, and as a yeast food.

AMMONIUM SALICYLATE N.F. (See Salicylates).

AMYL ACETATE

Typical Analysis: Water white liquid; odor, no residual; sp. g. 0.865 - 0.870 at 15.5°C.; shipping wt. per gal., 7.20 lbs.; acidity, less than 0.01% as free acetic acid; dryness, mixes with petroleum benzine in all proportions without turbidity. Boiling range: below 110°C., none; above 130°C., less than 50%; above 150°C., none. Ester content, 85-90%.

(*Continued*)

R.R. Classification: Amyl Acetate.

General Information: Used as a nitrocellulose solvent. It is less active than ethyl or butyl acetate and more resistant to moisture. Blends of all three with appropriate diluents such as alcohols (ethyl, butyl, and amyl) yield thinners and solvent mixtures of excellent cutting power, moisture resistance, good flow and leveling, and compatability with various resins and oils. Used in the artificial leather industry and in formulating lacquer finishes for wood, metals, textiles, and paper.

AMYL PHOSPHORIC ACID (See Alkyl Phosphoric Acids).

ANILINE OIL

(Also known as aminobenzene).

Mol. Wt. 93.13

Specifications: Slightly yellowish liquid; purity, 99.5% min.; distillation range, 95% within 0.5°C.; distillation limits, 182.0 to 185.0°C. (dry point); crystallizing point, —6.2°C. min.; moisture, 0.10% max.; solution in HCl, complete; nitrobenzene, none.

R.R. Classification: Aniline. "Poison" label required.

General Information: A basic intermediate in the dyestuff industry. It also finds application in the production of rubber accelerators, as a constituent of resins and in the manufacture of explosives. *CAUTION: This product is toxic. Avoid breathing its vapors. Avoid contact with the skin.*

ortho-ANISIDINE

(Also known as *ortho*-methoxyaniline, *ortho*-aminoanisole, and 1-amino-2-methoxybenzene.)

Mol. Wt. 123.15

Standard Form: Liquid

Specifications: Reddish brown to amber liquid; crystallizing point 5.3°C. min. Distillation range: first drop 223.0°C. min.; 95%, 1.2°C. max.; dry point, 226.0°C. max. Solution in HCl, clear.

R.R. Classification: Dye Intermediate.

General Information: Used as a component of azo dyes and in the manufacture

(*Continued*)

of dyestuff intermediates. *CAUTION: This product is toxic. Avoid breathing its vapors and avoid contact with the skin.*

para-ANISIDINE

(Also known as *para*-methoxyaniline, *para*-aminoanisole, and 1-amino-4-methoxybenzene.)

Mol. Wt. 123.15

Standard Form: Fused solid

Specifications: Fused, crystalline mass; crystallizing point 57.2°C. min. Distillation range: first drop 240.0°C. min.; 95% 2.0°C. max.; dry point 243.0°C. max. Solution in HCl clear, darkens on ageing.

R.R. Classification: Dye Intermediate.

General Information: Used as a component of various azo dyestuffs and as an intermediate in chemical synthesis. *CAUTION: This product is toxic. Avoid breathing its vapors. Avoid contact with the skin.*

ANTI-OXIDANTS, OIL (See Santolube).

ANTIOXIDANTS, RUBBER

See individual antioxidants below for specifications.

R.R. Classification: Chemicals NOIBN.

Available Literature:
"Monsanto Chemicals for the Rubber Industry," 42 pages.
"Latex Compounding," 36 pages.
"Rubber Compounding for the Wire Industry," 48 pages.

"FLECTOL H"

Specifications: Condensation product of acetone and aniline. Light colored powder; 99.5% min. through 200 mesh, no coarse particles; m. p. 120°C. min.; sp. g. 1.08; antioxidant value equal to that of the accepted standard in vulcanized rubber, both in oxygen bomb and standard flexing tests; solubility approx. 10% in benzene, alcohol and gasoline; insoluble in water.

"FLECTOL WHITE"

Specifications: Light colored powder, not darker than the approved color

(*Continued*)

standard; 99.5% min. through 200 mesh, no coarse particles; m. p. 145°C. min.; sp. g. 1.25; antioxidant value equal to that of the accepted standard in ultra violet light tests; soluble in alcohol, very slightly soluble in water and benzene, insoluble in gasoline.

"OXYNONE" (2, 4-Diamino Diphenylamine)

Specifications: Brown crystalline powder; 99.5 per cent through 100 mesh and 95 per cent through 200 mesh, no coarse particles; m. p. not less than 123°C.; sp. g. 1.25; soluble in alcohol, chloroform and benzol; very slightly soluble in cold water and gasoline.

"SANTOFLEX B"

Specifications: Reaction product of acetone and para-aminodiphenyl. Waxy, dark gray, lumpy solid; crystallizing point about 80°C.; sp. g. 1.045.

"SANTOFLEX BX"

Specifications: Constant composition blend of Santoflex B and dipbenyl-para-phenylene diamine. Waxy, dark gray, lumpy solid; sp. g. 1.11.

"SANTOVAR A"

Specifications: Alkylated polyhydroxy phenol. Nearly white crystalline powder, no darker than the accepted standard; m. p. not less than 165°C.; sp. g. 1.049; completely soluble in twice its weight of acetone.

General Information: Used as a varnish anti-skinning agent; as an antioxidant in oils, paints, and rubber.

ANTISEPTICS AND GERMICIDES

Chloramine-T U.S.P. (See under C).
***para*-Chloro-*meta*-Cresol** (See under C).
***para*-Chloro-*meta*-Xylenol** (See under C).
Dichloramine-T N.F. (See under D).
Phenol U.S.P. (See under P).
"Santamine" (See under S).
"Santophen" (See under S).

ARESKAP (Monobutyl Phenylphenol Sodium Monosulfonate)

Standard Forms: Liquid and dry powder.

(*Continued*)

R.R. Classification: Washing Compound NOIBN

General Information: Wetting, penetrating and spreading agent; used as spreading agent in insecticidal compositions, in embalming fluids and in metal pickling.

ARESKET (Monobutyl Diphenyl Sodium Monosulfonate)—

Standard Forms: Liquid and dry powder.

R.R. Classification: Washing Compound NOIBN.

General Information: Wetting, penetrating and spreading agent.

ARESKLENE (Dibutyl Phenylphenol Sodium Disulfonate) —

Standard Forms: Crystals and glauboids.

Typical Analysis: 43% Na_2SO_4 available.

Dry Aresklene-400: Tan hygroscopic powder, slightly aromatic; sulfates, trace; chlorides, trace; m. p. about 160°C.; pH, approx. 7.5 for 1% solution of dry material at 25°C.; soluble (10 parts to 90 parts solvent) in alcohol, acetone, dibutyl tartrate, ethylene glycol, ethyl acetate and butyl cellosolve.

Aresklene-375: Light brown paste, slightly aromatic; sulfates, trace; chlorides,

(Continued)

A laboratory in the new rubber chemicals research building at Nitro, W. Va.

trace; m. p., decomposes at about 175 C.; not soluble in solvents which are immiscible with water.

R.R. Classification: Washing Compound, NOIBN.

General Information: Wetting, penetrating and spreading agent used in kierboiling, scouring and dying textiles, in industrial cleaners, in deodorant preparations, in insecticidal formulations, in metal cleaning and as a stabilizer and wetting agent in latex used to treat cord or other fabrics.

"AROCLORS"

Specifications: The Aroclors are chlorinated hydrocarbons which vary from water-white mobile liquids and pale yellow viscous oils to light amber resins and opaque crystalline solids. *Non-flammability:* The viscous Aroclor oils and resins do not support combustion when heated alone even at their boiling points—temperatures above 360°C. Most of the Aroclors flux readily with resinous and pitch-like materials to give a product having a decreased fire hazard. *Electrical properties:* The Aroclors have excellent electrical characteristics, high dielectric strength and resistivity, low power factor. Certain of the liquid Aroclors have a high dielectric constant as compared with that of mineral oils. *Solubility:* The Aroclor oils and resins are easily soluble in most of the common organic solvents and drying oils. The hard crystalline materials are in general less soluble than the oils of resins. All Aroclors are insoluble in water. *Adhesiveness:* The more viscous Aroclor and Aroclor resins have excellent adhesive properties. *Thermoplasticity:* The Aroclors are thermoplastic, and apparently undergo no further condensation or hardening upon repeated melting and cooling. *Non-drying properties:* The Aroclors are non-drying, and when they are exposed to the air no noticeable oxidation or hardening takes place. *Vaporization loss:* The clear resins have rather low vaporization losses. At 65.8°C. (150°F.) these losses are less than 0.04 g. per square inch of surface per month. *Odor and taste:* The Aroclor viscous oils and resins are almost without odor and taste at ordinary temperatures. *Refractive indices:* The refractive indices of these materials are above 1.6125. *Stability:* The Aroclors in general are stable on long heating at 150°C. and are not affected by boiling with sodium hydroxide solution. The light oils can be distilled at atmospheric pressure without appreciable decomposition and the viscous oils and resins distill readily under vacuum. *Corrosiveness:* The Aroclors have practically no corrosive action when applied to metallic surfaces.

General Information: Uses: *Lacquer, paint and varnish:* Aroclors impart resistance to moisture, gas, acids, alkalies, and ultra violet light and improve electrical insulating properties and durability. They function as both plasticizers and resins in nitrocellulose and ethyl cellulose lacquers. *Sealing Waxes:* Where a moisture proof, non-flammable wax or one with good electrical insulating properties is desired. *Adhesives:* Aroclors in adhesive application have the desirable qualities of being non-crystalline, insoluble in water, thermoplastic, light in color, practically odorless, non-drying, and soluble in most organic solvents. They provide excellent adhesion even to lacquered or varnished surfaces. *Impregnation:* Aroclors are used in impregnation of materials and articles to give them resistance to moisture, flame, alkalies and acids, and to improve electrical insulating properties. Corresponding to each clear Aroclor there is also a black Aroclor of similar properties. *Flameproofing:* Aroclors are used in combination with many other materials to reduce the flammability of those materials. *Rubber and rubber substitutes:* The liquid Aroclors have a solvent

(*Continued*)

action on rubber and act as plasticizer. The solid Aroclors impart flame resistance. *Plastics:* The Aroclors are compatible with nitrocellulose, ethyl cellulose and vinyl resins. In ground powder form is an excellent organic pigment.

Available Literature: 20-page booklet "The Aroclors — Physical Properties and Suggested Applications."

ASPIRIN (See Acetyl Salicylic Acid).

BATTERY ACID (Electrolyte)

Typical Analysis: Practically colorless liquid; H_2SO_4, 93.2% min.; iron, 0.005% max.; nitrogen compounds (as HNO_3), 0.001% max; sp. g. 1.210-1.835. (Acids of lower strengths should be calculated in proportion to above specification on H_2SO_4 content.)

R.R. Classification: Sulfuric Acid.

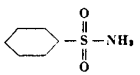
General Information: Electrolyte is sulfuric acid, especially adapted to the needs of the storage battery trade. Various strengths can be furnished to meet the needs of the individual purchaser.

BELT CEMENT

General Information: Nitrocellulose base cements for cementing ply belting and laps. Characterized by strength, flexibility, rapid drying properties, and resistance to water. Specially adapted to power belting. More flexible types are offered for wool combing aprons and paper machine dryer felts.

R.R. Classification: Lacquers.

BENZENE SULFONAMIDE, TECHNICAL



Mol. Wt. 157.18

Characteristics: A brownish crystalline solid, crystallizing at 150° - 152°C.

R.R. Classification: Lacquer Solvents, NOIBN.

General Information: This product is the techincal form of Santicizer 129. It may be used in organic syntheses, production of dyestuffs or as a plasticizer in resinous compositions where color is not a factor; is analogous to Monsanto's para-Toluenesulfonamide and can probably be used as a substitute in most applications.

BENZENE SULFONIC ACID, TECHNICAL

Mol. Wt. 158.17

Characteristics: Greenish black viscous liquid or crystalline mass; crystallizing point, 25.8°C. (approx.); H_2SO_4, 24.0 - 25.0%; benzene sulfonic acid, 70.0 - 71.0%; sp.g. 25°/15.5°C., 1.45 (approx.).

R.R. Classification: Chemicals, NOIBN.

General Information: Used as an intermediate in organic synthesis and as a catalyst in certain condensation reactions.

BENZOATE OF SODA (See Sodium Benzoate).

BENZOIC ACID

Mol.Wt. 122.12

Grades: U.S.P. and Technical.

Specifications of U.S.P. Grade: White crystalline needles or fine powder; assay 99.5 min. (dry basis); m.p. 122.5°C. min.; solution in alcohol (1:2.5) and in 10% sodium carbonate (1:6), clear and colorless; meets U.S.P. test for carbonizable impurities; 5% max. powder retained on 100 mesh screen.

Specifications of Technical Grade: White to yellowish white granules or powder; assay, 99.25% min.; odor, characteristic; solution in 10% Na_2CO_3 (1:6), slightly turbid or opalescent and practically colorless; approx. 10-20% retained on 20 mesh; approx. 100% retained on 100 mesh.

R.R. Classification: Of U.S.P. Grade—Food Preserving Compound; of Technical Grade—Chemicals, NOIBN.

General Information: U.S.P. Grade used in medicinal preparations and as a preservative in foodstuffs. Technical Grade used in the manufacture of benzoates and benzoyl compounds; as an intermediate in the manufacture of dyes; as a mordant in calico printing; as a modifying agent in alkyd resins; as a color stabiliser in baking varnishes; as a dispersing agent in the grinding of pigments.

BENZOTRICHLORIDE

Mol. Wt. 195.48

Standard Form: Liquid.

Specifications: Colorless to light green or yellow liquid; crystallizing point 6.0°C. min. Distillation range: first drop, 218.0°C. min.; 95% (1-96 ml), 2.0°C. max.; dry point, 223.0°C. max.

R.R. Classification: Chemicals NOIBN.

General Information: Used as an intermediate in dyestuff synthesis. *CAUTION: Irritating to the skin. Vapors are highly irritating to the eyes. Avoid breathing vapors. Avoid contact with the skin.*

BENZYL CHLORIDE

Mol. Wt. 126.59

Standard Forms: Liquid, anhydrous; liquid with 10% Na_2CO_3 solution.

Specifications: For anhydrous liquid and material recovered from 10% solution below: Colorless to light green to brown liquid; sp. g. at 15.5/15.5°C., 1.104 - 1.108. Distillation range: first drop, 177.5°C. min.; 95% (1-96), 3.0°C. max.; dry point, 185.0°C. max.

Liquid with 10% Na_2CO_3: Na_2CO_3 in water solution, 9.0 - 11.0%. Note: 23 lbs. of 10% Na_2CO_3 solution are added to 450 lbs. of benzyl chloride contained in 55 gal. black iron drums. The wet material is a milky white emulsion, from which water may separate into a definite layer at either the bottom or top depending on the temperature and the concentration of Na_2CO_3. *The concentration of Na_2CO_3 slowly decreases on standing.*

R.R. Classification: Chemicals NOIBN.

General Information: Used in the production of the following: Dyestuffs; perfume bases such as benzyl alcohol, acetates, benzoate and phenyl ethyl alcohol; plasticizers; resins; wetting agents; rubber accelerators; gasoline gum inhibitors; benzyl cellulose; various pharmaceuticals. *CAUTION: This product is irritating to the skin. Vapors are highly irritating to the eyes. Avoid contact with the skin. Avoid breathing vapors.*

BISULFATE OF SODA (See Nitre Cake)

BISULFITE OF SODA (See Sodium Bisulfite).

BLEACH (See Mercler).

BONE ASH

General Information: Mold wash grade for coating molds used in casting copper wire bars, ingots and slabs. A superior mold coating for certain steel casting operations. This product is also used in producing opal and other translucent glasses.

R.R. Classification: Bone Ash.

BONE BLACK

Grades: Twelve grades are available which vary in fineness, top tone, undertone, tinting strength, and color in oil.

Specifications: In general, bone blacks when compared with lampblack or carbon black have greater hardness and lower oil absorption. They mix easily with water, shellacs and lacquer, and are relatively able to sunlight. Specifications for the various standard grades are as follows:

Grade No.	% of Moisture	% P_2O_5	% Carbon	Oil Absorption*	% thru 325 Screen
45	4.10	33.50	9.20	46.2	99.89
150	4.10	33.50	9.20	46.2	99.90
250	4.94	33.05	9.75	43.9	99.40
350	4.07	30.15	13.84	43.9	99.85
439	4.78	32.05	14.57	50.2	99.95
439 Spec.	4.78	31.73	15.12	50.5	99.90
450 & 450-CT.	4.86	34.50	9.30	42.7	**
650	4.28	34.00	8.75	43.9	99.73
841	4.02	32.95	8.90	46.2	99.90
850	3.82	34.60	8.37	43.9	99.90
Ceco	4.95	32.30	9.70	46.3	99.95

*Lbs. oil per 100 lbs. pigment.
**No. 450, 99.90; No. 450-CT., 99.67

R.R. Classification: Animal Charcoal, Other Than Spent.

General Information: Chief use is as a pigment in leather finishes, artificial leather, paints, lacquers, japans, inks and wall paper. Bone black has good jetness and is easy to wet, whereas lampblack wets only with difficulty and has much less jetness.

BRONZING LIQUIDS

General Information: Clear lacquer base mediums for aluminum and bronze powders. Several types offered for metal, wood, fabric, and paper. Applied by spray or machine coating. Many are inhibited to retard gelling.

R.R. Classification: Bronzing Liquids.

"BUTASAN" (See Accelerators, Rubber).

BUTYL ACETATE

Typical Analysis: Water white liquid: sp. g. 0.872 - 0.877 at 20/20°C.; 7.3 lbs. per gal.; ester content, 88-90%. Boiling range: below 115°C., none; below 122°C., not over 10%; below 125°C., at least 90%; below 130°C., 100%. Dryness, mixes with 19 vols. 60° Bé. gasoline. Less than 0.01% as free acetic acid.

R.R. Classification: Butyl Acetate.

General Information: Used as a nitrocellulose solvent. Is intermediate in activity between ethyl acetate and amyl acetate. Blends of all three with appropriate diluents such as alcohols (ethyl, butyl, and amyl) yield thinners and solvent mixtures of excellent cutting power and moisture resistance, good flow and leveling, and compatability with various resins and oils. Used in the artificial leather industry and in formulating lacquer finishes for wood, metals, textiles, and paper.

BUTYL BENZENE SULFONAMIDE (See Santicizer 127).

n-BUTYL PHOSPHORIC ACID (See Alkyl Phosphoric Acids).

BUTYL PHTHALATE (See Dibutyl Phthalate).

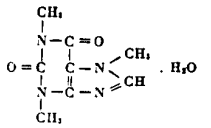
BUTYL PHTHALYL BUTYL GLYCOLLATE (See Santicizer B-16)

CABLE LACQUERS

General Information: Manufactured in clear, black and colors for application by gasket, for high tension automotive cables and primary wires. Special types are available that are flameproof, resistant to hot oil, and have high heat test ratings; also non-inflammable type sleeving lacquer of high dielectric strength. All types build well, giving a tough, glossy, flexible finish.

R.R. Classification: Lacquers.

CAFFEINE, U.S.P.



Mol. Wt. 212.21

Standard Forms: Powder, anhydrous; powder, hydrated.

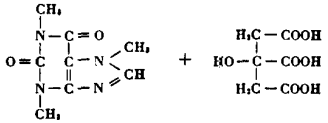
Specifications: White powder. Loss on drying at 80°C: anhydrous powder 0.25% max.; hydrated flakes 5.75 - 6.50%. M.p. 235°C. min.; meets U.S.P. test for carbonizable impurities.

MESH Retained on—	*Hydrated*	*Anhydrous*
20 mesh screen	Trace max.	
35 mesh screen	12.0% max.	
45 mesh screen	18.0% max.	
100 mesh screen		None
200 mesh screen		2.5% max.

R.R. Classification: Chemicals NOIBN.

General Information: Pharmaceutical product.

CAFFEINE, CITRATED, U.S.P.



(Caffeine) (Citric Acid)

Equal quantities by weight

Standard Form: Powder.

Specifications: White powder; assay 48.0-52.0% anhydrous caffeine; loss on drying at 80°C., 0.2% max.; solubility in water (1-4), complete; conforms to U.S.P. tests for sulfate and heavy metals; 15.0% max. retained on 100 mesh screen.

R.R. Classification: Chemicals NOIBN.

General Information: Pharmaceutical product.

CALCIUM GLYCEROPHOSPHATE N.F. (See Glycerophosphates).

CALCIUM NITRATE

$Ca(NO_3)_2 . 3\ H_2O$

Standard Forms: White crystals; 75% water solution.

Typical Analysis:

	White Crystals	*Solution*
$Ca(NO_3)_2 . 3\ H_2O$	98.95%	74.21%
Heavy Metals	none	none
Iron	none	none
R_2O_3	none	none
Water	none	25%
	Balance to make up 100% is probably magnesium nitrate.	

R.R. Classification: Calcium Nitrate.

General Information: Used as a coagulant in latex dipping processes.

CALCIUM PHOSPHATE, MONO

(Also known as primary calcium phosphate, calcium di-hydrogen phosphate, mono-basic calcium phosphate, calcium acid phosphate, and acid phosphate of lime).

Grades: Regular for phosphated and self-rising flour and baking powder. Granular for baking powder. All grades meet U.S. Pure Food Law requirements. Special grades will be supplied on request.

The following mixtures are carried in stock:

Neut. Strength	*Constituents*
52	Regular, Starch and 15% Calcium Sulfate.
50	Regular and Starch
50	Granular and Starch
45	Regular, Starch and 18% Calcium Sulfate.
45	Regular, Starch and 30% Calcium Sulfate.
45	Regular and Starch.

Properties: A white stable material, soluble in water, giving an acid reaction.

R.R. Classification: Calcium Phosphate.

General Information: Used in bakeries for leavening purposes and to prevent the formation of "rope" in bread; as a leavening agent in biscuits and crackers and as an acid leavening agent in pancakes; as sole acid agent or mixed with sodium aluminum sulfate or sodium acid pyrophosphate in baking powders; in making self-rising, phosphated plain flour and prepared flours; to control pH of solution in malt.

CALCIUM PHOSPHATE, DI

(Also known as phosphate of lime, precipitated bone, secondary phosphate of lime, dicalcium *ortho*-phosphate and bibasic calcium phosphate.)

Anhydrous $CaHPO_4$ Dihydrate $CaHPO_4.2H_2O$

Mol. Wt. 136.068 Mol. Wt. 172.084

Standard Forms: Anhydrous; dihydrate.

Properties: Insoluble in alcohol; soluble in dilute citric acid solution. Solubility in CO_2 - free water in grams per liter:

	30°C.	*50°C.*	*68°C.*	*100.1°C.*
Anhydrous:				
CaO	.0414	.667	.0985	.1046
P_2O_5	.0866	.1630	.2234	.2461
Dihydrate:				
CaO	.0954	.2617	.3409	.3109
P_2O_5	.2066	.6182	.3245	.7591

Grades: Medicinal; food; dentifrice.

R.R. Classification: Calcium Phosphate.

General Information: Used as a mineral supplement in diets that are deficient in calcium and phosphorus; as polishing agent in tooth pastes and powders.

Anniston, Alabama, plant of the Phosphate Division.

CALCIUM PHOSPHATE, TRI

(Also known as tri-basic calcium phosphate, normal calcium phosphate, neutral calcium phosphate, tertiary calcium phosphate.).

Standard Form: White powder.

Grades: Dentifrice, conditioner (salt, sugar, etc.), and medicinal. All material conforms to requirements of the U.S. Pure Food Laws.

Properties: White amorphous powder, odorless and tasteless; practically insoluble in water.

R.R. Classification: Calcium Phosphate.

General Information: Used as a mineral supplement to supply calcium and phosphorus; as a tooth paste base or polishing agent in tooth powder; as an ingredient in making milk glasses; as an antacid; as a conditioner to prevent caking in salt, sugar, talc and other powdered material.

CALCIUM PHOSPHATE, X-C

GeneralInformation: Extra rich in calcium. Used as a mineral supplement to supply calcium and phosphorus, especially in enriched flours; to control pH of baked products in order to reduce loss of Thiamin (B_1) in baking process; in phosphating plain flours.

CALCIUM PYROPHOSPHATE

$Ca_2P_2O_7$ Mol. Wt 254.12

Properties: A finely subdivided powder; contains 43.8% CaO and 55.5% P_2O_5.

General Information: Used in food fortification as a mineral supplement.

CALCIUM SALICYLATE (See Salicylates).

CALCIUM SULFATE (See Crysalba).

CARBOLIC ACID (See Phenol).

CARBON DIOXIDE GAS

CO_2

Typical Analysis: 100% CO_2 approx.; sp. g. of liquefied gas, 1.057.

(Continued)

R.R. Classification: Liquefied Carbon Dioxide.

General Information: Monsanto carbon dioxide is liberated from pure soda ash. It is purified, dried and compressed to 400 lbs. per sq. in. in a multi-stage compressor, then condensed or liquefied and placed in steel cylinders. Thus prepared, it is entirely free from odors and tastes and is widely used in carbonating beverages. It is also used as a non-oxidizing atmosphere, in rubber vulcanizing, in dry cleaning, in preserving foods, or wherever an inert oxygen-free medium is required. Liquefied Carbon Dioxide is the cheapest source of high pressure which is portable and without fire hazard.

CARBON DIOXIDE, SOLID (Dry Ice)

Standard Form: Blocks, 10"x10"x10", weighing 50 to 55 lbs.

R.R. Classification: Dry Ice.

General Information: A product of molasses fermentation in the manufacture of alcohol. Carbon dioxide thus produced as compared with the gas from other sources permits higher yield and a purer product, requiring less processing for purification prior to liquefying and solidifying. Used for low temperature refrigeration.

CAST PHENOLIC (See Plastics, Opalon).

CATECHOL (See Pyrocatechol).

CAUSTIC SODA
(Also known as sodium hydroxide)

Na OH Mol. Wt. 40.00

Standard Form: Solution 50%.

Specifications: Practically clear, colorless or slight yellowish or greenish tinge; sodium hydroxide 48.5% min., 50.5% max.; sodium carbonate 0.20% max.; sodium chloride 1.25% max.; sodium chlorate 0.04% max.; iron 0.007% max.; sodium sulfate 0.04% max.; copper 0.0005% max.

R.R. Classification: Caustic Soda.

General Information: Used in petroleum refining, vegetable oil refining, tanning, soap making, textile manufacture (rayon), rubber reclaiming.

CELLULOSE ACETATE (See Plastics, Fibestos).

CELLULOSE NITRATE (See Plastics, Nitron).

CEMENTS

General Information: Rapid-drying waterproof cement in various soluble cellulose and resin bases; also heat sealing cements. A complete line of cements is offered for adhering wood, metal, paper and fabric to various plastic materials; also cements for packaging in collapsible metal tubes, such as household cement, model airplane cement, and library cement.

R.R. Classification: Lacquer.

CHLORAL HYDRATE, U.S.P.

$CCl_3CH(OH)_2$ Mol. Wt. 165.39

Standard Form: Crystals.

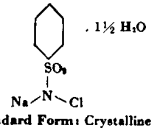
Specifications: Colorless, dry transparent crystals; assay 99.5% min.; solubility in water (1:1), complete; water solution neutral to litmus; comforms to U.S.P. test for carbonizable impurities and chlorides.

R.R. Classification: Chemicals NOIBN.

General Information: Used in pharmaceutical preparations and veterinary medicines.

CHLORAMINE-B

(Also known as N,N-sodium chlorobenzene sulfonamide)



$\cdot 1\frac{1}{2} H_2O$

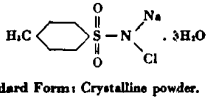
Mol. Wt. 240.63

Standard Form: Crystalline powder.

Specifications: Nearly white crystals or crystalline powder; soluble in water; active chlorine 14.45% min.

General Information: Chloramine-B is a water-soluble, chlorine-bearing powder used as a germicide, disinfectant and deodorant.

CHLORAMINE-T, U.S.P.



$\cdot 3H_2O$ Mol. Wt. 281.70

Standard Form: Crystalline powder.

Specifications: White or faintly yellow powder or granules; solubility in water (2:15), complete; free alkali (as NaOH), 0.07 - 0.15%; loss on drying (3 hrs. at

(Continued)

97°C.), 18.0 - 20.0%; active chlorine 12.25 - 12.60%; assay 97.3% min.

MESH

Retained on 10 mesh screen—Trace max.
Retained on 35 mesh screen—1.0% min.

R.R. Classification: Disinfectant other than medicinal.

General Information: Chloramine-T is a water-soluble, chlorine-bearing powder used as a germicide, disinfectant and deodorant.

CHLORCOSANE (Chlorinated Paraffin, N.F.)

Specifications: Light yellow oil; odorless and tasteless; sp. g. 1.00 to 1.07 at 25°C.; combined chlorine content 27% to 30%; reaction of water extract to litmus, neutral; chlorides (as HCl) 0.004% max.; free chlorine, none; unchlorinated paraffin, negative (N.F. test).

R.R. Classification: Chemicals NOIBN.

General Information: A solvent for dichloramine-T. For uses where a product with fire-resistant, insulating and solvent properties are indicated.

CHLORINATED DIPHENYL (See Aroclors).

CHLORINATED PARAFFIN, N.F. (See Chlorcosane).

CHLORINE

Specifications: Clear, amber colored liquid; about 1½ times as heavy as water; conforms with American Water Works Association specifications.

R.R. Classification: Chlorine.

General Information: Used for municipal water purification, sewage treatment and swimming pool sterilization, for slime control, in pulp and textile bleaching, metallurgy, bleaching and processing of flour, organic synthesis, and in the manufacture of metallic chlorides and hypochlorites. *CAUTION: Chlorine is toxic and highly irritating. Avoid contact with the skin and breathing the vapors.*

Available Literature: 20-page booklet "Monsanto Chlorine"

***para*-CHLORO-*meta*-CRESOL,** white transparent crystals; used as a disinfectant intensifier; made by Monsanto Chemicals Limited.

***ortho*-CHLORO-*para*-TOLUENE-SODIUM SULFONATE** (See Monsanto Salt).

***para*-CHLORO-*meta*-XYLENOL,** white crystals; used as a disinfect-

(*Continued*)

ant intensifier and as a preservative and preventive against mold and mildew; made by Monsanto Chemicals Limited.

ortho-CHLOROANILINE

(Also known as *ortho*-aminochlorobenzene and 1-amino-2-chlorobenzene.)

Mol. Wt. 127.58

Standard Form: Liquid

Specifications: Discolors readily on exposure to air; crystallizing point —2.3°C. min. Distillation range: first drop, 208.0°C. min.; 95% (1-96 ml), 1.0°C. max.; dry point, 210.0°C. max; Solution in HCl, very slightly opalescent max.

R.R. Classification: Dye Intermediate.

General Information: Used as an intermediate in the production of dyestuffs. *CAUTION: This product is toxic Avoid breathing its vapors and avoid contact with the skin.*

meta-CHLOROANILINE

(Also known as *meta*-aminochlorobenzene and 1-amino-3-chlorobenzene.)

Mol. Wt. 127.58

Standard Form: Fused solid

Specifications: Clear, light yellow liquid; crystallizing point approx. —10.0°C. Distillation range: first drop, 228.0°. min.; 95% (1-96 ml), 1.0°C. max.; dry point, 231. 0°C. max.

R.R. Classification: Dye Intermediate.

General Information: Used as an intermediate in the manufacture of azo dyestuffs. *CAUTION: This product is toxic. Avoid breathing its vapors. Avoid contact with the skin.*

para-CHLOROANILINE

(Also known as *Para*-aminochlorobenzene and 1-amino-4-chlorobenzene.)

Mol. Wt. 127.58

Standard Form: Fused solid.

(*Continued*)

Specifications: Yellowish, white solid; crystallizing point 69.5°C. min. Distillation range: first drop, 229.0°C. min.; 95% (1-96 ml), 1.5°C. max.; dry point, 233.0°C. max. Solution in HCl, slight opalescence max.

R.R. Classification: Dye Intermediate.

General Information: Used as an intermediate in the production of dyestuffs. *CAUTION: This product is toxic. Avoid breathing its vapors and avoid contact with the skin.*

CHLOROBENZENE

Mol. Wt. 112.56

Standard Form: Liquid.

Specifications: Clear, almost colorless liquid. Distillation range: first drop, 131.5°C. min.; 95% (1-96 ml), 0.5°C. max.; dry point, 133.5°C. max.

R.R. Classification: Monochlorobenzene.

General Information: Major use is as an intermediate in the preparation of the various substituted chlorobenzenes which are in turn intermediates for the preparation of dyestuffs, explosives, and various other organic chemicals. Also used as an organic solvent.

ortho-CHLOROPHENOL, TECHNICAL

(Also known as *ortho*-hydroxychlorobenzene and 1-chloro-2-hydroxybenzene.

Mol. Wt. 128.56

Standard Form: Liquid.

Specifications: Clear yellow to brown liquid; monochlorophenol (from Cl content), 95.0% min. Distillation range: first drop, 173.0°C. min.; 95% (1-96 ml.), 2.0°C. max.; dry point, 178.0°C. max.

R.R. Classification: Dye Intermediate.

General Information: Used as an intermediate in the production of dyestuffs and various other organic products. *CAUTION: This product is toxic. Avoid breathing its vapors. Avoid contact with the skin.*

para-CHLOROPHENOL

(Also known as *para*-hydroxychlorobenzene and 1-chloro-4-hydroxybenzene.)

(*Continued*)

Mol. Wt. 128.56

Standard Form: Fused solid.

Specifications: Yellow to brown crystalline mass; crystallizing point 42.5°C. min.; sp.g. at 45.0°/15.5°C., 1.256-1.262.

R.R. Classification: Dye Intermediate.

General Information: Used as an intermediate in the production of dyestuffs, as a germicide and in the synthesis of pharmaceuticals. *CAUTION: Care should be exercised in handling this product. Avoid contact with the skin.*

CHLOROSULFONIC ACID

(Also known as sulfuric chlorohydrin.)

$ClSO_3OH$ Mol. Wt. 116.53

Standard Form: Liquid.

Specifications: Heavy mobile liquid; assay 98.5% min.

R.R. Classification: Acid.

General Information: Used in chlorosulfonation reactions. *CAUTION: Chlorosulfonic acid reacts violently with water, forming hydrochloric and sulfuric acids.*

CHROME SULFATE (See Santotan).

CITRATED CAFFEINE, U.S.P. (See Caffeine, Citrated).

CONTACT MASS (See Vanadium Catalyst).

COPPERAS NITRATE OF IRON (See Nitrate of Iron C).

COTTON SOLUTIONS

General Information: Made from RS (regular soluble) cotton of any desired viscosity. Viscosity, solid content, and solvent composition can be regulated to meet customer requirements. Used in manufacture of lacquers, leather dopes, fabric coatings, artificial leather finishes, etc. Composition of standard base solutions follow:

(*Continued*)

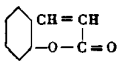
Standard Nitrocellulose Solutions

Formula Number	*Viscosity of Nitrocellulose*	*Wt. NC to 1 gal. Solvents*	*Percent Nitrocel. dry*	*Active Solvent**	*Weight one gallon*
R-1202	½ Seconds	64 oz.	35.9	Butyl Acetate	8.71 lbs
R-4683	½ "	64 "	36.5	Ethyl Acetate	8.54 "
R-2816	6 "	45 "	28.1	Butyl Acetate	8.53 "
R-1205	15-20 "	28 "	19.5	Butyl Acetate	7.99 "
R-1204	15-20 "	28 "	19.5	Ethyl Acetate	8.1 "
L-4692	250-400 "	16 "	13.0	Ethyl Acetate	7.24 "

* Usual added diluents: Toluol, xylol, naphthas (varying aromaticity), alcohols (ethyl, butyl, amyl).

R.R. Classification: Lacquers.

"COUMARIN MONSANTO" (Coumarin N. F.)



Mol. Wt. 146.14

Standard Forms: Crystals, fine; crystals, large—4 mesh.

Specifications: Fine or large white crystals: melt (liquid), clear and colorless; m.p. 68.8°C. min.; solubility in ethyl alcohol (1:10), complete; loss on drying 0.03% max.; ash 0.05% max.; conforms to N.F. test for acetanilid; 5.0% max. retained on 4 mesh screen; 95.0% min. retained on 8 mesh screen.

R.R. Classification: Coumarin.

General Information: Coumarin is a flavor and odor principle used separately and in conjunction with vanillin. It is used in perfumes, soaps, tobacco, inks, foods and other products where flavoring or aromatic ingredients are required.

Available Literature: Folder, "Coumarin Monsanto".

CREAMERY ACID (See Sulfuric Acid).

***meta*-CRESOL,** colorless liquid, assay 98-100%, crystallizes at 10.5 - 12°C.; used in the manufacture of synthetic perfumes and nitro-derivatives; made by Monsanto Chemicals Limited.

***ortho*-CRESOL,** white crystalline mass, crystallizes 30 - 31°C.; used in the manufacture of chemicals and as a dye intermediate; made by Monsanto Chemicals Limited.

para-**CRESOL,** loose white crystals, crystallizes 34.5°C.; dye intermediate; made by Monsanto Chemicals Limited.

CRESOL-CRESYLIC ACID, duty-free grades; used as a flotation agent and gasoline antioxidant and in the manufacture of soaps, disinfectants, paint removers, textile chemicals, resins and dyestuffs; made by Monsanto Chemicals Limited.

CRESYLIC ACID (See Cresol).

"CRYSALBA"

$CaSO_4$ Mol. Wt. 136.14

Properties: Extremely fine, white powder composed of minute particles of crystalline-shaped anhydrous calcium sulfate, standardized and specially prepared for use as a dentifrice base (paste or powder).

R.R. Classification: Calcium Sulfate.

Principal Uses: Used as a tooth paste base or polishing agent. Suitable for preparation of neutral, acid, basic, soap, or magnesia type dentifrice.

"CURODEX"

A complete line of reodorants for the rubber trade; not manufactured by us but furnished for the convenience of our customers.

"CYCLINE" OIL

Specifications: Blend of mineral and vegetable oils. Clear, yellow oil with pale blue-green fluorescence; sp. g. 0.89; flash point, 185°C.; viscosity, between 105 and 115 Saybolt viscosimeter at 37.8°C.; soluble in benzene, gasoline, dry alcohols, ethers and acetone.

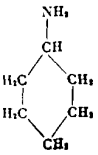
R.R. Classification: Petroleum Oil, NOIBN.

General Information: Used as a rubber softener.

Available Literature: 42-page booklet "Monosanto Chemicals for the Rubber Industry."

CYCLOHEXYLAMINE

(Also known as hexahydroaniline.)



Mol. Wt. 99.17

Standard Form: Liquid.

Specifications: Clear, practically colorless; sp. g. at 15.5/15.5°C., 0.870-0.874. Distillation range: first drop, 132.0°C. min.; 95% (1-96 ml.), 4.0°C. max.; dry point, 137.5°C. max.

R.R. Classification: Chemicals NOIBN.

General Information: Used as a dyestuff intermediate; as an intermediate or ingredient for insecticidal compositions; as a component of corrosion inhibitors; in organic synthesis. *CAUTION: This product is toxic. Avoid breathing its vapors and avoid contact with the skin.*

DETERGENTS (See Areskap, Aresket, Aresklene, Santomerse).

DIACETONE, TECHNICAL

Typical Analysis: Nearly water white liquid; acidity, neutral; odor, no residual; sp. g. 0.918 at 15.5°C.; shipping wt. per gal., 7.60 lbs.; diacetone content, 85%; boiling range, theoretical b.p. 164°C. (decomposes at 130° - 140°C.); dryness, mixes with 5 vols. of petroleum naptha without turbidity.

R.R. Classification: Diacetone.

General Information: Diacetone is one of the most active high boiling solvents for nitrocellulose. It is a good solvent for cellulose acetate and many resins, waxes and dyes. Diacetone is miscible and has a high tolerance for nearly all lacquer diluents. Higher percentages of water are tolerated than with most solvents.

DIAMMONIUM PHOSPHATE (See Ammonium Phosphate, Di).

"D.P. SOLUTION 4519"

Standard Form: 40% sol. in ethyl alcohol.

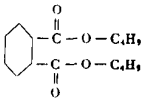
(*Continued*)

Properties: Pale straw colored liquid; 8.2 lbs. per gal.

R.R. Classification: Chemicals NOIBN.

General Information: Used as an anti-corrosion agent in lacquers and cotton solutions, and as an agent to prevent the settling of Santocel in flat lacquer formulations.

DIBUTYL PHTHALATE



Mol. Wt. 278.17

Specifications: Clear, oily, liquid, color (APHA) 10 max.; odor, slight; acidity (as phthalic acid) 0.01% max.; sp. g. at 20°/20°C., 1.048±0.001; refrac. index at 25°C., 1.4905±0.001; assay (ester content) 99% min.; sulfur (copper strip test), negative.

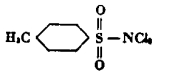
R.R. Classification: Dibutyl Phthalate.

General Information: Dibutyl Phthalate is one of the most widely used plasticizers for nitrocellulose. It is miscible with all the common organic solvents and with oils but is soluble in water only to the extent of 0.001% at 30°C. It has excellent light stability which permits its use in colorless, white or delicately tinted products. The stability of Dibutyl Phthalate and its high solvent power for most plastic materials make it one of the most acceptable plasticizers for general use.

Available Literature: 40 Page booklet "Plasticizers and Resins".

DICALCIUM PHOSPHATE (See Calcium Phosphate, Di).

DICHLORAMINE-T, N.F.



Mol. Wt. 240.11

Standard Form: Crystalline powder.

Specifications: Yellowish white crystalline powder; crystallizing point 80.5°C. min.; assay (available chlorine) 29.25%.

R.R. Classification: Chemicals NOIBN.

(*Continued*)

General Information: Dichloramine-T is a water soluble, active chlorine bearing product. It must be stored away from light and in a cool place.

2,5-DICHLOROANILINE

(Also known as 1-amino-2,5-dichlorobenzene)

Mol. Wt. 162.03

Standard Form: Fused crystalline mass.

Characteristics: Light brown crystalline mass; crystallizing point, 48.6°C. min. Distillation range: start, 247°C. min.; 95%, within 1.5°C.

R.R. Classification: Dye Intermediate.

General Information: Used as an intermediate in the preparation of azo dyestuffs. *CAUTION: This product is toxic. Avoid breathing its vapors. Avoid contact with the skin.* "Poison" label required.

DICHLOROBENZENE (See Santochlor and ortho-Dichlorobenzene)

para-DICHLOROBENZENE (See Santochlor).

ortho-DICHLOROBENZENE, TECHNICAL

(Also known as 1, 2-dichlorobenzene)

Mol. Wt. 147.00

Standard Form: Liquid.

Characteristics: Colorless to slightly yellow liquid; crystallising point, 7.0°C. max.; 100% (1st drop, dry point), 14.0°C. max. Sp.g. 15.5/15.5, 1.305 - 1.313; composition, 75 - 85% ortho-dichlorobenzene, 15 - 25% para-dichlorobenzene.

R.R. Classification: Ortho-dichlorobenzene.

General Information: Used as a dyestuff intermediate; solvent; ingredient in cleaning preparations; and as an insecticide and fungicide.

2, 4-DICHLOROPHENOL

(Also known as 1,3-dichloro-4-hydroxybenzene.)

Mol. Wt. 163.00

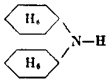
Standard Form: Fused solid.

Specifications: Yellow to brown crystalline mass; crystallizing point 42.0°C. min. Distillation range: first drop, 214.5°C. min.; 95% (1-96 ml.), 2.0°C. max.

R.R. Classification: Dye Intermediate.

General Information: Used as an intermediate in the production of dyestuffs and as a germicide. *CAUTION: Care should be exercised in handling this material. Avoid contact with the skin. Avoid breathing its vapors.*

DICYCLOHEXYLAMINE



Mol. Wt. 181.32

Standard Form: Liquid.

Characteristics: Clear, practically colorless liquid; sp.g. 15.5°/15.5°C., 0.916 - 0.920. Distilling range: first drop, 252.0°C. min. Flash point ("Tag" open cup), above 200°F.

R.R. Classification: Chemicals NOIBN.

General Information: Used as an intermediate in the manufacture of oil additives and insecticides. *CAUTION: This product is toxic. Avoid breathing its vapors. Avoid contact with the skin.*

DIETHYL PHTHALATE

Mol. Wt. 222.11

Specifications: Clear, water-white oily liquid; color (APHA), not darker than 10; odor, very slightly aromatic; acidity (as phthalic acid) 0.01% max.; sp. g. at 20°/20°C., 1.123±0.005; refrac. index at 20°C., 1.5030±0.001, sulfur (copper-strip test), negative.

(*Continued*)

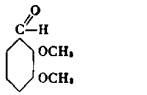
R.R. Classification: Diethyl Phthalate.

General Information: Diethyl Phthalate is a colorless liquid plasticizer generally used in mixture with dimethyl phtha ate as a plasticizer for cellulose acetate. It is miscible with all the common organic solvents and diluents. Evaporation rate of Diethyl Phthalate is too high for successful use as a regular nitrocellulose plasticizer and it is not a solvent for cellulose acetate. Thus its range of usefulness is somewhat restricted. Mixtures of Diethyl and Dimethyl Phthalates usually give better results than can be obtained by either one alone. Boiling point is 295°C.; weight per gal., 9.35 lbs.

Available Literature: 40 Page booklet "Plasticizers and Resins".

2, 3-DIMETHOXY BENZALDEHYDE, TECHNICAL

(Also known as *ortho*-veratraldehyde).



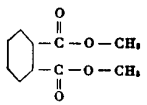
Mol. Wt. 166.0

Characteristics: Yellowish brown fused crystalline mass; solubility in sodium bisulfite, nearly complete; crystallizing point, 47.5°C. min.; sp.g. at 60°C., 1.117; wt. per gal., 9.3 lbs. approx.

R.R. Classification: Chemicals NOIBN.

General Information: Used as a perfume fixative and as an intermediate in chemical synthesis.

DIMETHYL PHTHALATE



Mol. Wt. 194.08

Specifications: Clear, water-white oily liquid; color (APHA), not darker than 10; odor, not more than slightly aromatic; acidity (as phthalic acid) 0.01% max.; sp. g. at 15.6/15.6°C., 1.196±0.001; refrac. index at 20°C., 1.5155±0.001; sulfur (copper strip test), negative.

R.R. Classification: Dimethyl Phthalate.

General Information: Dimethyl Phthalate is a solvent plasticiser for cellulose acetate. It is miscible with all common organic solvents and with oils (except

(*Continued*)

petroleum oils) and has a solubility in water of 0.4% at 32°C. It has excellent light stability. Dimethyl Phthalate is much used but cannot be said to meet very rigid plasticizer requirements. Its use is restricted almost entirely to the cellulose acetate field, and there, as a general rule, it is used in combination with diethyl phthalate or some other plasticizer. Dimethyl Phthalate has a boiling point of 282°C., a crystallizing point of 0°C., and weighs 10 lbs. per gallon.

Available Literature: 40 Page booklet "Plasticizers and Resins."

2, 4-DINITROANILINE.

(Also known as 1-amino-2, 4-dinitrobenzene.)

Mol. Wt. 183.12

Standard Form: Powder.

Specifications: Bright yellow powder; m. p. 177.5°C. min.; chlorides (total) 0.15% max.

R.R. Classification: Dye Intermediate.

General Information: Used as an intermediate in the preparation of dyestuffs. *CAUTION: This product is toxic. Avoid breathing its dust. Avoid contact with the skin.*

2, 4-DINITROCHLOROBENZENE, TECHNICAL

(Also known as 1-chloro-2,4-dinitrobenzene.)

Mol. Wt. 202.56

Standard Form: Fused crystalline solid.

Grades: 3 grades of fused crystalline solids with crystallizing points of 48.0°C., 46.5°C., and 44.0°C.

Approximate Analysis:

	2:4 dinitro-chlorobenzene	isomeric dinitro-chlorobenzenes
48.0°C.	95% Approx.	5% Approx.
46.5°C.	90% "	10% "
44.0°C.	85% "	15% "

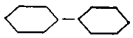
R.R. Classification: Dye Intermediate.

(*Continued*)

General Information: Used in the production of explosives, photographic chemicals, and dinitrophenol, and as an intermediate in the preparation of dyestuffs. *CAUTION: This product is toxic. Avoid breathing its vapors. Avoid contact with the skin.*

DIPHENYL

(Also known as biphenyl; phenyl benzene).



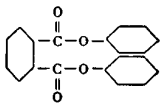
Mol. Wt. 154.2

Properties: Technical diphenyl is a light yellow crystalline solid. Boiling point 254.9°C, freezing point 68.5°C. to 68.9° C.

R.R. Classification: Diphenyl.

General Information: Used as a high temperature, low pressure heat transfer medium. It is also the starting point for many derivatives such as Aroclors (chlorinated diphenyl) and the sulfonic acid, nitro, amino and hydroxy compounds.

DIPHENYL PHTHALATE



Mol. Wt. 318.31

Specifications: Essentially white fused solid; melt, clear and light yellow color; free acid (as phthalic) 0.20% max., free phenol 0.25% max.

R.R. Classification: Lacquer Solvent.

General Information: Diphenyl Phthalate has a crystallizing point of about 69°C. and is readily soluble in ketones, esters and chlorinated hydrocarbons. Its solubility in alcohols, turpentine and linseed oil is rather low, approx. 5.0 grams per 100 c.c. of solvent at 25°C. Diphenyl Phthalate is compatible with nitrocellulose and with the sulfonamide, phenolic, polystyrene and vinyl types of synthetic resins. In nitrocellulose lacquers it produces hard coatings that have excellent gloss retention and weather resistance. Mixtures of Dipbenyl Phthalate with either Santolite MS or Santolite MHP are excellent plasticizers for nitrocellulose in odorless, flexible, adhesive coatings.

Diphenyl Phthalate is completely insoluble in water and gives increased water resistance to all compositions in which it is used. It is especially recommended for vinyl resins, polystyrene, ethyl cellulose, and some of the natural resins such as Damar.

Available Literature: 40 Page booklet "Plasticizers and Resins".

DIPHENYLGUANIDINE (See DPG under Accelerators, Rubber).

DIPPING LACQUERS (See Lacquers).

DISINFECTANT INTENSIFIERS (See Santophen, Areskap).

DISODIUM PHOSPHATE (See Sodium Phosphate, Di).

DISPERSING AGENTS (See Areskap, Aresket, Aresklene, Santomerse).

DRY ICE (See Carbon Dioxide Solid).

"EL SIXTY" (See Accelerators, Rubber).

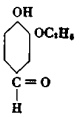
ELECTROLYTE (See Battery Acid).

EMULSIFYING AGENTS (See Areskap, Aresket, Aresklene, Santomerse).

ENAMELS (See Lacquers and Resins).

"ETHASAN" (See Accelerators, Rubber).

"ETHAVAN" (Ethyl Vanillin)



Mol. Wt. 166.17

Standard Form: Needles.

Specifications: Fine white crystalline needles; completely soluble in ethyl alcohol 95% (1:2); ash 0.05% max.; m.p. 76.5°C. min.

R.R. Classification: Chemicals NOIBN.

(*Continued*)

General Information: Ethavan is used as a flavoring and aromatic, and has a flavor similar to that of Vanillin but not identical with it. The relative flavoring strength of Ethavan approximates three times that of Vanillin.

Available Literature: Leaflet, "Ethavan."

ETHYL ACETATE

Typical Analysis: Water white liquid; sp. g., 0.895 at 15.5°C.; 7.40 lbs. per gal.; ester content, 85-90%. Boiling range: 70°C. - 80°C. Dryness, mixes with not less than 10 vols. of petroleum benzine without turbidity. Less than 0.02% as free acetic acid.

R.R. Classification: Ethyl Acetate.

General Information: Used as a nitrocellulose solvent. It is a more active solvent than either butyl or amyl acetate, evaporating the fastest, and having the least resistance to moisture blush. Blends of all three with appropriate diluents such as alcohols (ethyl, butyl, and amyl) yield thinners and solvent mixtures of excellent cutting power and moisture resistance, good flow and leveling, and compatibility with various resins and oils. Used in the artificial leather industry and in formulating lacquers and finishes for wood, metals, textiles, and paper.

ETHYL ALCOHOL—190 Proof

C_2H_5OH (Also see Mersol, a proprietary solvent type alcohol, and Nealco Anti-Freeze.)

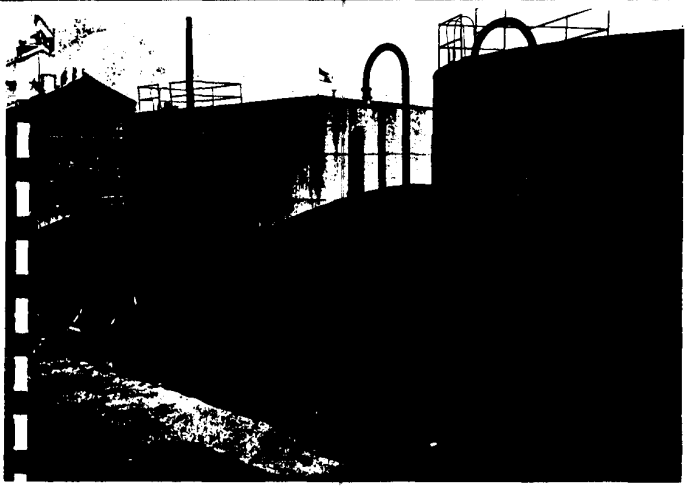
Grades:

1. *Tax Free:* 190 proof pure Ethyl Alcohol (95% by volume). May be withdrawn *Under Regulations and Provisions* by the U. S. or any governmental agency thereof, or by the several states and territories, or any municipal subdivision thereof, or by the District of Columbia, or for the use of any scientific university or college of learning, any laboratory for use exclusively in scientific research, or use in any hospital, or sanitarium, or for the use of any clinic operated for charity and not for profit, including use in the compounding of bona fide medicines for treatment outside of such clinics of patients thereof, but not for sale.

2. *Tax Paid:* 190 proof pure Ethyl Alcohol (95% by volume). (a) May be purchased by manufacturers and others for non-beverage use without Federal Permit or bond, but such users must sign affidavit that the alcohol so purchased is for industrial use only, as defined by Federal Alcohol Administration Regulation 2. (b) May be purchased by blenders and rectifiers. (c) Subject to Federal Government Tax. Individual state regulations apply on the purchase and use of pure Tax Paid Alcohol.

3. *Specially Denatured Alcohol:* May be withdrawn for use in a great number of specialized arts and industries. The character of the denaturant or denaturants employed is such that Specially Denatured Alcohol may be sold, possessed and used only pursuant to permit and bond approved by Internal Revenue Department, Alcohol Tax Division. All application forms covering the withdrawal of

(*Continued*)



Molasses storage tanks of the New England Alcohol Company.

Specially Denatured Alcohol may be obtained from the office of the District Supervisor, Internal Revenue Department, Alcohol Tax Division of the district in which the purchaser's plant is located.

4. *Completely Denatured Alcohol:* 188 proof. May be withdrawn without permit or tax, but buyer must comply with certain Federal and State regulations governing records and storage.

R.R. Classification: Alcohol NOIBN or Denatured Alcohol.

General Information: Nealco ethyl alcohol is manufactured by the fermentation of molasses. It is offered in its pure state and in all formulas of Specially Denatured and Completely Denatured Alcohol as authorized by Federal Law under the provisions of Title III of the National Prohibition Act. It is of high uniform quality complying with the exacting specifications of the National Formulary VI and U.S.P. XI.

Available Literature: 68-page booklet "Nealco Industrial Alcohol."

ETHYL BENZENE SULFONAMIDE (See Santicizer 128).

ETHYL PHOSPHATE (See Triethyl Phosphate).

ETHYL PHOSPHORIC ACID (See Alkyl Phosphoric Acids).

ETHYL PHTHALYL ETHYL GLYCOLLATE (See Santicizer E-15).

ETHYL TRIETHANOLAMINE PHOSPHATE

Properties: Medium straw colored liquid of slightly alcoholic odor; sp. g. 1.19 at 25°C.; wt. per gal. 9.9 lbs.; liquid at all ranges of relative humidity but very viscous when anhydrous; pH 7.0 - 7.4; strength, 60% solution in water.

R.R. Classifications: Chemicals NOIBN.

General Information: Used as a plasticizer for water soluble materials and as a humectant.

ETHYL VANILLIN (See Ethavan).

FERRIC CHLORIDE SOLUTION (Iron Perchloride)

$FeCl_3$

Standard Form: Liquid.

Grades: 37°Bé.; 40°Bé.; 42°Bé.

Typical Analysis: Ferric Chloride 42°Bé.: total Fe_2O_3, 20.3%; FeO, 1.0%; combined Fe_2O_3, 19.2%; $FeCl_3$, 39.0%.

R.R. Classification: Iron Chloride Liquid.

General Information: Used as an acid oxidizing agent in etching, photoengraving, and in the manufacture of textile printing rolls and brass signs. It is used in water and sewage treatment for its iron content.

FERRIC GLYCEROPHOSPHATE (See Glycerophosphates).

FERRIC NITRATE, LIQUID (True Nitrate of Iron)

$Fe(NO_3)_3$

Grades: 47°Bé., 16.0% Fe_2O_3

R.R. Classification: Iron Nitrate.

General Information: A source of ferric hydroxide for mineral tan and buff colors on cotton; brown papers; logwood blacks on silk; shoe stains and inks.

FERRIC PHOSPHATE

Sodium Ferric Pyrophosphate - $Na_8Fe_4(P_2O_7)_5.XH_2O$

(*Continued*)

Ferric Orthophosphate
Ferric Pyrophosphate
Ferric Acid Pyrophosphate

General Information: Used in food and pharmaceutical fortification as a mineral supplement.

FERRIC SULFATE (See Ferrisul).

FERRIC SULFATE, LIQUID (Copperas Nitrate of Iron)

$Fe_2(SO_4)_3$

Grades: 40°Bé., 13.6% Fe_2O_3
47°Bé., 15.7% Fe_2O_3

Containers: Carboys; barrels.

General Information: A strong solution of ferric sulfate, containing no nitric acid. Used as a source of ferric hydroxide for mineral tan and buff colors on cotton, brown papers, logwood blacks on silk, shoe stains and inks.

"FERRISUL"(Anhydrous Ferric Sulfate)

$Fe_2(SO_4)_3$

Standard Form: Pellets 4-40 mesh.

Typical Analysis: 90% min. $Fe_2(SO_4)_3$.

R.R. Classification: Dry Ferric Sulfate.

General Information: An effective coagulant for the treatment of water supplies, sewage, and industrial waste. In solution, it is a mild oxidising agent and can be used for pickling certain alloys such as the stainless steels, brass and other copper alloys. It is also used in various organic reactions.

Available Literature: Booklets, "Ferrisul for Treatment of Water, Sewage and Industrial Wastes" and "Ferrisul for Metal Treating."

FERROPHOSPHORUS (Iron Phosphide)

Standard Forms: Chill cast lumps, egg size; powder. Contains 23 - 26% phosphorus.

R.R. Classification: Ferrophosphorus.

General Information: An alloy of iron and phosphorus. Used in iron and steel castings to increase fluidity; in sheet steel to prevent sticking of sheets in final rolling; in wire to give stiffness and better surface for drawing.

Available Literature: Phosphorus-Iron Alloys Bulletin No. 1. A report of

(Continued)

general exploratory research upon the influence of phosphorus in low carbon, low alloy steels, 36 pages.

Bulletin No. 2. A report of experimental research investigation upon corrosion and mechanical influences of alloying elements in low alloy steels. 62 pages plus charts.

Bulletin No. 3. Abstracts of U.S. patents relating to phosphorus as an alloying element in steel and list of iron and steel patents, 54 pages.

Bulletin No. 4. Reports of experimental research investigation upon influence of phosphorus in steels in elevated temperature service and in Cr-Mo steels, 20 pages.

"FIBESTOS" (See Plastics).

"FLECTOL" H and WHITE (See under Antioxidants).

FLOTATION AGENTS (See Xanthates).

FUNGICIDES (See Santobrite and Santophen 20).

GERMICIDES (See Antiseptics and Germicides).

GLAUBER'S SALT (Sodium Sulfate)

$Na_2SO_4 + 10\ H_2O$

Standard Forms: Crystals and Glauboids.

Typical Analysis: 43% Na_2SO_4 available.

R.R. Classification: Glauber's Salt.

General Information: Used principally as a leveler in dyeing wool and silk; for the precipitation of barium sulfate or blanc fixe; neutralizing of sulfonated oils; treating softened boiler feed water to prevent caustic embrittlement; salting skins.

GLYCEROPHOSPHATES

Specifications: See individual glycerophosphates below.

General Information: The Glycerophosphates are a group of products contain-

(*Continued*)

ing the glycerophosphate radical and may be used advantageously to carry such important elements as calcium, iron, magnesium, manganese, potassium, and sodium in the formulation of pharmaceutical preparations. In the case of the less soluble salts, such as calcium, iron, magnesium, and manganese, the solubility of these products may be materially increased if they are formulated with Glycerophosphoric Acid or certain accepted food acids, such as lactic, citric and tartaric.

GLYCEROPHOSPHATE, CALCIUM, N.F.

$CaC_3H_5(OH)_2PO_4$ Mol. Wt. 210.15

Standard Form: Powder, 80 mesh.

Specifications: Fine white powder; assay (dry basis) 98.0% min.; sp. g. 0.42 - 0.50; loss on drying at 130°C., 12.0% max.; solubility in water (1:50), complete; chloride (as $CaCl_2$) 0.1% max.; sulfate (as $CaSO_4$) 0.50% max.; free phosphate (as P_2O_5) 0.02% max.; conforms to N.F. test for heavy metals; 3.0% max. retained on 80 mesh screen; 5.0% max. on 100 mesh screen.

R.R. Classification: Chemicals NOIBN.

GLYCEROPHOSPHATE, FERRIC, N.F.

$Fe_2[C_3H_5(OH)_2PO_4]_3$ Mol. Wt. 621.90

Standard Form: Powder.

Specifications: Buff or yellowish green powder; assay (dry basis), 17.0% Fe min.; moisture, 10.0% max.; chloride (as $FeCl_3$), 0.10% max.; sulfate (as $Fe_2(SO_4)_3$), 0.10% max.; free phosphate (as P_2O_5), 0.20% max.; 2.0% max. retained on 60 mesh screen, 10.0% max. on 150 mesh screen, 30.0% max. on 250 mesh screen.

R.R. Classification: Chemicals NOIBN.

GLYCEROPHOSPHATE, MAGNESIUM

$MgC_3H_5(OH)_2PO_4$ Mol. Wt. 194.39

Standard Form: Powder, 80-mesh.

Specifications: White powder; assay, 97.0% min.; moisture, 12.5% max.; calcium (as CaO), negative; chloride (as $MgCl_2$), 0.10% max.; sulfate (as $MgSO_4$), 0.10% max.; free phosphate (as P_2O_5), 0.20% max.; conforms to N.F. test for heavy metals; 2.0% max. retained on 60 mesh screen, 4.0% max. on 80 mesh screen, 10.0% max. on 100 mesh screen.

R.R. Classification: Chemicals NOIBN.

GLYCEROPHOSPHATE, MANGANESE, N.F.

$MnC_3H_5(OH)_2PO_4$ Mol. Wt. 225.00

Standard Form: Powder, 80-mesh.

Specifications: Pinkish white powder; assay (dry basis), 98.0% min.; solubility in 25% citric acid solution (1:5), complete; moisture, 10.0% max.; chloride (as MnCl.), 0.15% max.; sulfate (as $MnSO_4$), 0.03% max.; free phosphate (as P_2O_5), 0.20% max.; conforms to N.F. test for heavy metals; 2.0% max. retained on 60 mesh screen, 4.0% max. on 80 mesh screen, 10.0% max. on 150 mesh screen.

R.R. Classification: Chemicals NOIBN.

GLYCEROPHOSPHATE, POTASSIUM (Solution)

$K_2C_3H_5(OH)_2PO_4$

Standard Form: Solution 75%.

Specifications: Clear, colorless or slightly yellowish solution; assay, 61.6 - 63.2% anhydrous salt; carbonate (as K_2CO_3), 0.50 % max.; chloride (as KCl), 0.10% max.; sulfate (as K_2SO_4), 0.10% max.; free phosphate (as P_2O_5), 0.20% max.; conforms to N.F. test for heavy metals.

R.R. Classification: Chemicals NOIBN.

GLYCEROPHOSPHATE, SODIUM, N.F.

$Na_2C_3H_5(OH)_2PO_4 \cdot 5\frac{1}{2}H_2O$ Mol. Wt. 315.15

Standard Forms: Crystals, 10-80 mesh; powder.

Specifications: White crystals; assay, 68.0 - 72.0% anhydrous salt (equivalent to 96.35 - 104.9% hydrated salt); solubility in water (1:10), complete; chloride (as NaCl), 0.05% max.; free phosphate (as P_2O_5), 0.02% max.; conforms to N.F. test for heavy metals and sulfate (as Na_2SO_4); no crystals retained on 10 mesh screen, 40.0% min. crystals on 80 mesh screen.

R.R. Classification: Chemicals NOIBN.

GLYCEROPHOSPHATE, SODIUM (Solution)

$Na_2C_3H_5(OH)_2PO_4$ **Standard Form:** Solution 75%.

Specifications: Clear, colorless or slightly yellow solution; assay 50.0 - 52.0%

(*Continued*)

anhydrous salt; carbonate (as Na_2CO_3) 0.5% max.; chloride (as NaCl) 0.10% max.; sulfate (as Na_2SO_4) 0.10% max.; free phosphate (as P_2O_5) 0.15% max.; conforms to N.F. test for heavy metals.

R.R. Classification: Chemicals NOIBN.

GLYCEROPHOSPHORIC ACID (Solution)

$H_2C_3H_5(OH)_2PO_4$ Mol. Wt. 172

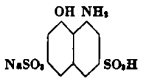
Standard Form: Solution 35%.

Specifications: Clear, colorless liquid, APHA 20 max.; assay 35.0 - 36.0%; chloride (as $CaCl_2$), 0.10% max.; sulfate (as $CaSO_4$), 0.20% max.; calcium (as CaO), 0.25% max.; free phosphate (as P_2O_5), 0.35% max.; conforms to N.F. test for heavy metals.

R.R. Classification: Chemicals NOIBN.

"GUANTAL" (See Accelerators, Rubber).

H ACID (Monosodium-1-Amino-8-Naphthol-3,6-Disulfonate)



Mol. Wt. 341.29

Typical Analysis: White powder; 86-88% monosodium salt; trace of NaCl and Na_2SO_4; solubility in water, complete.

R.R. Classification: Dye Intermediate NOIBN.

General Information: Used as an intermediate in the manufacture of dyestuffs.

"HIBITITE"

Standard Forms: Hibitite; Hibitite A, a commercial blend having half the strength of regular Hibitite.

Properties: Derivative of an organic base; reddish brown powder; soluble in concentrated sulfuric and muriatic acids.

R.R. Classification: Iron or Steel Cleaning NOIBN.

(Continued)

General Information: Hibitite is widely employed in acids used for pickling and cleaning ferrous metals. It protects the metal by inhibiting the attack of the acid and by reducing the possibility of embrittlement caused by hydrogen penetration. Hibitite A is similar in action to Hibitite with the exception that it is more readily dispersed than Hibitite in making up the acid solutions.

Sulfuric acid containing Hibitite is used for pickling tin plate, wire, alloy steels, sheets for galvanizing; for cleaning steel drums and sand filters; for preparing articles for vitreous enameling; for removing metal coatings. Muriatic acid containing Hibitite is used for cleaning boilers, economizers, heat exchangers, pipe lines, condensers, tanks, tubes, coils, screens, pans, drums and similar equipment.

For steel pickling acid containing Hibitite, see Inhibited Acid.

Available Literature: 4-page mimeographed leaflet, "Hibitite and Its Uses."

HYDROCHLORIC ACID, C. P.

HCl Mol. Wt. 36.46

Specifications: Colorless liquid free from suspended matter; strength 37.0 to 38.5%; non-volatile matter 0.0005% max.; sulphate 0.0002% max.; free chlorine 0.0002% max.; sulphite 0.003% max.; arsenic 0.00001% max.; iron 0.0001% max.; heavy metals (as lead) 0.0005% max.

R.R. Classification: Muriatic Acid

General Information: Laboratory reagent.

HYDROCHLORIC ACID (See Muriatic Acid).

2-HYDROXY-3-METHOXY BENZALDEHYDE, TECHNICAL

(Also known as *ortho*-vanillin.)

Mol. Wt. 152.1

Characteristics: Yellowish crystalline solid; crystallizing point, 40.0°C. min.; density, 1.20 at 60°C.; wt. per gal., 10.0 lbs.

R.R. Classification: Chemicals NOI BN.

General Information: Used as an antioxidant and as an intermediate in chemical synthesis.

INHIBITED ACIDS

Grades: These acids are solutions of Hibitite in Monsanto's commercial grades of 60°Bé. sulfuric acid, 66°Bé. sulfuric acid, 18°Bé. muriatic acid and 20°Bé. muriatic acid.

General Information: Addition of Hibitite to sulfuric and muriatic acids results in a decreased rate of attack of the acid on metal but does not retard the action of the acid on surface scale on the metal.

Inhibited sulfuric acid is used for pickling tin plate stock, pickling sheets for galvanizing, preparing articles for vitreous enamel, pickling wire, pickling high carbon steel, removing metal coatings, cleaning steel drums and cleaning sand filters.

Inhibited muriatic acid is used for pickling alloy wire and cleaning boiler tubes, condensers, pipes, heater coils and drums.

INHIBITORS (See Hibitite).

INKS, LACQUER BASE

General Information: Lacquer inks are rapid drying, waterproof, greaseproof, adherent, flexible, and resistant to abrasion. Colors are light, fast and opaque, glossy or dull. Adapted for printing or coating cellophane, glassine, foil and other wrapper stock. Application is by intaglio photo engraved roll printing *only*, print roll being cleared by doctor blade.

R.R. Classification: Lacquers.

INSECTICIDES

ortho-Dichlorobenzene (See under D).
"Santochlor" (See under S).

IRON CHLORIDE (See Ferric Chloride).

IRON GLYCEROPHOSPHATE (See Glycerophosphate, Ferric).

IRON NITRATE (See Ferric Nitrate).

IRON PHOSPHATE (See Ferric Phosphate).

IRON PHOSPHIDE (See Ferrophosphorus).

IRON GLYCEROPHOSPHATE N.F. (See Glycerophosphates).

IRON SULFATE (See Ferric Sulfate and Ferrisul).

LACQUERS

For information on special lacquers and related products offered by Monsanto see the following listings elsewhere in this catalog: Acetone; Aircraft Finishes; Amyl Acetate; Belt Cement; Bronzing Liquids; Butyl Acetate; Butyl Alcohol; Cable Lacquers; Cements; Cotton Solutions; Diacetone; Ethyl Acetate; Inks, Lacquer Base; Leather Dopes; Manicure Lacquers; Mersol (Solvent Alcohol); Mertec; Textile Lacquers; Textile Printing Lacquers; Thinners.

General Information: The Lacquer and Solvent Department of Monsanto has been engaged for twenty years in the development and manufacture of a wide variety of nitrocellulose base coatings for industrial use. At the present time Monsanto finishes for textiles, leather, paper, rubber, wood and metal are being used in practically all classes of industry. Specific information available on request.

R.R. Classification: Lacquers.

LACQUER COTTON (See Cotton Solutions).

LACQUER EMULSIFYING AGENTS (See Aresklene and Santomerse).

LAMPBLACK

Grades: Ten grades are available which vary in free carbon, density, and oil absorption.

Specifications:

Grade	*Free Carbon*	*Apparent Density Lb. per Cu. Ft.*	*Benzol Extract %*
Ordinary Black	85.0%	25.4	—
Lampblack Bear Germantown	97.20%	7.76	1.65
Commercial Black	85.05%	25.4	—
Lampblack No. 10	99.11%	12.11	.20
Lampblack B-5	97.20%	7.76	1.65
Lampblack B-16	98.38%	6.75	.7
Lampblack BTA	98.23%	6.30	.6
Lampblack S-100	97.70%	5.72	.6
Lampblack No. 8	97.03%	5.15	.65
Lampblack AA	96.34%	4.77	.85

R.R. Classification: Lampblack NOIBN.

General Information: Used as pigment in paints, varnishes, enamels, inks, leather finishes, stencils, crayons, polishes; in pressed forms as electrical conductors and electrodes.

Available Literature: Booklet, "Monsanto Lampblack."

LATEX PENETRANTS (See Aresklene and Santomerse).

LATEX STABILIZERS (See Aresklene and Santomerse).

LEATHER DOPES

General Information: Nitrocellulose solutions specially formulated for the incorporation of plasticizer and pigment for use in finishing split, patent, and artificial leathers.

R.R. Classification: Lacquers.

LITHIUM SALICYLATE N.F. (See Salicylates).

"LUSTRON" (See Plastics).

MAGNESIUM AMMONIUM PHOSPHATE

(Also known as magnesium ammonium *ortho* phosphate.)

$MgNH_4PO_4.6H_2O$. Mol. Wt. 245.44

Standard Form: White powder.

Properties: Insoluble in water and soluble in acids. Decomposes on heating.

Grade: Technical.

R.R. Classification: Chemicals NOIBN.

Principal Uses: As an ingredient in fire retarding paints for theatre scenery and curtains.

General Information: A hexahydrate and a monohydrate form exist. At ordinary temperatures disassociation of the hexahydrate to the monohydrate takes place without appreciable loss of ammonia. Above 60°C. the monohydrate loses NH_3 forming $MgHPO_4.H_2O$.

MAGNESIUM GLYCEROPHOSPHATE (See Glycerophosphates).

MAGNESIUM PHOSPHATE, MONO

(Also known as magnesium phosphate, monobasic; acid magnesium phosphate; magnesium tetrahydrogen phosphate; magnesium biphosphate.)

$MgH_4(PO_4)_2$ Mol. Wt. 218.31

Standard Form: White crystals.

Grade: Technical.

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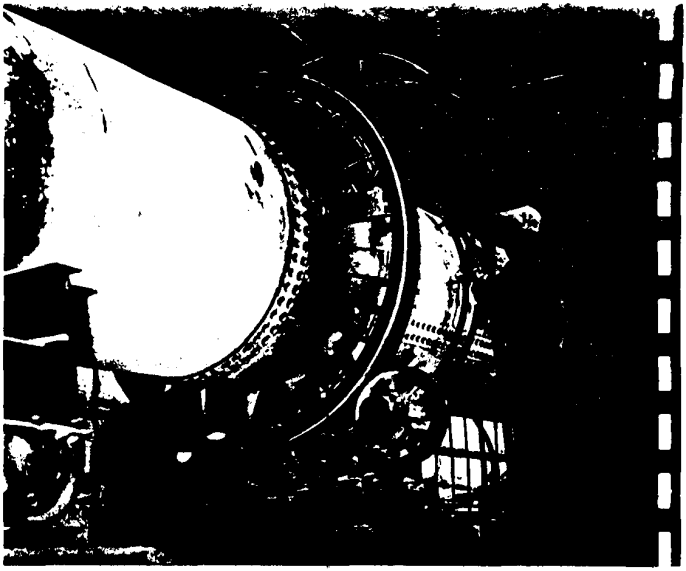


Rotary kiln at Camden, New Jersey, plant.

R.R. Classification: Chemicals NOIBN.

Principal Uses: Used in pharmaceutical preparations.

MAGNESIUM PHOSPHATE, TRI

(Also known as neutral magnesium phosphate.)

$Mg_3(PO_4)_2$ Mol. Wt. 262.88

Standard Form: White crystalline powder.

Grade: Technical.

R.R. Classification: Chemicals NOIBN.

General Information: Used in pharmaceutical products as an antacid.

MAGNESIUM SALICYLATES (See Salicylates).

MALEIC ANHYDRIDE

Mol. Wt. 98.06

Standard Form: Fused solid.

Specifications: White crystalline mass; crystallizing point 52.0°C. min.; water solution (4 grams in 10 ml.), clear and colorless; glyceromaleate resin, clear with slight amber color; iron 0.0005% max.

R.R. Classification: Chemicals NOIBN.

General Information: Used alone or in combination with other acids in the manufacture of alkyd type resins.

MANGANESE GLYCEROPHOSPHATE (See Glycerophosphates).

MANICURE LACQUERS (See Lacquers).

MANICURE LACQUERS and REMOVERS

General Information: Manicure lacquers are offered in two types — *transparent* and *creme*. The dyes used in the transparent type are selected for stability to light, soapy water and aging. The bottle appearance of the creme type lacquers is unusually good. There is no objectionable separation due to settling, and the lacquer applies without streaking. The bottle color matches the applied lacquer very closely.

Colors and shades are provided according to the suggestions and specifications of the customer, and the opportunity to assist in development of new shades is welcomed. For those who prefer to select from standard shades, the following are offered in *Manicure Lacquer R-4040 Creme and Transparent:*

Reddish Creme Shades		*Brownish Creme Shades*
Natural	Robin Red	Thistle
Rose	Tulip	Suntan
Sunrose	Burgundy	Rust
Old Rose	Garnet	Chestnut

Bluish Creme Shades	*Transparent*
Lilac	Natural
Windsor	Rose
Grape	Garnet
Heather	

(*Continued*)

Manicure Lacquer Remover R-2522 is an active solvent and has an agreeable odor.

Containers: Cans, 5 gal.; drums, 55 gal.

Available Literature: Color chip folder, "Monsanto Manicure Lacquers."

"MERCLOR" (Sodium Hypochlorite)

NaOCl

Standard Form: Liquid.

Typical Analysis: 22°Bé.; 12% available chlorine by volume

R.R. Classification: Sodium Hypochlorite Solution.

General Information: Merclor is used as an oxidizing agent for bleaching of vegetable fibers and as a chlorinating agent for water, organic compounds and wool. (*See table in general data section*)

"MERSOL"

Typical Analysis: Water white liquid; sp. g. 0.80 - 0.82 at 15.6°C.; odor, mild, non-residual; distillation range, 74° - 80° C.; acidity, less than 0.005% as acetic acid.

Composition:		
Alcohol, Special Denatured No. 1		100 gals.
Methyl isobutyl ketone		1 gal.
Ethyl acetate, denatured with methyl isobutyl ketone		1 gal.
Gasoline		1 gal.

R.R. Classification: Denatured Alcohol Solvent Containing Not Less Than 90% Denatured Alcohol.

General Information: Mersol, a proprietary solvent alcohol, is formulated to have the advantages of Special Denatured Alcohol No. 1 without the necessity and burden of purchasing and operating under a government permit. It has the mild odor of alcohol and no residual. Mersol may be used for most industrial purposes where SDA No. 1 is indicated, as a solvent for shellac and soft manila gums, in lacquer thinners, cleaners, removers, polishes, dressings, inks, adhesives, celluloid, softeners, brighteners, and as a fuel and dye and stain solvent.

Available Literature: 68 page booklet "Nealco Industrial Alcohol."

"MERTANOL"

Grades: Mertanol SS; Mertanol L; Mertanol 7L; Mertanol D; Mertanol 7D.

(*Continued*)

Typical Analyses:

	Mertanol SS	*Mertanol L*	*Mertanol 7L*
Tannin	12%	19 - 20%	19 - 20%
Acidity	.64 - .66 normal	1.22 - 1.26 normal	neutral
equivalent to	2.66 - 2.74% H_2SO_4	approx. 4.74% H_2SO_4	pH 6 - 8
Sp. Gr.	1.176 - 1.178	1.205 - 1.212	1.214 - 1.225
Inorganic Salts	8.2% Na_2SO_4	11.4% $(NH_4)_2SO_4$	18.8% $(NH_4)_2SO_4$

	Mertanol D	*Mertanol 7D*
Tannin	19 - 20%	19 - 20%
Acidity	1.22 - 1.26 normal	neutral
equivalent to	approx. 4.74% H_2SO_4	pH 6 - 8
Sp. Gr.	1.22 - 1.23	1.23 - 1.24
Inorganic Salts	11.4% $(NH_4)_2SO_4$	18.8% $(NH_4)_2SO_4$

Inorganic salt crystallizes out at temperatures below 40° F.

R.R. Classification: Liquid Tanning Extract NOIBN.

General Information: Mertanol is a synthetic tanning agent consisting of a napthalene sulfonic acid condensation product in liquid form. The free sulfuric acid acidity has been completely neutralized and the sulfonic acidity neutralized to a definite acidity.

Used in the manufacture of leather for bleaching of chrome tanned leather, bleaching base stock for making pastel leathers, for pre-tanning pickled stock before regular tan in order to maintain a lighter colored leather throughout the tannage, in vegetable tanning as an aid to penetration of the extracts and solubilization of non-tans, in dyeing to give even dyeing and increased penetration of the dye, and as a mordant to hasten dyeing of chrome tanned and untanned leathers.

"MERTEC" (Corrosion-Resistant Paint)

Mertec is a corrosion-resistant paint designed for use as a protective finish under severe acid and alkaline conditions. It is formulated on a chemically inert base and gives remarkable protection against acid fumes and caustic alkali attack. Mertec is primarily for use on metal, but the inert base makes it a practical finish for concrete. It may also be used on wood surfaces. It gives a tough, glossy, oil and water resistant finish. Fire resistance is excellent; the paint does not support flame travel. Heat resistance in continuous service is good up to about 200°F. Mertec is supplied in gray, rust, black, white and clear. Coverage is about 300 sq. ft. per gal.

Pigmented Mertec R-3311 Gray 859 has the most desirable general properties. It is flexible and adheres well to almost any reasonably clean surface. It should cover satisfactorily in one coat, particularly the gray color which is recommended for general mill use on exposed metal.

Clear Mertec R-3300 is inferior to the pigmented type in weather resistance. It is also slightly less effective as a protective coating, and is recommended only where a pigmented finish is impractical. In using Clear Mertec R-3300 as a vehicle for aluminum, use about 1½ pounds Aluminum Powder per gal. A

(*Continued*)

ready mixed product, Aluminum Mertec R-3457, can be supplied. For outside exposure a prime coat of R-3137 Gray 326 is recommended.

Clear Mertec Topcoat R-3311 is a special type for application over ordinary painted surfaces to give resistance to corrosion. Clear Mertec Topcoat also imparts greater resistance to corrosion when used over the Pigmented Mertec, and is especially recommended for use over Clear Mertec R-3300.

Pigmented Mertec R-3799 is a special type for concrete floors. No priming coats or special preparation of the surface is necessary other than cleaning off loose grit and dirt and any accumulation of oil and grease. The surface should preferably be dry but damp surfaces can be successfully finished. From the standpoint of durability under traffic the concrete surface should be smooth.

R.R. Classification: Lacquers.

Available Literature: Leaflet, "Maintenance Paints."

META-CHLOROANILINE (See meta-Chloroaniline under C).

META-CRESOL (See meta-Cresol under C.)

META-NITROCHLOROBENZENE (See meta-Nitrochlorobenzene under N).

"METHASAN" (See Accelerators, Rubber).

METHYL PHOSPHORIC ACID (See Alkyl Phosphoric Acids).

METHYL PHTHALYL ETHYL GLYCOLATE (See Santicizer M-17).

METHYL SALICYLATE U.S.P. (See Salicylates).

MIXED ACID (See Nitrating Acid).

MOLDING COMPOUNDS (See Plastics).

MOLD PASTE

Specifications: Several materials blended to give a satisfactory combination of the properties necessary for use on molds for vulcanizing rubber. Light brown colored paste; sp. gr., 1.54.

(Continued)

R.R. Classification: Chemicals NOIBN.

Available Literature: 42-page booklet "Monsanto Chemicals for the Rubber Industry".

MONOAMMONIUM PHOSPHATE (See Ammonium Phosphate, Mono).

MONOCALCIUM PHOSPHATE (See Calcium Phosphate, Mono).

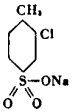
MONOCHLOROBENZENE (See Chlorobenzene).

MONOMAGNESIUM PHOSPHATE (See Magnesium Phosphate, Mono).

MONSANTO PLASTICS (See Plastics).

"MONSANTO SALT" (*ortho*-Chloro-*para*-Toluene Sodium Sulfonate)

(Also known as 3-chloro-4-methyl benzene sodiumsulfonate).



Mol. Wt. 228.63

Characteristics: Light gray to light tan powder; assay (from Cl content), 97.0 - 100.5%; NaCl, 0.5% max.; moisture (H_2O), 1.0% max.

R.R. Classification: Dye Intermediate.

General Information: Used in dyestuff synthesis.

MURIATIC ACID (Hydrochloric)

HCl

Grades: 18° Bé; 20° Bé; 22° Bé.

Typical Analysis: 18° Bé., 27.9% HCl.; 20° Bé., 31.5% HCl.; 22° Bé., 35.2% HCl.

R.R. Classification: Muriatic Acid

General Information: Used extensively in the starch, glucose, steel, galvanizing, paper, leather and glass industries. (*See table in general data section*)

"NEALCO" ANTI-FREEZE

General Information: A completely denatured ethyl alcohol type anti-freeze fluid for automobile, airplane and other gasoline engine cooling systems. Will not corrode the radiator, form rust, sludge or sediment; will not cause leaks nor attack hose connections.

R.R. Classification: Anti-freeze Alcohol.

NITRATE OF IRON, COPPERAS (See Ferric Sulfate).

NITRATE OF IRON, TRUE (See Ferric Nitrate).

NITRATING ACID (Mixed Acid)

Typical Analysis:

	80-15	*85-12*	*60-38*	*45-53*
Nitric Acid (HNO_3)	80.0%	85.0%	60.0%	45.0%
Sulphuric Acid (H_2SO_4)	15.0%	12.0%	38.0%	53.0%
Oxides of Nitrogen (N_2O_3)	0.25%	0.25%	0.25%	0.25%

R.R. Classification: Nitrating Acid.

General Information: Mixed acid is used for nitrating in the chemical industry, particularly in the manufacture of explosives and dyestuffs. Special mixtures can be furnished to meet individual requirements. (*See table in general data section*)

NITRE CAKE (Sodium Bisulfate)

Standard Forms: Bulk; ground; globular.

Typical Analysis: 35% H_2SO_4 available.

R.R. Classification: Nitric Cake.

General Information: Used to replace either sulfuric acid or combination of sulfuric acid and Glauber's salt. One hundred lbs. of Nitre Cake is approximately equivalent to 35 lbs. of 66° sulfuric acid and 141 lbs. of Glauber's salt.

Used principally in viscose rayon spinning baths; dyeing woolen goods; refining nickel ores; manufacture of sulfate pulp; in tanneries for pickling, deliming and making one bath tan solutions; as an acid scour for household use; in agriculture for disinfecting soil; as a bowl cleaner in sanitary trade.

NITRIC ACID

HNO_3

Standard Forms: 36° Bé., 38° Bé., 40° Bé., and 42° Bé.

Typical Analysis: %HNO_3: 36°Bé., 52.3; 38°Bé., 56.5; 40°Bé., 61.4; 42°Bé., 67.2. Sp. g. will not vary more than 0.5° terms of Bé. H_2SO_4 0.1% max.; HCl 0.1% max. For higher strengths refer to Merrimac Division Sales Office.

R.R. Classification: Nitric Acid.

General Information: Used in the manufacture of insecticides, dyestuffs, drugs, pharmaceuticals, explosives, photo engravings, nitrates and other nitro products. (*See table in general data section*)

NITRIC ACID C. P.

HNO_3 Mol. Wt. 63.01

Typical Analysis: Colorless liquid, free from suspended matter; strength(HNO_3), 70.0 to 71.5%; non-volatile matter, 0.0005% max.; sulphate (SO_4) 0.0002% max.; chloride (Cl), 0.00007% max.; arsenic (As), 0.000003% max.; heavy metals (as lead), 0.0005% max.; heavy metals (as iron), 0.0001% max.

R.R. Classification: Nitric Acid.

General Information: Laboratory reagent.

1-NITRO-2, 5-DICHLOROBENZENE

(Also known as 2, 5-dichloronitrobenzene.)

Mol. Wt. 192.01

Standard Form: Fused solid.

Specifications: Light yellow to light brown crystalline solid; crystallizing point, 52.5°C. min.

R.R. Classification: Dye Intermediate.

General Information: Used as an intermediate in the preparation of dyestuffs. *CAUTION: This product is toxic. Avoid breathing its vapors and avoid contact with the skin.*

ortho-NITROANILINE

(Also known as *ortho*-aminonitrobenzene and 1-amino-2-nitrobenzene.)

Mol. Wt. 138.12

Standard Forms: Powder; powder with 0.5% tricalcium phosphate.

Specifications: Yellow to orange powder; m. p. 70.0°C. min. Assay: powder, 98.70% min.; powder with tricalcium phosphate, 98.50% min. Ash: powder, 0.25% max.; powder with tricalcium phosphate, 0.75% max.

R.R. Classification: Dye Intermediate.

General Information: *ortho*-Nitroaniline powder has a tendency to "set up" in lumps on standing. It is recommended that it be milled to proper fineness just before using. The addition of 0.5% tricalcium phosphate reduces the caking tendency. *ortho*-Nitroaniline is used as an intermediate in the preparation of dyestuffs. *CAUTION: This product is toxic. Avoid breathing its dust and avoid contact with the skin.*

para-NITROANILINE

Mol. Wt. 138.12

Standard Form: Powder.

Characteristics: Bright yellow crystalline powder; soluble in HCl; m. p. 148°C. min.; assay 99% min.

R.R. Classification: Dye Intermediate. "Poison" label required.

General Information: Intermediate in dyestuff syntheses. *CAUTION: This product is toxic. Avoid contact with skin. Avoid inhaling vapors.*

ortho-NITROANISOLE

(Also known as *ortho*-aminoanisole, *ortho*-nitrophenylmethylether and 1-methoxy-2-nitrobenzene.

Mol. Wt. 153.14

Standard Form: Liquid

(Continued)

Specifications: Light reddish or light amber liquid; crystallizing point, 9.6°C. min., dry basis. Distillation range: first drop 270.0°C. min.; 95% 2.0°C. max.; dry point 273.0°C. max. Nitrophenol 0.05% max.

R.R. Classification: Dye Intermediate.

General Information: *ortho*-Nitroanisole is used in the production of such dye intermediates as *ortho*-anisidine and dianisidine. It is also used in various organic syntheses. *CAUTION: This product is toxic. Avoid breathing its vapors and avoid contact with the skin.*

NITROCELLULOSE SOLUTIONS (See Cotton Solutions).

meta-NITROCHLOROBENZENE

(Also known as *meta*-chloronitrobenzene and 1 chloro-3-nitrobenzene.)

Mol. Wt. 157.50

Standard Form: Fused solid

Specifications: Greenish yellow crystalline mass; clear when melted; crystallizing point 43.9°C. min.

R.R. Classification: Dye Intermediate.

General Information: Used for conversion into various dyestuff intermediates, chloroanilines and chlorobenzidines. *CAUTION: This product is toxic. Avoid breathing its vapors. Avoid contact with the skin.*

ortho-NITROCHLOROBENZENE

(Also known as *ortho*-chloronitrobenzene and 1-chloro-2-nitrobenzene.)

Mol. Wt. 157.50

Standard Form: Fused solid

Specifications: Greenish yellow crystalline mass; crystallizing point 31.7°C. (on sample as received).

R.R. Classification: Dye Intermediate.

General Information: Used in the preparation of dyestuff intermediates. *CAUTION: This material is toxic. Avoid breathing its vapors. Avoid contact with the skin.*

para-NITROCHLOROBENZENE

(Also known as *para*-chloronitrobenzene and 1-chloro-4-nitrobenzene.)

Mol. Wt. 157.56

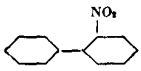
Standard Form: Fused solid

Specifications: Light greenish yellow solid; crystallizing point 82.5°C. min.

R.R. Classification: Dye Intermediate.

General Information: *para*-Nitrobenzene is used in the preparation of dyestuff intermediates. *CAUTION: This product is toxic. Avoid breathing its vapors and avoid contact with the skin.*

ortho-NITRODIPHENYL, TECHNICAL



Mol. Wt. 199

Characteristics: Light yellow to reddish crystalline solid; crystallizing point 34.5°C. min.

R.R. Classification: Dye Intermediate NOIBN.

General Information: Used as an intermediate in chemical synthesis where it is useful in some applications as an alternate for substituted nitrobenzenes. May be partially reduced and rearranged to give 2,2'-diphenyl benzidine (NH_2=1).

"NITRON" (See Plastics).

para-NITROPHENOL

(Also known as *para*-hydroxynitrobenzene and 1-hydroxy-4-nitrobenzene.)

Mol. Wt. 139.11

Standard Form: Granules

Specifications: Brown granular mass; m. p. (dry basis) 112.0°C. min.; assay, 96.5% min.; water insoluble material 0.20% max.; alcohol insoluble material 0.20% max.

(*Continued*)

R.R. Classification: Dye Intermediate.

General Information: *para*-Nitrophenol has the following uses: as an intermediate in the production of dyestuffs and photographic chemicals such as *para*-aminophenol and methyl *para*-aminophenol; as a fungicide to prevent mold growth on chrome tanned leather. *CAUTION: This product is toxic. Avoid breathing its dust or vapors and avoid contact with the skin.*

OIL ANTIOXIDANTS (See Sentolube).

OIL OF VITRIOL (See Sulfuric Acid).

OLEUM (See Sulfuric Acid).

"OPALON" (See Plastics).

ORTHO-AMINODIPHENYL (See ortho-Aminodiphenyl under A).

ORTHO-ANISIDINE (See ortho-Anisidine under A).

ORTHO-CHLOROANILINE (See ortho-Chloroaniline under C).

ORTHO-CHLORO-PARA-TOLUENE-SODIUM-SULFONATE (See Monsanto Salt.).

ORTHO-CHLOROPHENOL (See ortho-Chlorophenol under C).

ORTHO-CRESOL (See ortho-Cresol under C).

ORTHO-DICHLOROBENZENE TECHNICAL (See ortho-Dichlorobenzene Technical under D).

ORTHO-NITROANILINE (See ortho-Nitroaniline under N).

ORTHO-NITROANISOLE (See ortho-Nitroanisole under N).

ORTHO-NITROCHLOROBENZENE (See ortho-Nitrochlorobenzene under N).

ORTHO-NITRODIPHENYL (See ortho-Nitrodiphenyl under N).

ORTHO-PHENETIDIN (See ortho-Phenetidin under P).

"OXYNONE" (See Antioxidants, Rubber).

PAINT, acid and alkali resistant for plant maintenance; (See Mertec).

PAINT ANTISKINNING MATERIALS, available to fit varied trade requirements; (See Santovar A).

PAPER LACQUERS (See Lacquers).

PARA-AMINODIPHENYL (See para-Aminodiphenyl under A).

PARA-ANISIDINE (See para-Anisidine under A).

PARA-CHLOROANILINE (See para-Chloroaniline under C).

PARA-CHLORO-META-CRESOL (See para-Chloro-meta-Cresol under C).

PARA-CHLORO-META-XYLENOL (See para-Chloro-meta-Xylenol under C).

PARA-CHLOROPHENOL (See para-Chlorophenol under C).

PARA-CRESOL (See para-Cresol under C).

PARA-NITROANILINE (See para-Nitroaniline under N).

PARA-NITROCHLOROBENZENE (See para-Nitrochlorobenzene under N).

PARA-NITROPHENOL (See para-Nitrophenol under N).

PARA-PHENETIDIN (See para-Phenetidin under P).

PARA-TOLUENESULFONAMIDE (See para-Toluenesulfonamide under T).

PARA-TOLUENESULFONCHLORIDE (See para-Toluenesulfonchloride under T).

PENETRATING AGENTS (See Areskap, Aresket, Aresklene, Santomerse).

PENTACHLOROPHENOL (See Santophen 20 and Permasan).

PERCHLORIDE OF IRON (See Ferric Chloride Solution).

"PERMANOL"

Grades: Permanol; Permanol 7.

Properties: Viscous liquid. Inorganic salt crystallizes out at temperatures below 40° F.

R.R. Classification: Liquid Tanning Extract NOIBN.

General Information: Permanol is a synthetic tanning agent in liquid form. It has the special property of being extremely lightfast. Information on uses for Mertanol applies. See Mertanol.

"PERMASAN"

Characteristics: Consists of 5% pentachlorophenol, min., 5% non-volatile solvent and 90% petroleum distillate; light amber color, less than 4.5 NPAS; characteristic petroleum odor; flash point, 140°F. min. by Tagliabue closed cup method; sp.g. approx. 0.8785 at 15.5°C.; wt. per gal., 7.2 lbs.

(*Continued*)

R.R. Classification: Liquid Wood Preservative NOIBN.

General Information: Used for preservation of wood against termites, *Lyctus* (powder-post) beetles, decay, and a wide range of other wood-attacking insects and organisms. Does not adversely affect the feel and appearance of wood, and surfaces properly treated may be satisfactorily glazed, painted or otherwise finished. Permasan conforms with the specifications of the Western Pine Association's Bulletin No. 6 (revised) and is accepted by the National Door Manufacturers Association.

Permasan is irritating to the skin and mucous membranes if sufficient contact is permitted. The precautions for handling given in literature listed below should be observed.

Available Literature: 6-page Monsanto Technical Bulletin 0-20, "Permasan for the Preservation of Seasoned Wood." 5-page Monsanto Technical Bulletin 0-14, "Permasan for *Lyctus* (Powder-Post) Beetle Control."

"PERMASAN 116"

Characteristics: Consists of 5% pentachlorophenol, min., and 95% mixture of water repellents, organic solvents and diluents; light amber color, less than 4.5 NPAS; mild, not unpleasant odor; flash point, 100°F. min. by Tagliabue closed cup method; sp. g. approx. 0.855 at 15.5°C.; wt. per gal., 7.13 lbs.

R.R. Classification: Liquid Wood Preservative NOIBN.

General Information: Used same as ordinary Permasan (see above) except gives added advantages of water repellency. Conforms with specifications of Western Pine Association's Bulletin No. 6 (revised).

Permasan is irritating to the skin and mucous membranes if sufficient contact is permitted. The precautions for handling given in literature listed below should be observed.

Available Literature: 8-page Monsanto Technical Bulletin 0-21, "Permasan 116 - A Water-Repellent Preservative for Wood."

PETROLEUM CHEMICALS (See Santolene, Santolubes, Santopoid, Santopour).

PHENACETIN (See Acetophenetidin).

ortho-PHENETIDIN

(Also known as *ortho*-aminophenylethylether, *ortho*-aminophenetole, and 1-amino-2-ethoxybenzene.

(*Continued*)

Mol. Wt. 137.18

Standard Form: Liquid

Specifications: Dark red liquid; crystallizing point (as received) —4.0°C. min. Distillation range: first drop 231.0°C. min.; 95% (1-96 ml.), 2.0°C. max.; dry point, 234.0°C. min. Solubility in HCl, complete.

R.R. Classification: *Dye Intermediate.*

General Information: *ortho*-Phenetidin is used as an intermediate in the production of dyestuffs. *CAUTION: This product is toxic. Avoid breathing its vapors and contact with the skin.*

para-PHENETIDIN

(Also known as *para*-aminophenylethylether, *para*-aminophenetole, and 1-amino-4-ethoxybenzene.)

Mol. Wt. 137.18

Standard Form: Liquid

Specifications: Dark red liquid; crystallizing point (as received) 4.0°C. min. Distillation range: first drop 248.0°C. min.; 95% (1-96 ml.), 2.0°C. max.; dry point 251.0°C. max. Solution in HCl, opalescent.

R.R. Classification: Dye Intermediate.

General Information: *para*-Phenetidin is used as an intermediate in the production of dyestuffs and pharmaceuticals. *CAUTION: This product is toxic. Avoid breathing its vapors and contact with the skin.*

PHENOL-FORMALDEHYDE RESIN (See Plastics, Resinox).

PHENOLIC RESIN, CAST (See Plastics, Opalon).

PHENOL

(Also known as carbolic acid and hydroxybenzene.)

Mol. Wt. 94.11

(*Continued*)

Standard Forms: Crystalline solid, U.S.P.; liquid 85%; liquid 88%.

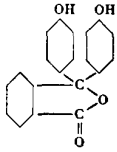
Specifications of Crystalline Solid, U.S.P.: White crystalline solid; melt, colorless mobile liquid; solution in water (1:15), clear and colorless; non-volatile residue (100°C.), 0.04% max.; crystallizing point 40.0°C. min. Distilling range: first drop, 180.0°C. min.; 100% (first drop to dry point), 2.0°C. max.; 50% to dry point, 0.2°C. max.

Specifications of Liquids: Colorless mobile liquids. Assay: liquid 85%, 85.0-86.0%; liquid 88%, 88.0 - 89.0%.

R.R. Classification: Phenol.

General Information: Used as an intermediate for the production of dyestuffs; in production of resins for molding and in the preparation of varnishes, enamels, lacquers and paints; as a selective solvent in the manufacture of lubricating oils; as a disinfectant; in textile printing; in the production of explosives, synthetic tanning materials, pharmaceuticals and medicinals, antiseptics, germicides and preservatives, deodorants, soaps, embalming fluid, vermin exterminators, rubber compounds, and photographic chemicals.

PHENOLPHTHALEIN, U.S.P.



Mol. Wt. 318.31

Standard Form: Powder.

Specifications: White powder; m.p. 259.0°C. min.; solubility in alcohol (1:15), complete; acidity (cc's N/1000 NaOH/2 g. sample), 3.0 cc. max.; ash 0.05% max.; arsenic 0.001% max.; conforms to U.S.P. test for fluorine and heavy metals; trace max. retained on 100 mesh screen; 21.0% max. on 325 mesh screen.

R.R. Classification: Chemicals NOIBN.

General Information: Used in pharmaceutical preparations.

PHENOLPHTHALEIN, YELLOW, Not U.S.P.

Standard Form: Powder.

Specifications: Yellow powder; m.p. 257.0°C. min.; loss on drying, 0.50% max.; ash, 0.10% max.; acidity (cc's N/1000 sodium hydroxide per 2 gm. sample), 5.0 cc max.; solution in ethyl alcohol 95% (1:15), clear; sp. g. (apparent) 0.500 - 0.600; none retained on 20 mesh screen.

(*Continued*)

R.R. Classification: Chemicals NOIBN.

General Information: Used in pharmaceutical preparations.

PHENOL-FORMALDEHYDE (See Plastics, Resinox Molding Compounds).

PHENYL SALICYLATE (See Salicylates).

PHOSPHATES (See Ammonium Phosphate, Calcium Phosphate, Magnesium Phosphate, Potassium Phosphate, Sodium Phosphate)

PHOSPHOLEUM (See Tetraphosphoric Acid).

PHOSPHORIC ACID (Orthophosphoric Acid)

H_3PO_4 Mol. Wt. 98.004

Standard Forms: 50%, 75% and 85% H_3PO_4. Other concentrations supplied on request.

Specifications: Clear, water-white liquid miscible with water in all proportions.

Grades: U.S.P.; food, meets all U.S. Pure Food Law requirements; commercial, clear water white liquid; Phosilage, meets all U.S. Food Law requirements; special.

R.R. Classification: Phosphoric Acid.

General Information: Principal uses — *Ceramics:* To increase translucency and improve the color of porcelains; as a vitrifying agent and flux. *Chemicals and Intermediates:* In manufacture of sodium phosphates, calcium phosphates, and other phosphates; in manufacture of ethylene gas; in making albumen derivatives. As a drying agent in the synthesis of various intermediate chemicals. *Dyes:* As a drying agent in the synthesis of various dyes. *Engraving:* In process engraving and litho trades. *Envelopes:* As a penetrant to aid in the absorption of the gum. *Fertilizers:* In manufacture of double and triple superphosphates; in manufacture of ammonium phosphate. *Gelatin:* In manufacture of gelatin. *Glass:* As opacifier. *Jelly and Preserves:* As a substitute for tartaric and citric acids. *Metals:* For pickling and cleaning. *Pharmaceuticals:* In manufacture of certain pharmaceutical chemicals; in making dental cements; in manufacture and purification of hydrogen peroxide; in manufacture of glycerophosphates. *Rope and Twine:* For brightening the finish. *Rubber:* As a coagulant of rubber latex. *Rust Proofing:* In the manufacture of rust proofing compounds. *Silage:* For silage preservation. *Soft drinks:* As a substitute for

(*Continued*)

tartaric and citric acids. *Sugar:* As a defecating and clarifying agent. *Textiles:* In brightening the color of silk; in the dyeing of cotton; in calico printing. *Water treatment:* In water softening and correction of alkalinity.

Density and Composition of water solutions of Orthophosphoric Acid @ $\frac{15°C.}{4°}$

Density g./cc.	Decrease per 1°C.	$\%H_3PO_4$	$\%P_2O_5$	%P
1.100	0.00030	17.52	12.69	5.54
1.150	0.00035	25.25	18.29	7.98
1.200	0.00045	32.52	23.55	10.28
1.250	0.00050	39.22	28.41	12.40
1.300	0.00055	45.51	32.96	14.39
1.339	0.00055	50.00	36.21	15.81
1.350	0.00060	51.22	37.10	16.19
1.400	0.00060	56.85	41.17	17.97
1.450	0.00060	62.27	45.10	19.68
1.500	0.00065	67.35	48.78	21.29
1.550	0.00070	72.11	52.23	22.79
1.581	0.00077	75.00	54.32	23.71
1.600	0.00075	76.75	55.59	24.26
1.650	0.00075	81.30	58.88	25.70
1.693	0.00080	85.00	61.56	26.87
1.700	0.00080	85.63	62.02	27.07
1.750	0.00080	89.88	65.10	28.41
1.800	0.00080	94.15	68.19	29.76
1.850	0.00080	98.13	71.07	31.02
1.874	0.00080	100.00	72.43	31.61

The density of more concentrated acids increases approximately linearly (within the range 72.44% to 85% P_2O_5) with the excess P_2O_5 over 72.44% according to the equation:

Density $\frac{15°C.}{4°} = 1.874 + 0.0171\ (\%P_2O_5 - 72.43)$.

PHOSPHORIC ANHYDRIDE (See Phosphorus Pentoxide).

PHOSPHORUS, ELEMENTAL

(Also known as yellow phosphorus and white phosphorus)

Grades: Monsanto process of manufacture provides over 99.9% purity.

Properties: Light yellow, wax-like, semi-transparent solid; burns spontaneously in air to form P_2O_5; m.p. 44.1°C.; insoluble in water but very soluble in carbon bisulphide.

R.R. Classification: Phosphorus, Yellow.

General Information: Used in manufacture of phosphorus alloys, phosphoric anhydride, phosphorus compounds, phosphoric acid, rodent poisons, flares, smokescreens, etc.

PHOSPHORUS OXYCHLORIDE

(Also known as phosphoryl chloride).

$POCl_3$ Mol. Wt. 153.35

(*Continued*)

Standard Form: Liquid.

Specifications: Water-white to yellow liquid; crystallizing point 0.8°C. min.; assay 99.0% min. Distillation range: first drop, 106.0°C. min.; 95% (1.96 ml.), 1.5°C. max.; dry point, 108.5°C. max. PCl_3, 0.20% max.; PCl_5, trace max.; H_3PO_4, 0.30% max.; HCl, 0.50% max.; free chlorine, trace max.; iron, 0.0005% max.

R.R. Classification: Phosphorus Oxychloride.

General Information: Used as a chlorinating agent and catalyst in the preparation of various intermediates and dyestuffs and as a reagent in the preparation of acetic anhydride and organic phosphates. *CAUTION: Care must be exercised in handling this product. Avoid breathing its vapors; avoid contact with the skin. It reacts with water with explosive violence.*

PHOSPHORUS PENTOXIDE

(Also known as phosphoric anhydride; phosphoric oxide; solid P_2O_5.)

P_2O_5 Mol. Wt. 141.96

Standard Form: White amorphous powder.

Characteristics:
Vapor Pressures: (after J. C. Southard and R. A. Nelson—J.A.C.S. 59. 911 (1937)
p = vapor pressure in cm. of mercury.
T = absolute Temperature).
A (low temperature form) $\text{Log}_{10}p = 9.792-(5000/T)$
B (high temperature form) $\text{Log}_{10}p = 11.113-(7930/T)$
L (liquid) $\text{Log}_{10}p = 6.809-(4320/T)$
Atmospheric sublimation temperature: 358.9°C.
Heat of vaporization:
A—22,800 calories per gm. molecule.
B—36,200 calories per gm. molecule.
L—19,700 calories per gm. molecule.
Heat of fusion: 16,500 calories per gm. molecule.
Probable molecular formula of vapor: P_4O_{10}.

R.R. Classification: Phosphoric Anhydride.

General Information: Used in the manufacture of organic and phosphorus compounds and as a cayalyst. It is a vigorous drying and dehydrating agent.

PHOSPHORUS TRICHLORIDE

PCl_3 Mol. Wt. 137.35

Standard Form: Liquid.

Specifications: Water white liquid: sp. g. at 15.5/15.5°C., 1.582-1.587. Dis-

(*Continued*)

tilling range: first drop ,74.5°C. min.: dry point, 79.0°C. max.; total range, 3.0°C. max.

R.R. Classification: Phosphorous Trichloride.

General Information: Used as a chlorinating agent and catalyst in the preparation of various intermediates and dyestuffs; as a reagent in the preparation of acetic anhydride and organic phosphates; in the manufacture of phosphorus oxychloride and phosphorus pentachloride; and in producing iridescent metallic deposits. *CAUTION: Care must be exercised in handling this product. Reacts with water. Avoid breathing its vapors; avoid contact with the skin.*

PHTHALIC ANHYDRIDE

Mol. Wt. 148.11

Standard Form: Flakes

Grades: Three grades with crystallizing points of 131.2°C., 131.0°C., and 130.7°C respectively.

Specifications: White flakes; solution in benzene (1:20) clear; ash 0.03% max. Maleic acid: 131.2°C., 0.10% max.; 131.0°C., 0.15% max.; 130.7°C., 0.15% max.

R.R. Classification: Phthalic Anhydride.

General Information: Uses: As an intermediate in the production of dyestuffs, perfume bases, alcohol denaturants, pharmaceutical products, plasticizers—such as dibutyl phthalate, dimethyl phthalate, diethyl phthalate, phthalyl glycollates —and alkyd resins.

PHTHALYL CHLORIDE

Mol. Wt. 203.03

Standard Form: Liquid.

Characteristics: Yellowish liquid; assay, 95.0% min.; crystallizing point, 7.5°C. min.

R.R. Classification: Chemicals NOIBN. Corrosive liquid (white label required).

General Information: Used in the manufacture of plasticizers and resins.

PICKLER'S ACID (See Inhibited Acid).

PIPERIDINE

(Also known as hexahydropyridine).

Mol. Wt. 85.14

Standard Form: Liquid

Specifications: Clear, water-white liquid of characteristic odor; assay, 98% min.; pyridine, 1.0% max.; sp. g. 25°/25°C., 0.860 - 0.003. Distillation range: 104.0°C. min. start; 107.0°C. max. dry point.

R.R. Classification: Chemicals NOIBN.

General Information: Used as an intermediate in the manufacture of pharmaceuticals, wetting agents, and germicides.

"PIP-PIP" (See Accelerators, Rubber).

PLASTICIZERS (See Santicizers, Dibutyl Phthalate, Diethyl Phthalate, Dimethyl Phthalate, Diphenyl Phthalate, Tricresyl Phosphate, Triphenyl Phosphate).

PLASTICS (See individual materials below.)

CAST PHENOLIC (See Plastics, Opalon).

CELLULOSE ACETATE (See Plastics, Fibestos).

CELLULOSE NITRATE (See Plastics, Nitron).

PLASTICS

"FIBESTOS"* (Cellulose Acetate)

The most widely-used thermoplastic, cellulose acetate, is distinguished by a flexible range of properties and formulations. In the form of molding compounds, Fibestos is adapted to either compression or injection molding. Sheets, rods, tubes and continuous length rolls are other forms in which it is produced by Monsanto.

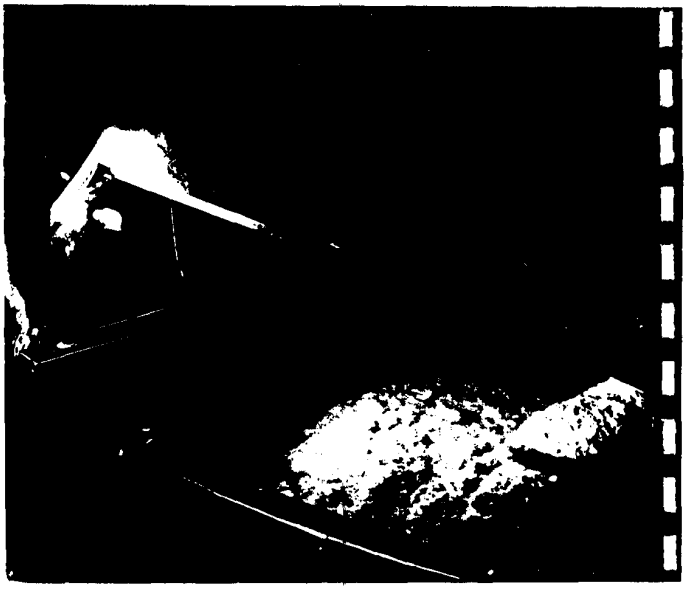
Mechanical Properties:

Specific gravity	1.27 - 1.37
Specific volume, cubic inches per pound	20.2 - 21.8

(*Continued*)

Refractive index N_D	1.47 - 1.50
Tensile strength, lbs./sq.in.	3,500 - 11,000
Elongation, percent	3-55
Bursting strength (rupture) lbs. sq.in./mil.	18 - 35
Modulus of elasticity, lbs. -sq.in x 10^5	1 - 3.5
Impact strength, Izod, ft. lbs./in. of notch (A.S.T.M.)	0.7 - 4.2
Brinell hardness, 2.5 mm. ball 10 kg. load	9 - 15
Rockwell hardness	M25 - M55
Machining qualities	Good
Molding Properties:	
Type	Thermoplastic
Molding qualities	Excellent
Molding Temperature °F.	
Compression	210 - 350
Injection	300 - 410
Molding Pressure lbs./sq. in.	
Compression	500 - 5000
Injection	8000 - 30000
Preforming	Very good
Tendency to cold flow	Slight

Processing cellulose at Springfield plant for manufacture of Monsanto plastics.



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Molding methods applicable	Compression, injection, extrusion, swaging
Mold shrinkage, inches/inch: Postive	.002 - .003
Semi-positive	.005 - .007
Flash	.008 - .009
Extruding quality	Excellent

Thermal Properties:

Burning rate, in./min. (.060")	1.5 - 2.0
	Slow burning
Thermal conductivity, 10^{-4} calories/sec./sq.cm./°C./cm.	4.5 - 7.8
Specific heat, calories/°C./gram.	0.3 - 0.4
Thermal expansion, 10^{-5} °C.	10 - 16
Resistance to heat, °F. (continuous)	140 - 250
Softening point, °F.	140 - 260
Effect of heat, dry	Little or none
moist	Slight swelling
Heat distortion, °F. (A.S.T.M.)	122 - 212

Electrical Properties:

Volume resistivity, ohms-cms. (50%R.H. and 25°C.)	$(0.7 - 1.4) \times 10^{13}$
Breakdown voltage, 60 cycles volts/mil.	600 - 1,800
Dielectric constant, 60 cycles	3.5 - 7.5
10^6 cycles	2.0 - 5.0
Power factor, 60 cycles	0.007 - 0.07
10^6 cycles	0.007 - 0.03

Chemical and Physical Properties:

Odor	None to mild aromatic
Taste	None
Effect of age	Slight
Effect of sunlight	Gradually become brittle—some colors fade
Effect of ultraviolet light	Gradually become brittle—some colors fade.
Effect of metal inserts	None
Effect of weak mineral acids	Fair resistance
Effect of strong acids	Decomposes
Effect of weak alkalis	Slight
Effect of strong alkalis	Decomposes
Water absorption 24 hours	1.5 - 3%
Solubility: Softens in—	Alcohols, esters
Swells in—	Chlorinated hydrocarbons
Insoluble in—	Aromatic and aliphatic hydrocarbons, animal, mineral, and vegetable oils, ethers

Color: Available in an extremely wide variety of transparent, translucent, pastel and opaque colors, as well as in many mottles, pearls and decorative configurations.

Forms: Sheets, rods, tubes and molding compounds.

*Trade Mark Reg. U. S. Pat. Off.

"LUSTRON"* (Polystyrene Molding Compounds)

Lustron is Monsanto's formulation of polystyrene molding compound. The rapid expansion of uses for Lustron since its introduction in 1939 is excellent proof of its versatility and broad range of useful properties. It is unexcelled among thermoplastics for electrical characteristics, chemical resistance, low moisture absorption and dimensional stability as the following table of properties indicates.

Molding quality	Excellent
Compression molding temperature, °F.	275 - 350
Compression molding pressure, lbs./sq.in.	1000 - 5000
Injection molding temperature, °F.	300 - 500
Injection molding pressure, lbs./sq.in.	10,000 and up
Compression ratio	2.0 - 2.3
Mold shrinkage	Compression 0.002 - 0.005 in. per in. Injection 0.002 - 0.008 in. per in.
Specific gravity	1.054 - 1.070
Specific volume, cu.in./lb.	26.3 - 25.9
Refractive index	1.59
Tensile strength, lbs./sq. in.	5000 - 9000
Elongation, %	2 - 5
Modulus of elasticity, in tension, lbs./sq. in.	$1.7 - 2.6 \times 10^5$
Compressive strength, lbs. sq. in.	11,500 - 13,500
Flexural strength, lbs./sq. in.	14,000 - 19,000
Impact strength, Izod, ft. lbs./in. of notch (A.S.T.M.)	0.35 - 0.50 ft.lbs./in. of notch
Brinell hardness (2.5mm ball, 25kg. load)	20 - 30
Rockwell hardness	M87 - M90
Light transmission, %	88 - 90
Thermal conductivity, cal./sec./sq.cm./°C./cm.	1.9×10^{-4}
Specific heat, cal./°C./gram	0.32
Thermal expansion, °C.	$(6 - 8) \times 10^{-5}$
Softening point, °F.	190 - 230
Distortion under heat, °F. (A.S.T.M.)	170 - 180
Tendency to cold flow	Slight
Volume resistivity, ohm-cms. (50% R. H. and 25°C.)	$10^{17} - 10^{19}$
Dielectric strength, short time, 1/8 in. thickness volts/mil.	500 - 700
Dielectric constant, 60 cycles	2.5 - 2.6
Dielectric constant, 10^3 cycles	2. 5- 2.6
Dielectric constant, 10^6 cycles	2.5 - 2.6
Power factor 60 cycles	0.0001 - 0.0002
Power factor 10^3 cycles	0.0001 - 0.0002
Power factor 10^6 cycles	0.0001 - 0.0004
Water absorption, immersion 24 hrs.	0.00
Burning rate	Moderate
Effect of age	Very slight
Effect of sunlight	Yellows slightly
Effect of weak acids and strong acids	None
Effect of weak alkalis and strong alkalis	None
Effect of organic solvents	Soluble in aromatic and chlorinated hydrocarbons
Machining qualities	Fair to good

(*Continued*)

Color possibilities	Unlimited
Effect on metal inserts	None

Available Literature: 16-page booklet "Lustron—A Monsanto Plastic."

*Trade Mark Reg. U. S. Pat. Off.

"NITRON"* (Cellulose Nitrate Sheets, Rods, Tubes)

Nitron is a cellulose nitrate plastic which continues as the most suitable material for many exacting uses such as drawing instruments, fountain pens, tool handles, tooth brush handles, heel coverings, watch and instrument crystals. The range of colors and special effects obtainable in Nitron plastics is unlimited. It is easy to fabricate and can be molded, drawn, or blown.

Mechanical Properties:

Specific gravity	1.35 - 1.40
Specific volume, cu.in./lb.	19.8 - 20.5
Refractive index N_D	1.50
Ultimate tensile strength, lbs./sq. in.	5,000 - 10,000
Elongation, %	10 - 40
Modulus of elasticity, in tension lbs./sq. in.	200,000 - 400,000
Impact strength, Charpy, ft. lbs /in. of notch (A.S.T.M.)	3 - 12
Brinell hardness, 2.5 m.m. ball, 10 kg. load	8 - 11
Rockwell hardness	M25 - M60
Machining qualities	Very good

Molding Properties:

Type	Thermoplastic
Molding quality	Good
Compression molding temperature	185 - 250°F.
Compression molding pressure, lbs./sq. in.	100 - 500
Preforming	Very good
Tendency to cold flow	Slight
Molding methods applicable	Swaging, shearing, blowing—All very good

Thermal Properties:

Burning rate	Rapid
Thermal conductivity, B.T.U./hr./sq. ft./°F. temp. diff./in. thickness	0.90 - 1.48
Specific heat, calories/°C./gram	0.34 - 0.38
Thermal expansion, 10^{-5}/°F.	6.5 - 8.9
Resistance to heat, °F. (continuous)	Approximately 140
Softening point, (A.S.T.M.)	160 - 195°F. Decomposes at 272°F. in 30 minutes
Effect of heat, dry	Discolors on continued heating at 212°F.

Electrical Properties:

Volume resistivity ohms-cms. (50% R. H. and 25°C.)	$(2\text{-}30) \times 10^{19}$
Dielectric strength, 60 cycles, volts/mil	600 - 1,200

(*Continued*)

Dielectric constant, 60 cycles	6.7 - 7.3
Dielectric constant, 10^6 cycles	6.2
Power factor, 60 cycles	0.06 - 0.15
Power factor, 10^6 cycles	0.07 - 0.10

Chemical and Physical Properties:

Odor	None or camphorous
Taste	Tasteless to slight
Effect of age	Slight hardening
Effect of sunlight	Discolors and becomes brittle
Effect of ultraviolet light	Yellows and decomposes on extended exposure
Effect of weak mineral acids	Good resistance
Effect of strong acids	Poor resistance, decomposes
Effect of weak alkalis	Very slowly decomposes
Effect of strong alkalis	Decomposes
Water absorption 24 hours immersion	0.6 - 2.0%
Effect of hot water	Softens, slight shrinkage
Effect of cold water	None
Effect on metal inserts	None
Solubility: Soluble in	Alcohols, ketones, esters
Insoluble in	Aromatic and aliphatic hydrocarbons, mineral, animal and vegetable oils.

Color: Available in an extremely wide variety of transparent, crystal, translucent, pastel and opaque colors, as well as in many mottles, pearls and ornamental configurations.

Forms: Available in sheets, rods, tubes and special shapes.

*Trade Mark Reg. U. S. Pat. Off.

"OPALON"* (Cast Phenol-Formaldehyde)

A cast phenol-formaldehyde resin. Opalon is noted for its beauty and the ease with which it can be fabricated, together with the ability to take a high and lasting polish. Special shapes and castings can be produced with low investment in molds. The size of casting ranges from handles for brushes and razors to large parts for coin machine housings, and complete radio cabinets. Restrictions on raw materials now limit the use of Opalon to essential civilian needs and to military applications.

Mechanical Properties:

Specific gravity	1.27 - 1.32
Specific volume, cu. in./lb.	20.0 - 21.8
Refractive Index N_D	1.5 - 1.7
Tensile strength, lbs./sq.in.	5,000 - 12,000
Elongation	Very Slight
Modulus of elasticity, lbs./sq.in.x10^5	5-15
Compressive strength, lbs./sq.in.	15,000 - 30,000
Impact strength, Izod ft. lbs./in. of notch (A.S.T.M.)	0.1 - 0.4
Brinell hardness, 2.5 mm. ball, 25 kg. load	30 - 45

(*Continued*)

Rockwell hardness	M80 - M130
Machining qualities	Excellent
Shrinkage, %	0 - 1
Molding Properties:	
Type	Thermosetting, non-moldable
Thermal Properties:	
Burning rate	Will not support combustion
Thermal conductivity, 10^{-4} calories/second/sq.cm °C. cm.	3 - 5
Specific heat, calories/°C./gram	0.3 - 0.4
Thermal expansion, 10^{-5}/°C.	2.8
Resistance to heat, °F. (continous)	160
Effect of heat, dry	Hardens slowly
moist	Whitens
Heat distortion	Above normal temperatures
Electrical Properties:	
Volume resistivity, ohms-cms. (50% R.H. and 25°C)	10^{9} - 10^{14}
Dielectric constant, 60 cycles	5 - 10
10^{6} cycles	3.0 - 7.0
Power factor, 60 cycles	0.025 - 0.20
10^{3} cycles	0.005 - 0.08
10^{6} cycles	0.01 - 0.045
Chemical and Physical Properties:	
Odor	None
Taste	None
Effect of age	Hardens slightly
Effect of sunlight	Yellows slightly on exposure Some colored materials fade
Effect of ultraviolet light	Yellows slightly on exposure Some colored materials fade
Effect of weak acids	None or slight
Effect of strong acids	Decomposed by oxidizing acids. Reducing and organic acids have less effect
Effect of weak alkalis	Slight to marked, depending on alkalinity
Effect of strong alkalis	Decomposes
Water absorption, 24 hours immersion	0.01 - 0.5
Effect of hot water	Softens and whitens
Effect of cold water	None
Effect on metal inserts	Inert
Solubility: Insoluble in—	Most organic solvents, alcohols, ketones, esters, aromatic and aliphatic hydrocarbons, mineral, animal and vegetable oils

Color: Available in an extremely wide variety of transparent, crystal, translucent, pastel and opaque colors, as well as in many mottles and ornamental configurations.

Form: Available in sheets, rods, tubes and a very extensive variety of cast shapes and objects.

*Trade Mark Reg. U.S. Pat. Off

"RESINOX"* (Phenol Formaldehyde Molding Compounds)

Over a period of years the range of Resinox molding materials has grown to encompass almost every important industrial demand. Shortages of metals and the extremely exacting requirements of the nation's armed forces have stimulated the development of new types of Resinox materials having particularly high impact strengths. Since fillers vary the properties of Resinox, the following table gives the range attained by the most common fillers of wood flour, cut fabric, cotton flock, mica and asbestos.

Molding quality	Fair-excellent
Compression molding temperature, °F.	290 - 400
Compression molding pressure, lbs./sq.in.	2000 - 4500
Compression ratio (bulk factor)	2.02 - 10.0
Mold shrinkage, inches per inch	.004 - .010
Specific gravity	1.34 - 1.75
Specific volume, cu. in./lb.	13.3 - 22.2
Tensile strength, lbs./sq. in.	4200 - 9500
Modulus of elasticity, lbs./sq. in x 10^5	8 - 45
Compressive strength, lbs./sq.in.	20,000 - 35,000
Flexural strength lbs./sq. in.	8,000 - 15,000
Impact strength, ft. lbs./in. of notch, Izod (A.S.T.M.)	0.26 - 4.00
Rockwell hardness	M85 - M125
Thermal conductivity, 10^{-4} cal./sec./sq.cm./°C./cm.	.3 - 20
Specific heat, cal/°C./gram	0.25 - 0.36
Thermal expansion, 10^{-5}/°C	2.0 - 7.5
Resistance to heat °F. (continuous)	225 - 450
Softening point, °F.	None
Distortion under heat °F.	240 - 285
Tendency to cold flow	None
Volume resistivity, ohm-cms. (50% R. H. and 25°C.)	10^9 - 10^{13}
Dielectric strength, short time, volts/mil, ⅛ in. thickness	250 - 500
Dielectric strength, step-by-step, volts/mil, ⅛ in. thickness	200 - 400
Dielectric constant, 60 cycles	5 - 20
Dielectric constant, 10^3 cycles	4 - 20
Dielectric constant, 10^6 cycles	4.5 - 20
Power factor 60 cycles	0. 04- 0.30
Power factor 10^3 cycles	0.04 - 0.20
Power factor 10^6 cycles	0.005 - 0.10
Water absorption, immersion 48 hours (%)	0. 01 - 1.5
Burning rate	Very low
Effect of age	None
Effect of sunlight	Light shades discolor
Effect of weak acids	None to slight
Effect of strong acids	Decomposed by oxidizing acids
Effect of weak alkalis	Slight to marked
Effect of strong alkalis	Decomposes
Effect of organic solvents	None on bleed-proof materials

(*Continued*)

Machining qualities ..... Fair
Color range ..... Limited
Available Literature: 12-page booklet "Resinox—A Monsanto Plastic."
*Trade Mark Reg. U. S. Pat. Off.

"SAFLEX"* (Laminating Plastic)

Saflex is a polyvinyl acetal sheet plastic used as the interlayer in making "Hi-Test" laminated safety glass.

The Saflex plastic sheet, .015 gauge, acts as the bonding agent holding the two sheets of glass firmly together and prevents scattering of the glass in case one or both surfaces of the glass are broken. The tough, elastic Saflex interlayer gives full protection at all temperature ranges encountered in winter or summer driving.

For military vehicles and aircraft, multiple-layer laminations of Saflex and glass give protection against small-caliber bullets, bomb or shell fragments and flying debris.

*Trade Mark Reg. U. S. Pat. Off.

"VUELITE"* (Embossed Fluorescent Lighting Shields)

Vuelite is the trade name for embossed cellulose acetate, developed by Monsanto to serve as diffusing panels for fluorescent lighting fixtures.

Glare and brightness are eliminated by a suitable design that spreads the light evenly. The excellent light transmission factor of the material assures highly efficient light distribution.

Although a fluorescent fixture may be large in size, the addition of a Vuelite diffusing panel adds very little to its weight thereby allowing the design of a low-weight fixture. The danger of breakage of Vuelite as compared with glass of the same size is very small.

Vuelite is easily formed to shape. Fixtures that require more than a six-inch radius are fitted with diffusing panels by slipping flat sheets into position. Smaller sizes and intricate shapes are formed without expensive molds or tools while punching, drilling and cutting operations are carried out with ordinary tools.

Vuelite sheets are 20"x 50" in size, available in the following designs:

Number	Name	Limiting Gauge Not Under	Direction of Size	Design
4B	"H" Line	.050"	20x47	Lengthwise
6B	Whipcord	.040"	20x47	Lengthwise
8B	Silk	.050"	20x49	Lengthwise
9B	Cobra	.050"	20x47	Lengthwise
20B	Large Cube	.050"	20x47	Both ways
27B	Mesh	.050"	20x49	Lengthwise
42B	Aztec	.040"	20x49	Crosswise
44B	Glow Worm	.040"	20x49	Lengthwise

(Continued)

54B	Sahara	.050″	20x47	Both ways
55B	No. 5174	.050″	20x47	Both ways
65B	Large Crackle	.040″	20x49	Both ways

*Trade Mark Reg. U. S. Pat. Off.

"VUEPAK"* (Rigid Transparent Packaging Material)

PLASTICS

Vuepak is produced as a clear transparent sheet plastic in continuous length rolls 31½ inches wide. It is extensively used in the manufacture of durable rigid transparent containers, packages and displays for all types of consumer goods products. Originally used chiefly for luxury items, Vuepak containers have now become a successful packaging medium for food products, candies, household appliances, beverages and dry bulk products of all types. An important contributing factor to the broader use of Vuepak containers has been the improved efficiency of fabricating equipment and techniques in the plants of the more than two hundred firms now established as Vuepak fabricators.

The properties of Vuepak are covered by the properties of Fibestos cellulose acetate materials in the preceding table.

Standard gauges of Vuepak are .005″, .0075″, .010″, .0125″, .015″ and .020″. In addition to continuous length rolls, Vuepak is sold in standard size sheets or in pieces cut to order.

Vuepak can be drawn, scored, beaded, folded or stitched. With suitable inks the surface of Vuepak can be readily printed in one or more colors.

For special requirements Vuepak containers can be made with metal bottoms and lids or in combinations with box-board, paper, wire frames or wood.

*Trade Mark Reg. U. S. Pat. Off.

POLYSTYRENE (See Plastics, Lustron).

POLYVINYL ACETAL SHEET (See Plastics, Salfex).

POTASSIUM AMMONIUM PHOSPHATE

(Also known as potassium ammonium phosphate; ammonium potassium phosphate.)

$KNH_4H_4(PO_4)_2$ Mol. Wt. 251.128

Standard Form: White crystals.

Grade: Technical crystals.

(*Continued*)

R.R. Classification: Potassium Salts NOIBN.

General Information: Used in pharmaceutical products for special medicinal purposes, and in the fermentation of wines.

POTASSIUM AMYL XANTHATE

R.R. Classification: Potassium Xanthate.

General Information: Flotation agent used principally in the mining industry.

POTASSIUM ETHYL XANTHATE

R.R. Classification: Potassium Xanthate.

General Information: Flotation agent used principally in the mining industry.

POTASSIUM GLYCEROPHOSPHATE (75% SOLUTION) (See Glycerophosphates).

POTASSIUM PHOSPHATE, DI

K_2HPO_4 Mol. Wt. 174.18

Standard Form: 60% solution in water.

Typical Analysis: Bluish, odorless liquid; sp.g. 1.7 at 25°C.; 14.6 lbs. per gal.; pH 9.9 - 10.3; viscosity 33 centipoises at 25°C.; water solubility 71 grams per 100 gms. solution.

R.R. Classification: Chemicals, NOIBN.

General Information: Used as an antistatic agent for wool and in fermentation and nutrient solutions.

POTASSIUM PHOSPHATE, MONO

(Also known as potassium diphosphate and potassium biphosphate).

KH_2PO_4 Mol. Wt. 136.09

Standard Form: White crystals.

Grades: Technical containing about 0.50% SO_3; sulfate-free containing about 0.01% SO_3.

(*Continued*)

R.R. Classification: Potassium Salts.

General Information: Used to control pH of culture media and for special medicinal purposes.

POTASSIUM PYROPHOSPHATE, TETRA

$K_4P_2O_7$ Mol. Wt. 330.34

Properties: White powder, hygroscopic in air; pH value in 1% solution at 25°C., 10.6; solubility, 190 grams in 100 grams water at 25°C.

R.R. Classification: Cleaning Compound.

General Information: Used for incorporation in textile oils and soaps to increase emulsifying values and to prevent formation of insoluble hard water soaps; as clarifying agent and to improve cleansing action of soaps.

POTASSIUM SALICYLATE (See Salicylates).

n-PROPYL PHOSPHORIC ACID (See Alkyl Phosphoric Acids).

PYRIDINE,

pure water-white liquid; used as a solvent and chemical reagent; as a denaturant for alcohol, and in special medicinals; made by Monsanto Chemicals Limited.

PYROXYLIN CEMENTS (See Celluloid Cements and Belt Cements).

PYROCATECHOL

(Also known as brenzcatechin, catechol or 1, 2-dihydroxy benzene).

Mol. Wt. 114.1

Specifications: Fine white needles (may contain a few dark specks); assay, 99.5% min.; odor, practically none; crystallizing point, 104.0°C. min. Solution in cold water, (1:10): color, APHA 40, max.; turbidity, essentially clear. Solution in alcohol (1:10): color, APHA 40, max.

R.R. Classification: Chemicals NOIBN.

General Information: Used as a developer in fur dyes, antioxidant in printing inks, and as intermediate in chemical synthesis.

"R-2" CRYSTALS (See Accelerators, Rubber).

REODORANTS, RUBBER

Monsanto provides, but does not manufacture, the following types of rubber reodorants for the convenience of its customers.

Curodex No. 19—Pale yellow liquid; deodorizes; percent used in 100 lbs. of rubber, 0.15 - 0.20; standard package, 5 lb. bottle.

Curodex No. 188—Pale yellow liquid; odor, lily; percent used in 100 lbs. of rubber, 0.20 - 0.50; standard package, 5 lb. bottle.

Curodex No. 198—Pale yellow liquid; odor, musk; percent used in 100 lbs. of rubber, 0.20 - 0.50; standard package, 5 lb. bottle.

RESINS (See Santolites and Plastics).

"RESINOX" (See under Plastics).

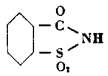
RUBBER LACQUERS (See Lacquers).

"SACCHARIN MONSANTO"

Saccharin Monsanto is available in the so-called insoluble form (complies with U.S.P. requirements for Saccharin) and in the soluble or sodium form (complies with U.S.P. requirements for Saccharin, Sodium). Descriptions of both forms are given below.

SACCHARIN, U.S.P.

(Also known as saccharin insoluble; ortho-sulfobenzimide).



Mol. Wt. 183.11

Standard Form: Powder

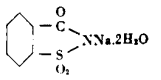
Specifications: White crystalline powder; assay 98% min.; m.p. 227.0°C. min.; loss of drying 0.50% max., solubility in 10% Na_2CO_3(1:5) complete.

R.R. Classification: Chemicals NOIBN.

General Information: Saccharin has approximately 500 times the sweetening power of sugar. Used as a sweetener in tooth pastes, mouth washes, and pharmaceutical preparations, and in beverages and foodstuffs in place of sugar for diabetics.

SACCHARIN, SODIUM, U.S.P.

(Also known as soluble saccharin; sodium ortho-sulfobenzimide).



Mol. Wt. 241.13

Standard Forms: Crystals; powder.

Specifications: White crystals or powder; solubility in water (1:8), complete. Loss on drying at 125°C.: crystals 14.0% min. —14.35% max.; powder, 5.3% min. —5.8% max.

R.R. Classification: Chemicals NOIBN.

General Information: See under Saccharin, U.S.P.

"SAFLEX" (See Plastics).

SALICYLATE, AMMONIUM

Mol. Wt. 155.08

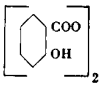
Standard Form: Powder, 80 mesh.

Specifications: White crystalline powder; assay, 98.0% min.; solubility in water (1:5), complete, colorless; solubility in ethyl alcohol 95% (1:15), complete; conforms to N. F. test for heavy metals. No powder retained on 80 mesh screen.

R.R. Classification: Chemicals NOIBN.

General Information: Pharmaceutical product.

SALICYLATE, CALCIUM



Mol. Wt. 314.16

Standard Form: Powder.

Specifications: Fine white powder; solubility in water (1:50), complete, colorless; free salicylic acid, 0.25% max.; conforms to U.S.P. test for heavy metals.

R.R. Classification: Chemicals NOIBN.

General Information: Pharmaceutical product.

Pilot plant operation at St. Louis plant.

SALICYLATE, LITHIUM, N.F.

Mol. Wt. 143.98

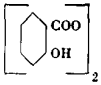
Standard Form: Powder.

Specifications: White or slightly grayish powder; assay 98.5% min.; solubility in water (1:20), complete, colorless; conforms to N.F. test for heavy metals.

R.R. Classification: Chemicals NOIBN.

General Information: Pharmaceutical product.

SALICYLATE, MAGNESIUM



Mol. Wt. 298.54

Standard Form: Powder.

Specifications: Fine white powder; solubility in water (1:10), complete; conforms to U.S.P. test for heavy metals.

R.R. Classification: Chemicals NOIBN.

General Information: Pharmaceutical product.

SALICYLATE, METHYL, U.S.P.

Mol. Wt. 152.14

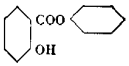
Standard Form: Liquid.

Specifications: Clear, colorless liquid, assay 98.0% min.; solubility in 70% ethyl alcohol (1:7), complete; solubility in N KOH (1:10), complete; sp. g. 25/25°C., 1.180 - 1.185; free phenols, 0.010% max.; conforms to U.S.P. test for heavy metals.

R.R. Classification: Oil of Wintergreen.

General Information: Used as a pharmaceutical product, as a flavoring agent in foodstuffs and beverages, and as an odorant in printing inks and insecticides

SALICYLATE, PHENYL, U.S.P. (Salol)



Mol. Wt. 214.21

Standard Forms: Crystals; powder, 80-mesh.

Specifications: White crystals or powder; solubility in ethyl alcohol 95% (1:6), complete; m.p. 41.0°C. min.; conforms to U.S.P. tests for chloride, sulfate, free acid, free phenol, and free salicylic acid. 1.0% max. retained on 80 mesh screen.

R.R. Classification: Chemicals NOIBN.

General Information: Pharmaceutical product.

SALICYLATE, POTASSIUM

Mol. Wt. 176.21

Standard Form: Powder.

Specifications: White or very slightly pinkish powder; assay (dry basis), 99.0% min.; solubility in water (1:10), complete; conforms to U.S.P. test for heavy metals; free alkali, negative.

R.R. Classification: Chemicals NOIBN.

General Information: Pharmaceutical product.

SALICYLATE, SODIUM, U.S.P.

Mol. Wt. 160.11

Standard Forms: Powder, crystals.

Specifications: White powder or crystals; assay (as received) 99.5% min.; solubility in water (10:100), complete, APHA 15 max.; solubility in ethyl alcohol 95% (1:10), complete, colorless; conforms to U.S.P. tests for heavy metals and carbonizable impurities; trace max. powder retained on 60 mesh screen, 1.0% on 80 mesh screen, 2.0% on 100 mesh screen.

R.R. Classification: Sodium Salts.

General Information: Pharmaceutical product.

SALICYLATE STRONTIUM, N.F.

$Sr \cdot 2H_2O$

Mol. Wt. 397.74

Standard Form: Powder.

Specifications: White crystalline powder; assay (as dihydrate), 99.0% min.; solution in water (1:20), complete; conforms to N.F. test for heavy metals and barium.

R.R. Classification: Chemicals NOIBN.

SALICYLIC ACID, (Ortho-Hydroxybenzoic Acid)

Mol. Wt. 138.05

Grades: U.S.P. and "B" Grade.

Specifications of U.S.P. Grade: White needles or powder, 100-mesh; assay 99.5% min.; m.p. 158.0°C. min.; conforms to U.S.P. test for carbonizable substances; ash 0.05% max.; powder trace, max. retained on 100-mesh screen.

Specifications of "B" Grade: White needles; assay 98.75% min.; m.p. 158.0°C. at start.

(*Continued*)

R.R. Classification: Salicylic Acid.

General Information: Used in the manufacture of medicinals and dyestuffs, as an industrial preservative and as an intermediate in many organic syntheses.

SALOL (See Salicylate, Phenyl).

SALT CAKE (Sodium Sulfate, Technical)

Na_2SO_4

Typical Analysis: 94 - 95% Na_2SO_4 available.

R.R. Classification: Salt Cake.

General Information: Used in the manufacture of sulfate pulp, glass, sodium sulfide, and for treatment of boiler feedwaters.

"SANTAMINE"

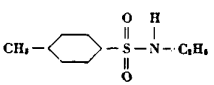
Characteristics: White powder, readily soluble in water, will not decompose on standing if kept in clean dry place.

R.R. Classification: Disinfectant Other Than Medicinal NOIBN.

General Information: Santamine is a sterilizing and deodorizing agent developed especially for the dairy industry, where it is used in water solution for washing utensils, equipment and bottles as well as the udders and teats of the cows. It also finds use in other industries where an efficient chemical sterilizing agent is required. It contains no poison or acid and will not harm rubber or metal.

"SANTICIZER 8"

(Mixture of *ortho*- and *para*-toluene ethyl sulfonamides).



Mol. Wt. 199.26

Specifications: Light yellow, viscous liquid; odor, slight, characteristic; free amide, 9% to 13%; acidity (as acetic acid) 0.1% max.

R.R. Classification: Lacquer Solvents NOIBN.

General Information: This plasticizer is readily miscible with all common organic solvents except the petroleum hydrocarbons in which it is only very

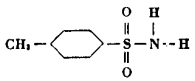
(*Continued*)

slightly soluble. It is soluble in castor oil, slightly soluble in china wood oil and insoluble in linseed oil. In water it is soluble to the extent of about 0.13% at 23°C. and 0.21% at 48°C. Its solubility in water is decreased by the presence of ammonia but is increased by other alkalies. Its retentivity in acetyl cellulose is about 90 parts by weight to 100 of acetate, and it imparts a high degree of plasticity. It is a solvent for both nitrocellulose and acetyl cellulose. Santicizer 8 is an excellent plasticizer for cellulose acetate, giving a brilliance and polish not obtainable with other plasticizers. This product, being practically insoluble in petroleum hydrocarbons, is a valuable plasticizer for coatings designed to withstand gasoline and related products. Santicizer 8 has some plasticizing action on such protein compounds as casein, glue, soybean protein and corn protein. It may be used alone or in conjunction with other materials such as glycerine or similar compounds. Santicizer 8 greatly increases the flexibility of shellac, having at the same time a considerable softening effect.

Available Literature: 40-page booklet, "Plasticizers and Resins".

"SANTICIZER 9"

(Mixture of *ortho*- and *para*-toluenesulfonamides)



Mol. Wt. 171.16

Specifications: Fine granular particles; m. p. 105°C. min.; melt, clear and light yellow; acidity, pH 4.6 min. in dilute acetone (2 gram sample in 15 cc A. R. Acetone and 35 cc of CO_2 free distilled water).

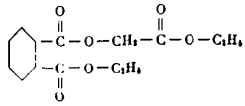
R.R. Classification: Lacquer Solvent NOIBN.

General Information: Solubility of this plasticizer is quite low in coal-tar hydrocarbons and negligible in petroleum hydrocarbons. It is readily soluble in *most other solvents, and in hot linseed, china wood, and caster oils.* It is soluble in water to the extent of only about 1.0% at 34°C., but this is increased by the presence of alkali. It is the least soluble of the Monsanto plasticizers in ethylene dichloride and in benzene, its solubility in ethylene dichloride being about 4% at 30°C. and in benzene about 1.5% at 30°C.

Santicizer 9 differs greatly from other plasticizers in its action. Relatively small amounts impart a gloss to polished articles and give smooth working and uniform curing of molded products. It blends readily with most synthetic resins and does not impart the softening action of liquid plasticizers. It is particularly valuable to the makers of molding compositions. In some phenol-aldehyde resins it appears to act not only as a lubricant but also as a promoter, giving more uniform and thorough curing. In amounts of about 20 parts per 100, it has a temporary plasticizing action on protein compounds such as corn protein and soybean protein.

Available Literature: 40-page booklet, "Plasticizers and Resins".

"SANTICIZER E-15" (Ethyl Phthalyl Ethyl Glycollate)



Mol. Wt. 280.13

Specifications: Color, (APHA), 20 max.; sp. g. at 25°/25°C., 1.180±0.005; refrac. index at 25°C., 1.498±0.002; acidity (as acetic acid) 0.02% max.; odor, slight; sulfur (copper strip test), negative.

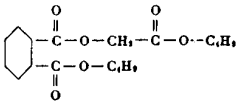
R.R. Classification: Lacquer Solvent NOIBN.

General Information: This plasticizer is miscible with the common organic solvents except the petroleum hydrocarbons. It is miscible with vegetable oils when heated but partially separates on cooling. Its solubility in water is 0.0175% at 30°C.

Santicizer E-15 is a solvent for both nitrocellulose and acetyl cellulose and for most resins. It is light-fast, and does not evaporate even from the thinnest films. With both acetyl and nitrocellulose it gives clear, tough, flexible films which have greatly increased resistance to moisture penetration. It is highly recommended for use with cellulose acetate and vinyl resins.

Available Literature: 40-page booklet, "Plasticizers and Resins".

"SANTICIZER B-16" (Butyl Phthalyl Butyl Glycollate)



Mol. Wt. 336.19

Specifications: Color (APHA), 45 max.; sp. g. at 25°/25°C., 1.097±0.005; refrac. index at 25°C., 1.490±0.002; acidity (as acetic acid) 0.02% max.; odor, essentially odorless; sulfur (copper strip test), negative.

R.R. Classification: Lacquer Solvent NOIBN.

General Information: Santicizer B-16 is a practically colorless liquid plasticizer which boils at 219°C. at 5 mm. and does not crystallize at temperatures as low as —35°C. Its water solubility is 0.0012% at 30°C. It is extremely light-stable. It darkens upon heating above 290°C.

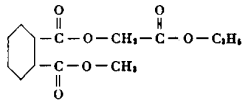
Santicizer B-16 is a solvent for nitrocellulose and is compatible with most resins, imparting good flexibility. It probably embodies more desirable properties

(*Continued*)

than any other single nitrocellulose plasticizers, fire retarding action being about the only property it does not have. Santicizer B-16 is a solvent for and imparts plasticity to many resins both synthetic and natural. It has especially interesting properties when used with resins of the glycerol-phthalate and phenol-aldehyde types in which is may be incorporated at various stages of resin formation. It is miscible with castor, linseed and china wood oils and somewhat retards gel formation in the latter on heating. It swells crepe rubber but appears to have no effect on vulcanized rubber. It is an excellent plasticizer for chlorinated rubber, from 10 to 25 parts per 100 usually being required. It is an exceptionally good plasticizer for polystyrene. Mixtures of Santicizer B-16 and Santolite resins may be used to plasticize casein and corn protein.

Available Literature: 40-page booklet, "Plasticizers and Resins".

"SANTICIZER M-17" (Methyl Phthalyl Ethyl Glycollate) —



Mol. Wt. 266.11

Specifications: Color, (APHA) 20 max.; sp. g. at 25°/25°C., 1.220±0.005; refrac. index at 25°C., 1.504±0.002; acidity (as acetic acid) 0.02% max.; odor, slight characteristic; sulfur (copper strip test), negative.

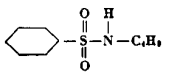
R.R. Classification: Lacquer Solvent NOIBN.

General Information: Santicizer M-17 is a solvent for both nitrocellulose and acetyl cellulose. It imparts a high degree of plasticity which is maintained undimished even in extremely thin films exposed to air currents for a long time. It is very light stable and may be used in transparent or tinted articles without danger of yellowing. This product is not miscible with castor, linseed, or china wood oils or with petroleum hydrocarbons but is readily miscible with other organic solvents. Its solubility in water is 0.09% at 30°C. but it imparts a considerable degree of resistance to moisture penetration to both nitrocellulose and acetyl cellulose films.

Santicizer M-17 is probably the best cellulose acetate plasticizer available. It dissolves Santolite resins, and as both are very resistant to petroleum products and compatible with so many film-forming materials, they make an excellent combination for producing gasoline resistant coatings.

Available Literature: 40 page booklet, "Plasticizers and Resins".

"SANTICIZER 127" (Butyl Benzene Sulfonamide)————.



Mol. Wt. 213.29

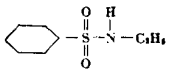
(*Continued*)

Characteristics: Essentially colorless, oily liquid; crystallizing point —20°C. (approx.); sp. g. 1.146 at 25°/25°C.; refrac. index 1.522 at 25°C.

R.R. Classification: Lacquer Solvents NOIBN.

General Information: This plasticizer is almost identical in characteristics with Santicizer 8 for which it may be substituted in most formulations. It has slightly less solvent action, lower compatibility, and is less soluble in water (0.003% at 31°C.). When used with small amounts of active solvent plasticizers it produces hard but flexible and tough compositions.

"SANTICIZER 128" (Ethyl Benzene Sulfonamide)



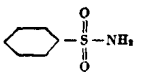
Mol. Wt. 185.25

Characteristics: White crystalline solid; m. p. 51.9°C.; sp.g., 1.208 at 60°C.

R.R. Classifications: Lacquer Solvents NOIBN.

General Information: The plasticizing properties of this product are of the same general character as Santicizer 8. It has less compatibility and should not be used in amounts greater than 50 parts by weight to 100 parts of base plastic. Its chief value is as an auxiliary plasticizer to be used with others in order to extend the supplies of less available materials and at the same time impart the properties of gloss, workability, etc., characteristic of the sulfonamide plasticizers.

"SANTICIZER 129" (Benzene Sulfonamide)



Mol. Wt. 157.18

Characteristics: White crystalline solid; crystallizing point 152°C.

R.R. Classification: Lacquer Solvents NOIBN.

General Information: Santicizer 129 is similar in properties to its toluene analog, Santicizer 9. The principal difference is a slightly lower compatibility with most plastic materials. See Benzene Sulfonamide Technical for use where color is not a factor.

"SANTOBRITE" (Sodium Pentachlorophenate Technical)

Standard Forms: Powder; 1-oz. briquettes.

(*Continued*)

Characteristics: Brownish gray powder; non-volatile at ordinary temperatures; practically odorless; non-hygroscopic under ordinary atmospheric conditions. Solubilities in water are: 4°C. (39°F.) 20.8% by weight; 25°C. (77°F.) 26.1% by weight; 35°C. (95°F.) 28.0% by weight. Santobrite is a stable, relatively unreactive chemical and is not spent on organic matter. Its water solutions do not attack metals and under ordinary conditions do not decompose to form acid materials. It can be supplied as substantially neutral material containing from 0.2 to 0.6% free alkali or as a more alkaline product containing 3 - 4% alkali. Conversion to pentachlorphenol occurs at pH's below 6.8.

R.R. Classification: Agricultural Insecticide or Fungicide NOIBN.

General Information: A water-soluble industrial preservative and fungicide. Used for manufacture of termite-resistant cellulose insulating board and for control of microbiological activity in paper, paperboard, leather, adhesives, latex and cold water paints; for control of sap stain in green lumber; and for control of slime and algae in water systems where the water is not used for drinking or bathing.

Santobrite and its solutions are irritating to the skins and mucous membranes of many individuals and are somewhat toxic to man and the higher animals. For detailed information on uses and methods of handling, write for literature listed below.

Available Literature:
Technical Bulletin No. 0-1, "Santobrite for the Preservation of Adhesives."
Technical Bulletin No. 0-2, "Santobrite and Santophen 20 for Paint Preservation."
Technical Bulletin No. 0-5, "Santobrite for Microorganism Control in the Pulp and Paper Industry".
Technical Bulletin No. 0-15, "Santobrite for the Control of Slime and Algae."
Technical Bulletin No. 0-17, "Santobrite for the Preservation of Rubber Latex."
Technical Bulletin No. 0-19, "Santobrite in the Tanning Industry."
Technical Bulletin No. 0-22, "Santobrite—Methods of Handling and Application."
"Sap Stain Control by Monsanto" (24 page booklet).
"Preservation of Cellulose Insulating Materials by Monsanto" (24 page booklet).
"Instructions for Handling Santobrite."

"SANTOCEL"

Standard Form: Light weight porous solid.

Properties: Santocel is silica gel from which the water has been removed by a process which does not destroy the original gel structure. Apparent density 7.5 lbs. per cubic foot; bulking value in liquid 17.1 lbs. per gal.

Typical Analysis:

SiO_2	90%
Volatile	5.5%
Sodium Sulfate	3.5
Fe_2O_3 and Al_2O_3	1.

(*Continued*)

Types: (1) Santocel 45, high oil absorbing.
(2) Santocel 58, low oil absorbing.
(3) Santocel "O", designed for use as a thermal insulator.

All but Santocel "O" are white and translucent.

Grades: The three types are each available in two grades, Fine and All Size.

APPROXIMATE MESH

Fine			*All Size*		
Thru	On		Thru	On	
	20 mesh 7%			3 mesh	20.7%
20	40 6%	3	6		20.7%
40	60 12%	6	10		17.2%
60	80 11%	10	20		14.7%
80	100 9%	20	40		13.0%
100	200 28%	40	60		4.2%
200	27%	60	80		2.5%
		100			7.0%

R.R. Classification: Insulating Material NOIBN.

General Information: Santocel 45 and Santocel 58 are used principally as (1) Flatting agents for paints, varnishes and lacquers. (2) Thickening agents for volatile and non-volatile liquids; particularly useful in printing inks. (3) Anti-caking agents. (4) Dry dispersing agent for pigments and dyestuffs. (5) Source of highly reactive silica. (6) Stiffening agent in crepe rubber.

Santocel "O" is designed for use as a thermal insulation material.

"SANTOCHLOR" (*para*-Dichlorobenzene)

(Also known as 1, 4-dichlorobenzene)

Mol. Wt. 147.00

Characteristics: White crystals; crystallizing point, 52.8°C. min.

Standard Crystal Sizes:
No. 2. (large)—For shaker top cans.
No. 5 (small)—For peach tree borers and for insecticide and miscellaneous uses.
No. 34 (medium)—A combination of two uniformly sized crystals. For shaker top cans and for compressing into cakes.

R.R. Classification: Paradichlorobenzene.

General Information: Para-dichlorobenzene is used as an intermediate in the production of dyestuffs; as a deodorant; mothicide, larvacide, and in control of peach tree borers.

(*Continued*)

Available Literature: 3 page Technical Bulletin No. 0-18, "Santochlor for the Control of Peach Tree and Stone Fruit Borers."

"SANTOCURE" (See under Accelerators)

"SANTOFLEX B" (See under Antioxidants, Rubber).

"SANTOFLEX BX" (See under Antioxidants, Rubber).

"SANTOLITE BA," almost identical in properties with Santolite MS, of which it is the benzene analog.

"SANTOLITE BH," almost identical in properties with Santolite MHP, of which it is the benzene analog.

"SANTOLITE BK," almost identical in properties with Santolite K, of which it is the benzene analog.

"SANTOLITE BK5," almost identical in properties with Santolite K5, of which it is the benzene analog.

"SANTOLITE K" ———————————————

Specifications: Clear, light yellow sticky resin; color, not more than No. 2.5 by Monsanto Santolite K Standard (comparable in depth of color but not in shade to No. 5 of the Gardner 1933 standard); acid number, 10 max.; refractive index at 50°C., 1.5330 to 1.5390.

R.R. Classification: Synthetic Resin.

General Information: Santolite K is a resinous condensation product of toluene sulfonamide, formaldehyde, and alkyd resins. It is a soft sticky resin with the qualities of both the sulfonamide and alkyd types. It is compatible with cellulose esters and ethers. Santolite K has plasticising properties itself but for most purposes additional plasticizer is desirable and Santicizer M-17 is recommended, although others may be used advantageously. Santolite K is soluble in practically all common organic solvents except the petroleum hydrocarbons. It is not compatible with drying oils so cannot be used in oil varnishes. Santolite K has a better light stability than the other Santolites and is of special value for increasing the resistance to moisture penetration of cellulose ester compositions.

Available Literature: 40-page booklet, "Plasticizers and Resins."

"SANTOLITE K5"

General Information: A modification of Santolite K having the same general characteristics except that it is harder.

"SANTOLITE MHP"

Specifications: Hard, practically colorless resin; refractive index (25 grams in 75 grams normal Butyl Acetate), 1.4280 to 1.4310; penetration, (200 gram load for 5 seconds at 25°C.) 2.0 mm. max.

R.R. Classification: Synthetic Resin.

General Information: Santolite MHP is an aryl sulfonamide-formaldehyde resin and is similar to Santolite MS in characteristics, except that it is much harder, softening at about 62°C. and being brittle at normal temperatures. It is nearly colorless and is well adapted to specialty lacquers, fabric coatings, molding compositions and the like. Being incompatible with drying oils it cannot be used as a varnish material.

Exceptional features of this resin are the ease with which it may be worked into practically any formula using a cellulose ester and the wide variation of properties obtained by its use. Its high degree of solubility makes very concentrated solutions possible, and its extreme compatibility with plasticizers and cellulose esters removes much of the danger of blushing, sweating and separation. Santolite MHP can be used in spraying, dipping or brushing lacquers to make clear, colorless, odorless coatings of good gloss and adhesion. It does not materially increase the viscosity of the solution and permits the building up of a high solids content in the lacquer. It is compatible with all the common plasticizers.

Available Literature: 40-page booklet, "Plasticizers and Resins".

"SANTOLITE MS"

Standard Forms: Viscous Resin; Solution T.B.

Specifications of Viscous Resin: Pale yellow viscous resin; solution in benzene (1:5), clear; solution in benzene (4:6), no crystalline deposit in 24 hrs.; refractive index at 50°C., 1.5690 - 1.5720; color of benzene solution (25 gms. in 50 cc.), APHA 70 maximum.

Specifications of Solution TB: Light colored, viscous liquid, free flowing at temperatures above 20°C. Composition: 85% Santolite MS; 15% solvent (95% toluene and 5% butyl acetate), tolerance from 14 to 16% solvents; refractive index at 25°C., 1.563±0.002.

R.R. Classification: Synthetic Resin.

General Information: Santolite MS is a soft, practically colorless resin made

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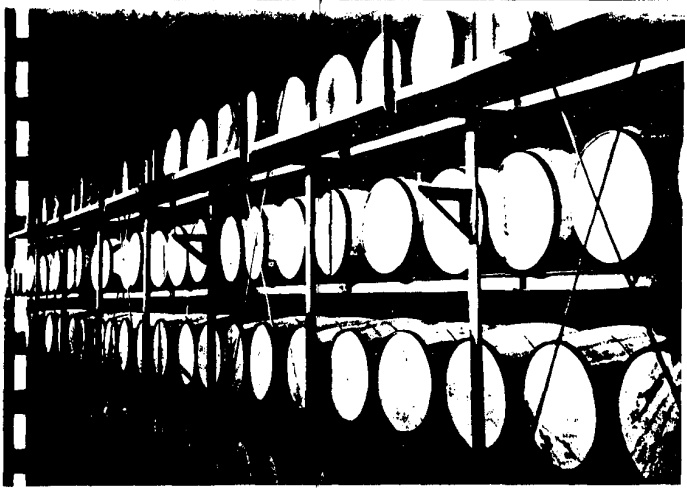


Looking down an aisle in one of the Monsanto warehouses.

by the condensation of formaldehyde with aromatic sulfonamides. Like all the Santolites it is compatible with both nitrocellulose and acetyl cellulose and, being a solvent for both, it can be used in any proportion. It forms brittle compositions with both these esters but the addition of a plasticizer makes such combinations permanently flexible. It is readily miscible with all the common organic solvents and thinners except petroleum hydrocarbons. It is not miscible with varnish and paint oils. Santolite MS is excellent for water-white lacquers which will not be exposed to extreme weather conditions, its high gloss and lack of color being unusual in the resin field.

Available Literature: 40-page booklet, "Plasticizers and Resins."

"SANTOMASK"

Specifications: Clear, light yellow liquid; faint vanilla-like odor; sp. g. at 25°/25°C., 1.04 - 1.06.

Additional Properties: Flash point, 210°F. (by Cleveland open cup method); flow point, below 0°C.; lbs. per gal., 8.7.

(Continued)

R.R. Classification: Chemicals NOIBN.

General Information: Odor-masking ingredient for interior paints, printing inks and similar products having objectionable natural odors. In addition to masking odors, may reduce or eliminate irritation to eyes, nose and throat caused by volatile components of some interior paints. Will not affect drying time, color durability and other characteristics of paints and inks.

"SANTOMERSE"

Standard Forms: The Santomerses are highly efficient surface active wetting agents and detergents. The Santomerse series consists of six products. Each is distinctive in character and has been developed to meet a certain industrial need.

Santomerse D—neutral powder.
Santomerse S—30% aqueous solution of Santomerse D.
Santomerse No. 1—neutral flakes.
Santomerse No. 2—alkaline flakes.
Santomerse No. 3—neutral powder.
Santomerse No. 3—paste (75% Santomerse No. 3 in water).

R.R. Classification: Washing Compound NOIBN.

General Information: The Santomerses are the salts of a homologous series of substituted aromatic sulfonic acids. They are used as wetting, spreading, penetrating, emulsifying agents and detergents in the following industries: textile, paper, leather, adhesive, rubber, insecticide, dust collection, soap, cosmetic, ceramic, detergent, metal cleaning, plating, emulsions, dyes, pharmaceutical, embalming fluid, laundry, steel, paint, cement, glue, felt and color, etc.

Available Literature: 32 page booklet "Santomerse".

"SANTOPHEN 7" (*ortho* and *para*-Benzyl Phenol.)

Standard Form: Fused solid.

Specifications: Light yellow, semi-crystalline mass; faint phenolic odor; sp. g., 1.088 - 1.098 (55°C./55°C.); refrac. index, 1.579 - 1.589 (55°C.); crystallizing point, 40°C. min.

R.R. Classification: Agricultural Insecticides.

General Information: Santophen 7 is used as the active ingredient in disinfectants and antiseptic formulations; as an industrial preservative and as an enhancing agent for coal tar and cresylic acid disinfectants. It is highly toxic to bacteria. *CAUTION: This product is toxic. Avoid contact with the skin.*

Available Literature: Monsanto Technical Bulletin 0-3, "Santophen 7—A Germicide and Industrial Preservative."

"SANTOPHEN 20" (Pentachlorophenol)

Characteristics: Dark grayish brown flakes; chlorphenolic odor; crystallizing point, 175°-180°C.; bulking value, 45.45 lbs. per cu. ft.; dispersible in soaps and sulfonated oils.

R.R. Classification: Agricultural Insecticides Other Than Liquid NOIBN.

General Information: Santophen 20 is highly toxic to fungi and many bacteria and is used industrially where such growths must be prevented or controlled. Frequently used in oil solution (See Permasan) or as the sodium salt (see Santobrite).

SOLUBILITY DATA

Solubilities expressed as per cent Santophen on weight of solution

	0° C.	*20° C.*	*40° C.*	*60° C.*
Water	0.00049	0.0014	0.0025	0.0053
Pine Oil	24.5	32.0	39.0	46.5
95% Ethyl Alcohol (Ethanol)	39.0	47.5	56.5	65.5
100% Ethyl Alcohol	46.0	53.0	60.0	67.0
Methyl Alcohol (Methanol)	40.5	57.0	72.0	77.5
Orthodichlorbenzene	5.5	8.5	15.5	26.0
Stoddard Solvent	....	1.5	3.5	7.5
No. 9 Refined Oil	0.4	1.1	2.5	5.6
Gas Oil	0.3	2.4	5.2	9.3
Diesel Oil	1.9	3.1	5.7	11.3
Carbitol	....	30.0	51.0	....
Ethylene Glycol	....	6.0	21.0	38.5
Diethylene Glycol	....	27.5	62.0	....
Benzol	....	11.0	19.5	31.5
Cellosolve	8.0	27.0	50.0	....
Butyl Carbitol	34.5	48.0	62.0	65.0
Dioxan	....	11.5	22.0	37.5
Diethyl Ether U.S.P.	....	52.9	....	....
Acetone U.S.P.	....	21.5	....	....
Linseed Oil (Raw)	....	13.9	....	....
Tung Oil	....	11.2	....	....
Dipentene	....	8.4	....	....
Turpentine	....	3.0	....	....
Carbon Disulfide	....	3.0	....	....
Carbon Tetrachloride	....	2.0	....	....
Glycerin	0.1 at 35°C.			

Santophen 20 and its solutions and formulations are irritating to the skin and mucous membranes and are somewhat toxic to man and the higher animals. Precautions suggested in "Instructions for Handling Santophen 20" should be observed.

Available Literature: 3-page mimeographed bulletin "Santophen 20." Mimeographed bulletin "Instructions for Handling Santophen 20."

"SANTOPOID S"

Standard Form: Oily, homogeneous liquid

Specifications: Dark brown liquid; sp. g. 1.20 - 1.30; flash, (open cup method), 250°F. min.; fire, (open cup method), 290 - 300°F. min.; pour, below —35°F. viscosity, S.U. at 100°F., 134.5 - 148.5 seconds.

R.R. Classification: Chemicals NOIBN.

General Information: Used up to 10% mixed with mineral oil to form extreme pressure lubricants for hypoid and other gears.

"SANTOPOUR"

Specifications: Gravity, 26.7°A.P.I.; flash, 485°F.; pour, 10°F.; viscosity, S.U. at 210°F., 156.4; carbon residue, 1.4; color, NPA (85 and 15), 6; neutralization number, 1.20.

R.R. Classification: Petroleum Lubricating Oil.

General Information: An improved pour point depressant for lubricating oils. Lowers the pour point of wax-bearing oils as much as 50°F. Stable under extreme service conditions.

Available Literature: Application Data Bulletin No. 120, "Santopour."

"SANTOSITE" (Sodium Sulphite Anhydrous, Technical)

Specifications: Tan to slightly pink crystalline powder; assay (Na_2SO_3) 93.0% min.; foreign odor, very faint, max.; solution, filtrate from a 10% solution in water is not darker than APHA 150 max.

R.R. Classification: Sodium Sulphite Anhydrous, Technical.

General Information: Used as a depressant in ore flotation and rubber, paper and cordage manufacture, and as a reducing agent for removing oxygen from boiler feed water.

"SANTOTAN-KR" (Basic Chrome Sulfate)

Contains approx. 50% of $Cr_2(SO_4)_2(OH)_2$

Standard Form: Crystals.

Specifications: Dark green crystals; solution in water (5:500), clear; basicity (Cr_2O_3/SO_3), 101-105; basicity (Schorlemmer), 37.3%-39.7%; chromium as Cr_2O_3, 23.9% min.

(*Continued*)

R.R. Classification: Dry Tanning Extract NOIBN.

General Information: Used in chrome tanning of calf, cow, and horse hides and sheepskins.

Available Literature: 16 page booklet "Chemicals for the Tanning Industry."

"SANTOVAR A" (See under Antioxidants, Rubber).

SANTOWAX, REGULAR

Standard Form: Yellow waxy solid.

Properties: Boiling range: first drop, 365°C.; 80%, 402°C. Freezing point: primary hold point, 140°C.; secondary hold point, 56°C. Apparent sp.g., 1.10 (approx.) at 25°C. Slightly soluble in alcohol and more soluble in benzene.

R.R. Classification: Coal Tar Resin.

General Information: Used in compounding polishes and waxes when a high melting wax is desirable. Also a plasticizer and resin.

"SANTOWAX M"

Standard Form: Yellow waxy solid.

Properties: Micro-crystalline hydrocarbon wax of unsual stability toward heat; melting point, 83° - 85°C.; flash point, 207°C.; hardness (ASTM D-5-25) 250 gm. load, 0.23 mm.

R.R. Classification: Coal Tar Resin.

General Information: Used as an opacifier for paraffin candles and as a partial substitute for Carnauba wax.

"SANTOWAX O"

Properties: Oily, crystalline hydrocarbon; hold point, less than 50°C.; flash point, 171°C.; flame point, 193°C. Hardness (ASTM D-5-25): 50 gm. load, 0.13 mm.; 150 gm. load, 0.40 mm.; 250 gm. load, 1.07 mm.

R.R. Classification: Coal Tar Resin.

General Information: Semisolid plasticizer for soft wax or resin compositions.

"SANTOWAX P"

Standard Form: Flaky crystals.

Properties: Nearly white, crystalline high-melting hydrocarbon; first crystals, 209° - 213°C.; flash point, 207°C.; flame point, 238°C.; hardness (ASTM D-5-25) 250 gm. load, 0.33 mm.

R.R. Classification: Coal Tar Resins.

General Information: Used to raise softening point and hardness of other waxes and resins.

SODIUM ACETATE

CH_3COONa Mol. Wt. 82.02

$CH_3COONa.3H_2O$ Mol. Wt. 136.07

Standard Forms: Crystals, 60%, N. F.; anhydrous (not N.F.)

Specifications of N.F. Grade: White crystals or granules; assay (as trihydrate), 99.5 - 104.0% solubility in water (1:2), complete; alkalinity (as Na_2CO_3), 0.025% max., conforms to N.F. test for heavy metals; no crystals retained on 10 mesh.

Specifications of Anhydrous (not N.F.): White or grayish crystalline material; assay, 99.0% min.; solubility in water (1:2), complete; carbonate (as Na_2CO_3), 0.5% max.

R.R. Classification: Sodium Acetate.

General Information: Used in the manufacture of dyestuffs as a condensing component and buffing agent in coupling reactions; in dyeing operations as a mordant; in the manufacture of pharmaceuticals; in the soap and tanning industries; and as a photographic chemical.

SODIUM ACID PYROPHOSPHATE

(Also known as disodium dihydrogen pyrophosphate and acid sodium pyrophosphate).

$Na_2H_2P_2O_7$ Mol. Wt. 221.97

Grades: Food and commercial. Food grade meets all U. S. Pure Food Law requirements.

Properties: White powder, soluble in water and having min. neutralizing value of 74; pH of 1% solution, 4.2.

(*Continued*)

R.R. Classification: Sodium Phosphate.

General Information: Used in oil well drilling muds and as a leavening agent in baking powder and flour.

SODIUM ALUMINATE

$Na_2Al_2O_4$ Mol. Wt. 164.2

Standard Form: White soluble powder; contains 90% soluble sodium aluminate.

Properties: Readily soluble in water and extremely low in iron and insoluble material. Stable for at least 24 hours in 10% solutions although contains a max. of only 5% free caustic soda.

R.R. Classification: Sodium Aluminate.

General Information: Used in papermaking: With aluminum sulfate for sizing at higher pH's. Also to help set color and filler and to improve paper formation. In treatment of municipal and industrial water: With aluminum sulfate as a coagulant. In the lime-soda softening process for silica removal and floc formation. Miscellaneous: As an alkaline source of alumina in the manufacture of certain pigments, catalysts and casein paints; in processing glycerin lyes; in chrome tanning; in cleaning solutions; to aid set of the frit in vitreous enameling.

SODIUM AMMONIUM PHOSPHATE

(Also known as microcosmic salt; sodium ammonium hydrogen phosphate; salt of phosphorus; phosphorous salt; fusible salt of urine.)

$NaNH_4HPO_4.4H_2O$ Mol. Wt. 209.09

Standard Form: Crystals.

Properties: Transparent, white, efflorescent, monoclinic crystals. Gives off water and ammonia on heating, leaving $NaPO_3$; contains above 32% P_2O_5, 7.5% NH_3 and 14% Na_2O.

Grade: Commercial.

R.R. Classification: Disodium Phosphate.

Principal Uses: Used principally in analytical laboratories for standardizing uranium solution; determination of Mg and Mn; as reagent in blow pipe analysis.

SODIUM BENZOATE

Mol. Wt. 144.11

(*Continued*)

Grades: U.S.P. and Technical.

Specifications of U.S.P. Grade: Thin white flakes or white powder; solubility in water (1.0:1.8 at 25°C.), complete; solubility in 90% ethyl alcohol (1:50), complete; N/10 alkali or acid per 2 gram sample, 0.2 cc max.; pH 6.8 - 10.4; loss on drying at 110°C., 0.50% max.; assay, 99.0% min.; chlorides (as NaCl), 0.05% max.; organic chlorine, none; sulfates (as Na_2SO_4), 0.05% max.; nitro compounds, none.

Specifications of Technical Grade: White or slightly tinted powder; assay, 99.0% min. (dry basis); solution in water (1:1.8), essentially complete but slightly inferior to U.S.P. quality; chlorides (as NaCl), 0.6% max.; sulfates (as Na_2SO_4), 0.6% max.; phthalic acid, 0.1% max.; heavy metals, none.

R.R. Classification: Food Preserving Compound.

General Information: Used for preserving foods, tobacco and medicinal preparations.

SODIUM BISULFATE (See Nitre Cake).

SODIUM BISULFITE

Standard Forms: Liquid—33° Bé. containing approx. 21% SO_2; wt. per gal., 10.78 lbs. Anhydrous (Sodium Metabisulfite)—66% SO_2 (approx.)

Typical Analysis:

	Liquid	Anhydrous
SO_2	21.5%	66%
Na_2SO_4	3.00	1.5
Fe	.006	.002

R.R. Classification: Sodium Bisulfite Dry or Sodium Bisulfite Liquid.

General Information: Used in dye manufacture, as source of SO_2 for reducing sodium bichromate to basic chrome sulphate in tanning, bleaching of vegetable tan extracts, production of hydrosulfite for vat dyeing, antichlor in bleaching of groundwood, bleaching dyes out of wooden coloring drums used for dyeing leather, antichlor in pulp bleaching, antichlor in laundries, bleaching of straw, rabbit fur, sugar syrups, glue, glucose. (*See table in general data section*)

SODIUM FERRIC PYROPHOSPHATE

$Na_8Fe_4(P_2O_7)_5 \cdot XH_2O$

Properties: A finely subdivided powder, insoluble in water, soluble in hydrochloric acid; contains min. of 15.5% iron.

General Information: Used in food fortification as a mineral supplement.

SODIUM GLYCEROPHOSPHATE (See Glycerophosphates).

SODIUM HYDROXIDE (See Caustic Soda).

SODIUM HYPOCHLORITE (See Merclor).

SODIUM PENTACHLOROPHENATE (See Santobrite).

SODIUM PHOSPHATE, DI

(Also known as phosphate of soda; sodium phosphate di-basic; secondary sodium phosphate; exsiccated sodium phosphate).

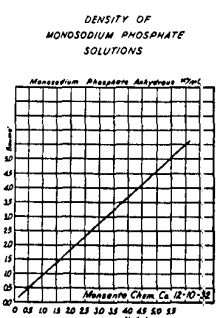
Na_2HPO_4 Mol. Wt. 141.982

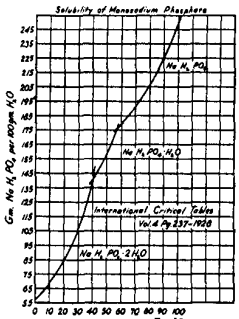
Properties: Soluble in water, insoluble in alcohol. On exposure to air will absorb 2 to 7 mols H_2O depending on humidity and temperature. Loses molecular water at 240°C. forming tetrasodium pyrophosphate. pH of 1% solution at 25°C., 8.8. One lb. anhydrous product is equivalent to 2.5 lbs. of crystalline (dodecahydrate).

Grades: Technical, Food (Regular, Granular, Powdered), Medicinal, U.S.P.

R.R. Classification: Disodium Phosphate.

General Information: Used in making glazes for potteries, porcelains and china ware; as an emulsifier in making process cheese; in various chemical processes; in manufacture of dyestuffs such as Schnitzler's green; in the preparation of enamels; in tinning and soldering; in leather tanning; as a bath ingredient in galvanoplastic work; in the manufacture of pigments such as cobalt phosphate; in the weighting of silk and impregnating of textiles in dyeing and calico printing; in the adjustment of condensed milk; conditioning boiler water; medicinal.





SODIUM PHOSPHATE, MONO

(Also known as sodium phosphate, monobasic; sodium dihydrogen phosphate; sodium biphosphate; monosodium ortho phosphate; acid sodium phosphate.)

NaH_2PO_4 Mol. Wt. 119.993

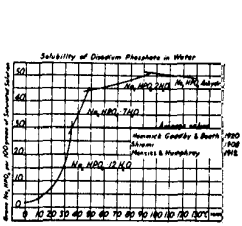
Standard Form: White powder.

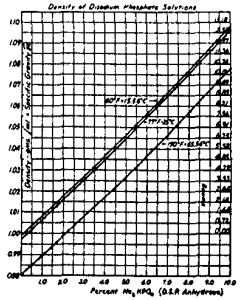
Properties: Contains not less than 58% P_2O_5; pH value of 1% solution, 4.5.

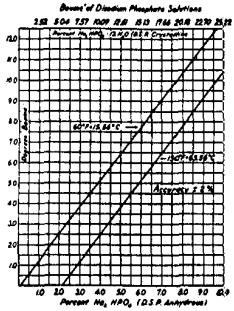
Grades: Food; commercial.

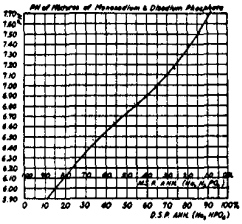
R.R. Classification: Sodium Phosphate.

General Information: Used for conditioning boiler water and in electroplating.









SODIUM PHOSPHATE, TRI

(Also known as normal sodium phosphate; sodium phosphate, tri-basic; tertiary sodium phosphate; T.S.P.)

$Na_3PO_4 \cdot 12H_2O$ Mol. Wt. 380.16

Specifications: White crystalline material, uniformly sized; quickly soluble in water giving an alkaline reaction; pH value of 1% solution, 11.8.

R.R. Classification: Trisodium Phosphate.

General Information: Used principally in cleaners and detergents for both household and industrial use. Fruit Cleaning: To remove insecticide sprays and inhibit growth of fruit mold. Water Treatment: For softening and conditioning water.

SODIUM PHOSPHATE, TRI, MONOHYDRATE

$Na_3PO_4.H_2O$ Mol. Wt. 181.99

Standard Form: White powder.

Properties: Soluble in water; one lb. is equivalent in Na_3PO_4 content to 2.10 lbs. of trisodium phosphate crystalline.

Grade: Commercial.

R.R. Classification: Trisodium Phosphate.

Principal Uses: Used for the same purposes as crystalline T.S.P.; in the manufacture of compounds containing caustic soda it permits the production of dry mixtures.

SODIUM POTASSIUM AMYL PHOSPHATE

(Mixture of sodium and potassium salts of the amyl phosphoric acids).

Standard Form: 60% solution in water.

Properties: Straw colored liquid with slight Pentasol odor; sp. g. 1.339; wt. per gal. 11.2 lbs.; pH 7.0 - 7.3; slightly hygroscopic; anhydrous form gelatinous.

R.R. Classification: Chemicals NOIBN.

General Information: Used as ingredient in vat printing pastes and as a spinning agent for wool.

SODIUM PYROPHOSPHATE, TETRA

(Also known as sodium pyrophosphate, pyrophosphate of soda, normal pyrosodium phosphate, alkaline sodium pyrophosphate and TSPP.).

Grades: Crystalline and Anhydrous.

Properties: White crystalline material and white granular or powder; pH value of 1% solution, 10.2.

R.R. Classification: Sodium Phosphate.

(*Continued*)

Entrance to office and laboratory building at Trenton, Michigan, plant.

General Information: Used in bleaching, especially for straw, and as an ink eradicator; in manufacture of iron pyrophosphate and other pyrophosphates; household and industrial cleaner and detergent; in dye bath for putting certain types of dye in complete solution; electroplating; metal cleaning; electrolytic separation of various metals; oil drilling muds; as emulsifier in process cheese manufacture; soap builder; degumming textiles.

SODIUM SALICYLATE (See Salicylates).

SODIUM SULFATE, ANHYDROUS

Na_2SO_4 Mol. Wt. 142.05

Typical Analysis: White granular crystals; 99% Na_2SO_4 available. For crude Sodium Sulfate, see Salt Cake.

R.R. Classification: Sodium Sulfate.

General Information: Differs from Glauber's salt only in sodium sulfate content. Glauber's salt contains 43% sodium sulfate and 56% water of crystallization. Anhydrous sodium sulfate contains 99% sodium sulfate and no water of

(*Continued*)

crystallization. Used for diluting dry dyestuffs and in tanning. Other uses same as for Glauber's salt.

For crude Sodium Sulfate, see Salt Cake.

SODIUM SULFHYDRATE*

NaHS Mol. Wt. 56.06

Standard Form: 33½% NaHS, liquid.

R.R. Classification: Sodium Sulfhydrate.

General Information: Sodium Sulfhydrate is chemically similar to sodium sulfide. Where a sulfide with a lower caustic content is desirable Sodium Sulfhydrate may be used. The main application for Sodium Sulfhydrate is in dehairing leather where its lower caustic alkalinity makes it more desirable than sodium sulfide for certain leathers. A lower caustic alkalinity causes less swelling of the hides or skins, thus producing leather with a finer, smoother grain. It can be said that Sodium Sulfhydrate affords a means of controlling plumping (swelling). Unlike sodium sulfide, Sodium Sulfhydrate will not dehair by itself. Lime must be used with it to give a sufficiently high pH for dehairing.

* Not manufactured by us, but furnished for the convenience of our customers.

SODIUM SULFIDE

Standard Forms: Crystals ($Na_2S.9H_2O$); concentrated—flakes.* ($Na_2S.nH_2O$); liquid (20% Na_2S solution).

Typical Analysis: Crystals, 31% Na_2S; concentrated, 60-62% Na_2S; liquid, 20% Na_2S.

R.R. Classification: Sodium Sulfide.

General Information: Sodium Sulfide is a salt of the weak acid, hydrogen sulfide, and the strong alkali, caustic soda, and consequently its solutions are strongly alkaline. Reacts with metal salts to form metal sulfides, nearly all of which are colored. Reacts with acids, precipitating sulfur and liberating hydrogen sulfide. Is a reducing agent, and solutions are ready solvents of sulfur to form polysulfides.

Principal use is in tanning, to remove hair from calfskins and cowhides, and from sheepskins from which the wool has already been removed. Other uses are in the manufacture and application of sulfur dyes, degumming of silk, denitrating of nitrocellulose rayon, sodium polysulfide solutions, leaching gold ore tailings, dissolving creosols from coal tar oils, boiling out linen, and depositing mineral pigments on cotton.

* Not manufactured by us but furnished for the convenience of our customers.

SODIUM SULFITE (See Sarcosite)

SOLVENTS (See Ethyl, Butyl and Amyl Acetates, Diacetone Alcohol).

"SOPANOX"

General Information: Sopanox is an amino compound, effective in minute quantities in restraining the oxidation of soap and the resulting rancidity, discoloration and other adverse qualities, all of which must be avoided in producing a product of highest grade. Our experience shows that Sopanox satisfies the exacting demands of manufacturers of soaps produced from animal or vegetable oils, filled or unfilled. It is particularly valuable in preventing discoloration of refined toilet soaps.

R.R. Classification: Chemicals NOIBN.

Available Literature: Technical bulletin "Sopanox."

"SOPET" (Sodium Potassium Ethyl Phosphate Solution)

Mixture of sodium and potassium salts of the ethyl phosphoric acids.

Standard Form: 60% solution in water.

Properties: Water white liquid with slight ester odor; 11.4 lb. per gal.; sp. g. 1.37 at 25°C.; pH 7.0 - 7.4 in 60% solution; viscosity, 128 centipoises at 25°C.

R.R. Classification: Chemicals NOIBN.

General Information: Used as fiber lubricant in spinning of wool. Being water soluble, is easily removed from yarn or cloth without soap scouring.

SPRAY LACQUERS (See Lacquers).

SPREADING AGENTS (See Areskap, Aresket, Aresklene, Santomerse).

STEEL PICKLING INHIBITORS (See Hibitite).

STRONTIUM SALICYLATE N.F. (See Salicylates).

SULFANILAMIDE, U.S.P. (*para*-Aminobenzene Sulfonamide)

Mol. Wt. 172.20

Standard Forms: Crystals, 30-mesh; powder, 100-mesh.

(Continued)

Specifications: White crystals or powder; assay (dry basis) 99.5% min.; m.p. 165.0°C. min.; solution in N/2HCl (2:30) clear; ash 0.05% max.; chlorides (as HCl) 0.014% max.; sulfate (as H_2SO_4) 0.04% max.; conforms to U.S.P. test for heavy metals.

MESH:	*30-mesh*	*100-mesh*
Retained on—		
30 mesh screen	Trace max.	
40 mesh screen	40.0% min.	
60 mesh screen	75.0% min.	0.8% max.
80 mesh screen		
100 mesh screen	90.0% min.	10.0% max.
140 mesh screen		25.0% max.
200 mesh screen		20.0% min.
		40.0% max.

R.R. Classification: Chemicals NOIBN.

General Information: Used in pharmaceutical preparations and veterinary medicines. *CAUTION: Sulfanilamide should be administered only under supervision of a competent physician.*

SULFATE OF IRON (See Ferric Sulfate and Ferrisul).

SULFUR

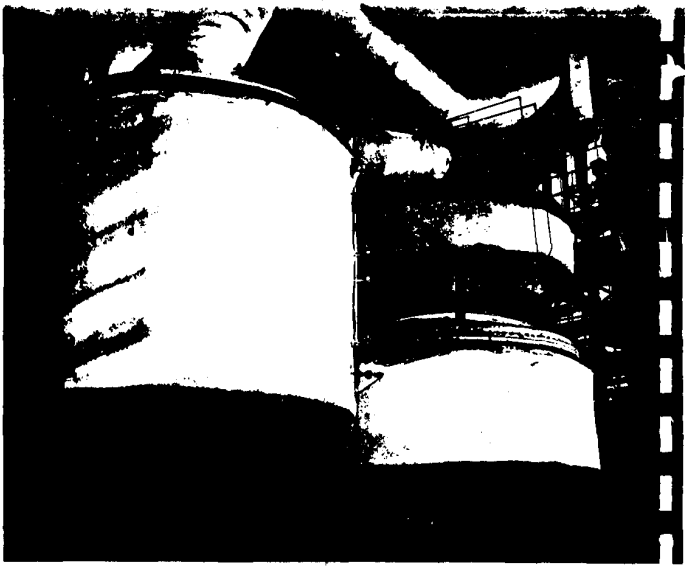
99.5% pure sulfur.

Grades: Commercial rubbermakers, commercial flour, 90% through 80 mesh; dusting, 93-95% through 325 mesh.

R.R. Classification: Sulfur.

General Information: Sulfur is a brilliant yellow crystalline substance, approximately twice as heavy as water and melting at about 248° F. This ready fusibility permits casting into various shapes. It is highly acid resisting and is a poor conductor of heat and electricity. It combines with rubber to form polysulfides.

Sulfur is used as a source of sulfur vapor for manufacture of carbon bisulfide and sublimed sulfur; as a source of sulfur dioxide for fumigation, bleaching and manufacture of sulfuric acid, sulfite and bisulfite for paper manufacturing; in formation of sulfides and polysulfides for oil refining, vulcanization of rubber, smelting, and manufacture of calcium sulfide and sodium polysulfide; as an acid-resistant bonding material for brick-lined acid tanks; as a water-resistant material for water pipe joints; as a non-conductor for the manufacture of insulators; as a fungicide; in manufacture of fireworks and railway signals; in grain mixtures for poultry; as a soil disinfectant.



Converters used in manufacture of sulfuric acid at Everett, Mass. plant.

SULFURIC ACID

H_2SO_4

Standard Strengths: 58° Bé; 60° Bé.; 66° Bé.; 98% H_2SO_4; Oleum.

Typical Analysis: 58° Bé: 74.36% H_2SO_4; freezing point, below —40°F.
60° Bé.: 77.67% min. H_2SO_4; freezing point, +12.6° F. approx.
66° Bé.: 93.2% min. H_2SO_4; freezing point, —29° F. approx.
98%: 98.0% min. H_2SO_4; freezing point, 38° F. approx.

Oleum—20% SO_3: 104.50% min. H_2SO_4; freezing point, 22.8°F.
25% SO_3: 105.6% min. H_2SO_4; freezing point, 48.7°F.
35% SO_3: 107.88% min. H_2SO_4; freezing point, 83.5°F.
40% SO_3: 109.00% min. H_2SO_4; freezing point, 91.5°F.
65% SO_3: 114.6% H_2SO_4; freezing point, 38.0° F.

Oleum freezing point data based on Manufacturing Chemists Association curve, 1941

R.R. Classification: Sulfuric Acid.

General Information: Used extensively in steel mills, enameling works, oil refineries, pigment works, by-product gas plants, fertilizer plants, tanneries, and many other industries. (*See tables in general data section*)

SULFURIC ACID C.P.

H_2SO_4 Mol. Wt. 98.07

Specifications: Colorless liquid; assay, 95.5 - 97.0%; non-volatile material, 0.0005% max.; chloride (Cl), 0.00006% max.; nitrate (NO_3), 0.0002% max.; ammonium (NH_4), 0.0003% max.; SO_3, 0.0005% max.; arsenic, 0.000003% max.; heavy metals (as Pb), 0.0005% max.; heavy metals (as Fe), 0.0001% max.

R.R. Classification: Sulfuric Acid. Corrosive liquid (white label required).

General Information: Used as a laboratory reagent and where an extremely pure material is required.

SULFURIC CONTACT CATALYST (See Vanadium Catalyst).

SULFURYL CHLORIDE

SO_2Cl_2 Mol. Wt. 134.97

Standard Form: Liquid.

Characteristics: Light yellow liquid (may deposit precipitate on standing); sp.g. 15.5°/15.5°C., 1.67 - 1.71. Distilling range: first drop, 50.0°C. min.; dry point, 70.0°C.; 20% - 100% range, 2.0°C. max.; total condensation, 95% min.

R.R. Classification: Chemicals NOIBN. Corrosive liquid (white label required).

General Information: Used as a chlorinating and condensing agent.

SYNTANS (See Mertanol).

TETRAPHOSPHORIC ACID (Phospholeum)

Properties: Clear, water white viscous liquid; P_2O_5 content 83 - 84%; does not crystallize at —50°C. Sp. g.: 2.060 at 20°C.; 1.983 at 100°C.; 1.960 at 125°C.

R.R. Classification: Phosphoric Acid.

General Information: Used for industrial applications where a high strength phosphoric acid is desired and as a drying agent.

TETRAPOTASSIUM PYROPHOSPHATE (See Potassium Pyrophosphate, Tetra).

(*Continued*)

TETRASODIUM PYROPHOSPHATE

(See Sodium Pyrophosphate, Tetra).

TEXTILE LACQUERS

General Information: Clear and pigmented for waterproofing garment fabrics, raincoats, shower curtains, duck and balloon cloth. Can be supplied in cellulose nitrate, acetate, aceto butyrate, ethyl cellulose, and chlorinated rubber base. Applied by machine coating.

R.R. Classification: Lacquers.

TEXTILE PRINTING LACQUERS

General Information: Pigmented lacquers for engraved roll and stencil printing on finished fabrics, cotton, silk, celanese, rayon taffetas, crepes, and voiles.

R.R. Classification: Lacquers.

THINNERS

General Information: Thinners are supplied for reducing all lacquer products to required viscosity for spraying, dipping, and machine coating. Can be adjusted to meet special requirements for flow out, drying time, moisture resistance, and solvent power. Retarding thinners, cleaning thinners, stripping thinners, removers, resins and dye solvents are also available.

R.R. Classification: Lacquer Thinning Compound.

THIOCARBANILIDE (See under Accelerators).

THIOUREA

(Also known as thiocarbamide, sulfocarbamide, and sulfourea.)

$NH_2.CS.NH_2$ Mol. Wt. 76.12

Standard Form: Crystals.

Specifications: White, free-flowing crystals; moisture 0.50% max.; ash 0.05% max.; solution (10% water at 25°C.) turbid.

R.R. Classification: Chemicals NOIBN.

General Information: Used as an intermediate in the production of dyestuffs and pharmaceuticals; in the manufacture of vulcanization accelerators; as an

(Continued)

ingredient of insecticidal compositions; moth-proofing agent in treating furs, feathers, skins and fabrics; and as an intermediate in the production of resins and waxes.

"THIURAD" (See Accelerators)

TOLUENE ETHYL SULFONAMIDE (See Santicizer 8).

para-TOLUENESULFONAMIDE

(Also known as *para*-toluenesulfonic acid amide, *para*-sulfonamidotoluene, and 4-sulfonamidotoluene.)

Mol. Wt. 171.21

Standard Form: Crystalline powder

Specifications: Light brownish crystalline powder; crystallizing point (dried material) 135.0°C. min.; ash 0.60% max.; alcohol insoluble material, 0.60% max.; loss on drying, 0.50% max.

R.R. Classification: Chemicals NOIBN.

General Information: Used as an intermediate in the production of active chlorine bearing compounds, as an intermediate in the production of dyestuffs, as a plasticizer, and as a base in the production of plasticizers and resins. Also see Santicizer 9, a mixture of ortho and para-toluenesulfonamides.

para-TOLUENESULFONCHLORIDE

Mol. Wt. 190.64

Standard Form: Crystals

Characteristics: White or yellowish crystals; assay, 95% min.; crystallizing point, 65.5°C. min.

R.R. Classification: Chemicals NOIBN.

General Information: Used as a condensing agent and an intermediate in dyestuff synthesis.

TOLUENESULFONIC ACID, TECHNICAL

Mol. Wt. 172.19

Standard Form: Fused crystalline mass.

Characteristics: Brown to black crystalline solid: toluenesulfonic acid, 85.0% min.; H_2SO_4, 8.0% max. Composition: approx. 85.0% para and 15.0% ortho; contains up to 14.0% water; may contain 1.0 - 2.0% toluene.

R.R. Classification: Chemicals NOIBN.

General Information: Used in the manufacture of dyestuff intermediates and as a catalyst in certain organic reactions.

TRICALCIUM PHOSPHATE (See Calcium Phosphate, Tri).

TRICHLOROBENZENE, TECHNICAL

$C_6H_3Cl_3$ Mol. Wt. 181.45
Mixture of 1, 2, 3- and 1, 2, 4-trichlorobenzene

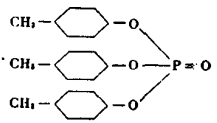
Standard Form: Liquid.

Characteristics: Practically clear, colorless to light yellow liquid; sp.g. 15.5°/15.5°C., 1.460 - 1.477; acidity as HCl, 0.01% max.; crystallizing point, 10.0°C. max. Distilling range; first drop, 205.0°C. min.; 50%, 213.0°C. min.; 90%, 216.0°C. min.; dry point, 250.0°C. max.

R.R. Classification: Trichlorobenzene.

General Information: Used in organic synthesis, as a solvent, and as an insecticide.

TRICRESYL PHOSPHATE



Mol. Wt. 368.18

(*Continued*)

Specifications: Clear practically colorless liquid; sp. g. at 20/20°C., 1.162 ± 0.005; acidity (as H_3PO_4) 0.01% max.; free phenols (permanganate test), a distinct purple color to be present after 30 minutes.

R.R. Classification: Lacquer Solvents NOIBN.

General Information: Tricresyl Phosphate is used principally as a plasticizer. It has a high boiling point and is relatively non-volatile, the evaporation loss in 100 hours at 100°C. being less than 0.10%. The refractive index is about 1.556 at 20°C. Viscosity increases rapidly at temperatures below normal until at about —35°C. the product is a solid transparent mass without crystalline structure. It is miscible with all the common solvents and thinners, and with linseed, china wood, and castor oils. Its solubility in water is less than 0.002% at 85°C. and it imparts good moisture resistance to nitrocellulose films. Being a solvent for nitrocellulose, it has a high retentivity and can be used in large proportions without danger of sweating or separation. Tricresyl Phosphate is the standard fire retarding plasticizer for nitrocellulose. It is compatible with most lacquer resins and gives firm, tough, flexible films of excellent weathering qualities. The ortho isomer, which is reputed to be the toxic element in normal Tricresyl Phosphate, has been virtually eliminated from Tricresyl Phosphate Monsanto, thereby reducing toxicity dangers to a minimum and making the product more suitable for many applications. Elimination of the ortho isomer causes no impairment in plasticizing qualities.

Available Literature: 40-page booklet, "Plasticizers and Resins".

TRIETHYL PHOSPHATE

$(C_2H_5)_3O_3PO$ Mol. Wt. 182.2

Standard Form: Liquid.

Characteristics: Water white liquid; acidity (cc. n/100 NaOH per 5 cc.), 3.0 cc. max.; moisture, 0.20% max. Distilling range: first drop, 200°C. min.; dry point, 220°C. max.

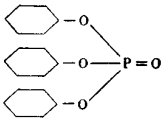
R.R. Classification: Chemicals NOIBN.

General Information: Used as a solvent plasticizer and as a catalyst in chemical syntheses.

Available Literature: 40-page booklet: "Plasticizers and Resins."

TRIMAGNESIUM PHOSPHATE (See Magnesium Phosphate, Tri).

TRIPHENYL PHOSPHATE



Mol. Wt. 326.31

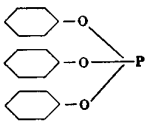
Specifications: White flakes, faintly aromatic; m. p. 48.5°C. min. start; solution in alcohol (10 gms. in 50 cc), not more than faintly opalescent; permanganate test, distinct purple color to be present after 30 minutes; acidity (as H_3PO_4) 0.003% max.

R.R. Classification: Lacquer Solvents NOIBN.

General Information: The chief uses of Triphenyl Phosphate are as a plasticizer and fire retarder. It is miscible with the common solvents and thinners and with vegetable oils. Its solubility in water is 0.001% at 34°C. and 0.002% at 54°C. and it imparts some moisture resistance to cellulose acetate films. Its retentivity in cast cellulose acetate films is nearly 80%; that is, it can be incorporated in the proportion of 8 parts to 10 of acetate without causing separation and blooming. It imparts good flexibility and gives clear, tough compositions without tendency toward tackiness. Triphenyl Phosphate is toxic and should not be used in articles such as foil, which are to come in contact with foodstuffs. One of the most valuable properties of Triphenyl Phosphate is that of fire retarding. When used alone in cellulose acetate films an amount of Tripbenyl Phosphate equal to 20% of the cellulose acetate weight produces films which will not support combustion.

Available Literature: 40-page booklet "Plasticizers and Resins"

TRIPHENYL PHOSPHITE



Mol. Wt. 310.31

Specifications: A crystalline solid at slightly below room temperature; at higher temperatures is an oily liquid weighing 9.85 lbs. per gal.

R.R. Classification: Chemicals NOIBN.

General Information: Used as a plasticizer and as a fire retarder for nitrocellulose.

TRISODIUM PHOSPHATE (See Sodium Phosphate, Tri).

"UREKA", "UREKA BLEND B", "UREKA C" (See under Accelerators, Rubber).

VANADIUM SULFURIC ACID CATALYST _____

General Information: Used in manufacture of sulfuric acid by contact process. (Not suitable for other purposes).

VANILLIN, ETHYL (See Ethavan).

"VANILLIN MONSANTO" (Vanillin, U.S.P.) _____

Mol. Wt. 152.14

Standard Form: Fine Crystals.

Specifications: Fine, white crystalline needles: m.p. 81.5°C. min.; no foreign flavor (in sugar solution): loss on drying, 0.03% max.; solubility in alcohol (1:2), complete.

R.R. Classification: Chemicals NOIBN.

General Information: Used as a flavoring agent in foodstuffs and beverages.

Available Literature: Leaflet "Vanillin Monsanto."

VARNISH ANTISKINNING AGENTS (See Santovar A).

"VUELITE" (See Plastics).

"VUEPAK" (See Plastics).

WATER-TREATING CHEMICALS (See Aluminum Sulfate, Ammonia, Chlorine, Ferrisul, Hypochlorite of Soda, Santobrite, Santosite, Sodium Aluminate, Sodium Sulfate).

WETTING AGENTS (See Areskap, Aresket, Aresklene, Santomerse).

XANTHATES, (See Potassium Amyl Xanthate and Potassium Ethyl Xanthate).

ZINC CHLORIDE

Grades: 25° Bé. and 52° Bé. solutions.

R.R. Classification: Zinc Chloride Liquid.

General Information: Used as a flux in galvanizing and soldering since it has the acid properties of muriatic acid without being volatile at the temperature used.

The following products are made by Monsanto Chemicals Limited, London, England, and are not at present available for sale by Monsanto in the United States:

"ACROSYL"
ANTHRACENE OIL
AURINE
BENZENE
BENZENE ABSORBING OIL
COUMARONE RESIN
CREOSOTE
NAPHTHA, HIGH FLASH
NAPHTHA, SOLVENT
NAPHTHALENE
PITCH
PYRIDINE BASES
TAR ACID OIL
TOLUENE

MONSANTO LITERATURE

Accelerators, Rubber. "Santocure." 52-page file size booklet giving properties, uses and comparative data.

Alcohol. "Nealco Industrial Alcohol." 70-page booklet giving chemical and physical data on ethyl alcohol, completely denatured alcohol, anti-freeze, and specially denatured alcohols. Also includes government regulations pertaining to alcohols.

Ammonia. "Monsanto Ammonia for Refrigeration." 12-page reference booklet for operators of refrigerating machines. Contains property tables for anhydrous ammonia and calcium chloride and instructions for handling ammonia and ammonia cylinders.

Aroclors. "The Aroclors." 20-page file size booklet covering physical and chemical properties, uses, and applications.

Chlorine. "Monsanto Chlorine." 20-page file size, illustrated booklet, giving properties of chlorine and information on containers, care of equipment and safe handling.

Coumarin. "Coumarin Monsanto." 4-page pocket size folder, giving properties and uses.

Ethavan. "Ethavan (Pure Ethyl Vanillin)." 4-page pocket size folder, giving properties and uses.

Ferrisul. "Ferrisul for Metal Treatment." 12-page file size booklet, giving properties and directions for use of Ferrisul for pickling stainless steel and copper and for etching metal articles preparatory to galvanizing.

Ferrisul. "Ferrisul for Treatment of Water, Sewage and Industrial Wastes." 16-page file size booklet, giving properties and directions for use of Ferrisul for treatment of municipal water supplies, sewage and industrial wastes and for other industrial uses.

Ferrophosphorus. "Phosphorus-Iron Alloys, Bulletin No. 1." 36-page file size booklet, containing a report of general exploratory research upon influence of phosphorus in low carbon, low alloy steel. Based on work done at Battelle Memorial Institute.

Ferrophosphorus. "Phosphorus-Iron Alloys, Bulletin No. 2." 64-page file size booklet. A report of experimental research investigation on corrosion and mechanical influences on alloying elements in low alloy steel.

Ferrophosphorus. Phosphorus-Iron Alloys, Bulletin No. 3." 56-page file size booklet in two parts. Part one: Digest of U.S. Patents relating to phosphorus as an alloying element. Part two: List of U.S. Patents relating to steel production and treatment.

Ferrophosphorus. "Phosphorus-Iron Alloys, Bulletin No. 4." 20-page file size booklet containing reports of experimental investigation on the influence of phosphorous in Cr.-Mo steels and steels in high temperature service.

Hibitite. "Hibitite and Its Uses." 4-page mimeographed bulletin.

Lacquers. "Saflex Lacquers." 4-page mimeographed bulletin on Saflex fabric coatings.

Lampblack. "Monsanto Bear Lampblack, Properties and Principal Uses." 12-page pocket size booklet, giving description and analyses of the various grades of Monsanto Lampblack.

Latex. "Latex Compounding." 36-page file size illustrated booklet containing comprehensive discussion of latex compounding methods and technique, compounding materials and various test data.

Manicure Lacquers. "Monsanto Manicure Lacquer." Pocket size color card folder, containing sample chips of the standard creme shades of Monsanto manicure lacquers.

Mertec. "Maintenance Paints." Mimeographed bulletin.

Methyl Salicylate. "Methyl Salicylate Monsanto." 4-page pocket size folder giving specifications and uses.

Permasan. "Chemicals for Termite Control," Monsanto Technical Bulletin No. 0-13, August 22, 1940. 4-page file size bulletin describing recommended chemicals for treatment of soil and wood.

Permasan 116. "Permasan 116, A Water Repellent Preservative for Wood." Monsanto Technical Bulletin No. 0-21, February 15, 1941. 8-page file size bulletin giving properties and application data.

Phosilage. "Grass Silage for More Profitable Livestock Farming—How to Make It and How to Feed It." 32-page pocket size booklet, describing procedure for making and feeding grass silage in which Phosilage is used as the preservative.

Plasticizers and Resins. "Plasticizers and Resins, Specifications and Application Data." Revised May, 1940. 40-page file size booklet, giving comprehensive data on properties and applications of Monsanto plasticizers and resins, which include the Santicizers, phthalates, phosphates, Santolites, and Aroclors.

Plastics. "Resinox, A Monsanto Plastic." 12-page illustrated booklet describing properties, manufacture, molding, and uses of Resinox phenol-formaldehyde plastic.

Plastics. "Lustron, A Monsanto Plastic." 16-page illustrated booklet describing properties, manufacture, molding, and uses of Lustron, Monsanto polystyrene.

Plastics. "A Wartime Guide to Monsanto Plastics." 15-page file size booklet describing the main groups of Monsanto Plastics and some of their wartime applications.

Potassium Pyrophosphate, Tetra. "Tetrapotassium Pyrophosphate." Monsanto Technical Bulletin No. P-23, January 1, 1941. 4-page file size bulletin.

Rubber Chemicals. "Monsanto Chemicals for the Rubber Industry." 44-page file size booklet giving properties and general characteristics and uses of Monsanto accelerators, antioxidants, softeners and miscellaneous materials for the rubber industry.

Rubber Compounding. "Rubber Compounding for the Wire Industry." 17-page file size booklet giving specifications and testing and compounding data on rubber wire coatings.

Santobrite. "Santobrite for the Preservation of Adhesives," Monsanto Technical Bulletin No. 0-1, June 1, 1940. 6-page file size bulletin.

Santobrite. "Santobrite and Santophen 20 for Paint Preservation," Monsanto Technical Bulletin 0-2. 2-page file size bulletin.

Santobrite. "Santobrite for Microorganism Control in the Pulp and Paper Industry," Monsanto Technical Bulletin No. 0-5, April 1, 1940. 8-page file size bulletin.

Santobrite. "Santobrite for the Control of Slime and Algae," Monsanto Technical Bulletin No. 0-15, March 25, 1940. 6-page file size bulletin, describing Santobrite for the control of slime and algae in industrial cooling water systems.

Santobrite. "Santobrite for the Preservation of Rubber Latex," Monsanto Technical Bulletin No. 0-17, September 29, 1939. 8-page file size bulletin describing the use of Santobrite for preventing biological deterioration of raw latex and latex products.

Santobrite. "Santobrite in the Tanning Industry," Monsanto Technical Bulletin No. 0-19, June 20, 1940. 6-page file size bulletin describing the use of Santobrite for preserving hides, tanned leather, and tanning materials from mold and biological deterioration.

Santobrite. "Santobrite—Methods of Handling and Application," Monsanto Technical Bulletin No. 0-22. 8-page file size bulletin.

Santobrite. "Preservation of Cellulose Insulating Materials by Monsanto." 24-page file size booklet describing the use of Santobrite for protecting cellulose insulating materials and fibre boards from attack by decay and termites. Contains much investigational and field data. Illustrated.

Santobrite. "Sap Stain Control by Monsanto." Revised August, 1940. 24-page illustrated file size booklet, describing the use of Santobrite for controlling sap stain and mold in green lumber.

Santochlor. "Santochlor for the Control of Peach Tree and Stone Fruit Borers," Monsanto Technical Bulletin No. 0-18, December 1, 1939. 3-page file size bulletin.

Santolube. "Santolubes—Corrosion Inhibitors for Lubricating Oils." 20-page file size booklet giving properties and results of operating and laboratory tests.

Santomask. "Santomask for After-Odor Control of Interior Paint, Printing Inks and Some Other Odoriferous Formulations," Monsanto Technical Buelltin No. 0-16, July 26, 1940. 2-page file size bulletin, giving properties and directions for use.

Santomerse. "Santomerse." 32-page file size booklet, giving physical and chemical properties and applications of Santomerse as a detergent and wetting, spreading, penetrating, cleaning and dispersing agent.

Santophen 7. "Santophen 7, A Germicide and Industrial Preservative," Monsanto Technical Bulletin No. 0-3, August 15, 1941. 7-page file size bulletin giving properties and application data.

Santopour. "Santopour, A Pour-Point Depressant for Lubricating Oils." 10-page file size booklet describing properties, method of application, and test and field service results.

Sopanox. "Sopanox—An Antioxidant for Soaps." Monsanto Technical Bulletin No. P-100, May 1, 1939. 3-page file size bulletin giving properties and directions for use of Sopanox, also methods of testing soap for oxidation and rancidity.

Vanillin. "Vanillin Monsanto." 4-page pocket size leaflet giving properties and uses.

Vuepak. "How Vuepak Helped 20 Manufacturers to Package for Greater Sales." 30-page file size booklet, giving case studies of sales gains resulting from use of Vuepak.

Intermediates are made at the Norfolk, Virginia, plant.

GENERAL DATA

TESTING LIQUIDS WITH THE BAUMÉ HYDROMETER

Monsanto products, when made to a Baumé specification, may vary 0.2° Bé. above but never below the specified strength. The hydrometer used should be of limited range, not more than 10° Bé., and should be at least 10" in length. Its accuracy should be certified by the manufacturer. Our own hydrometers are tested against standard glasses certified by the U. S. Bureau of Standards.

METHOD OF READING THE HYDROMETER*

The correct method of reading the hydrometer is illustrated in Figs. 1 and 2. The sample of liquid is placed in a clear glass jar or cylinder and the hydrometer carefully immersed in it to a point slightly below that to which it naturally sinks, and is then allowed to float freely.

The reading should not be taken until the liquid and the hydrometer are free from air bubbles and are at rest.

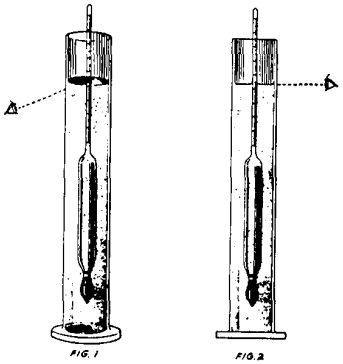


FIG. 1 FIG. 2

Method of Reading Baume Hydrometer

In taking the reading the eye should be placed slightly below the plane of the surface of the liquid (Fig. 1) and then raised slowly until this surface, seen as an ellipse, becomes a straight line (Fig. 2). The point at which this line cuts the hydrometer scale should be taken as the reading of the instrument (Fig. 2).

In case the liquid is not sufficiently clear to allow the reading to be made as above described, it will be necessary to read from above the liquid surface and to estimate as accurately as possible the point to which the liquid rises on the hydrometer stem. It should be remembered, however, that the instrument is calibrated

* U. S. Bureau of Standards, Circ. No. 57

to give correct indications when read at the principal surface of the liquid. It will be necessary, therefore, to correct the reading at the upper meniscus by an amount equal to the height to which the liquid creeps up on the stem of the hydrometer. The amount of this correction may be determined with sufficient accuracy for most purposes by taking a few readings on the upper and the lower meniscus in a sample of the clear liquid and noting the difference.

The magnitude of the correction will obviously depend upon the length and value of the subdivisions of the hydrometer scale and must be determined in each case for the particular hydrometer in question.

CORRECTING FOR TEMPERATURE

The Thermometer must be used along with the hydrometer in testing any liquid.

Hydrometers do not indicate the correct strength of a liquid unless read at the exact temperature indicated on the spindle, that is, at 60°F. Accurate readings may be obtained by bringing the liquid to this temperature by cooling or warming, but in most instances a correction can be applied with sufficient accuracy by reference to the following tables. For all liquids listed in this booklet, except Ammonia, the correction is added when the test is made above 60°F. and subtracted when made below 60°F. For Ammonia the reverse is true.

CONVERSION FORMULAE FOR DENSITY SCALES

Heavy Liquids

$$\text{Degrees Twaddell} = (\text{Sp. Gr.} - 1)200$$

$$\text{Sp. Gr.} = \frac{\text{Deg. Tw.} + 200}{200}$$

$$\text{Degrees Baumé} = 145 - \frac{145}{\text{Sp. Gr.}}$$

$$\text{Sp. Gr.} = \frac{145}{145 - \text{Deg. Bé.}}$$

Light Liquids

$$\text{Degrees Baumé} = \frac{140}{\text{Sp. Gr.}} - 130$$

$$\text{Sp. Gr.} = \frac{140}{130 + \text{Deg. Bé.}}$$

THE DILUTION AND CONCENTRATION OF LIQUIDS AND MIXTURES

RECTANGLE METHOD

The figures expressing the percentage concentration of two solutions (or those of one solution, and the figure 0 *for water*, where dilution with water is desired) are written in the two left hand corners of a rectangle, and the figure expressing the desired concentration is placed on the intersection of the two diagonals of this rectangle.

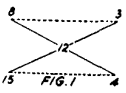


FIG. 1

Now subtract the figures on the diagonals, the smaller from the larger, and write the result at the other end of the respective diagonal. These figures then indicate what quantities of the solutions whose concentration is given on the other end of the respective *horizontal* line, must be taken to obtain a solution of the desired concentration. For example, to make a 12% solution, by mixing an 8% and a 15% solution we prepare Fig. 1, which indicates that we have to take 3 parts by weight of the 8% solution, and 4 parts by weight of the 15% solution to obtain (7 parts by weight of) the 12% solution.

Again, if we wish to dilute a 25% solution so as to obtain a 9% solution, we place the figure 25 in, for example, the upper left corner of a rectangle and place figure 0 (concentration of the solution in pure water) in the lower left corner, and then place the figure 9 (desired concentration) at the point of intersection of the diagonals, and subtracting across the diagonals, we obtain Fig. 2: 9 parts by weight of the 25% solution, if mixed with 16 parts by weight of water, will give 25 parts by weight of a 9% solution.

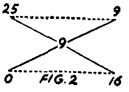


FIG. 2

In diluting to a given Baumé strength or Specific Gravity, the percentage composition, corresponding to the Baumé or Specific Gravity, must be taken from the following tables. For instance, supposing a 32° Baumé Chloride of Alumina solution is to be diluted to 8° Baumé with water. By reference to table on page 163 a 32° Baumé solution contains 27.88% Al_2Cl_6, and an 8° Baumé solution contains 6.50% Al_2Cl_6. These percentages must be used in finding the weights of Chloride of Alumina and water to be mixed by the above method. According to the scheme as outlined above, the percentages are arranged as in Fig. 3 and the subtractions made along the diagonals, the lower from the higher. Thus when 32° Baumé Chloride of Alumina is mixed with water in the proportion 6.50 pounds to 21.38 pounds, 27.88 pounds of solution will be obtained at 8° Baumé.

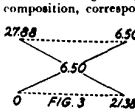


FIG. 3

SULFURIC ACID*

By W. C. Ferguson and H. P. Talbot

Degrees Bé	Specific Gravity 60°/60° F.	Per Cent H_2SO_4	Freezing (Melting) Point Dg. F.	Degrees Bé	Specific Gravity 60°/60° F.	Per Cent H_2SO_4	Freezing (Melting) Point Deg. F.
0	1.0000	0.00	+32.0	36	1.3303	42.63	—70.0
				37	1.3426	43.99	—60.0
1	1.0069	1.02	+31.2	38	1.3551	45.35	—53.0
2	1.0140	2.08	+30.5	39	1.3679	46.72	—47.0
3	1.0211	3.13	+29.8	40	1.3810	48.10	—41.0
4	1.0284	4.21	+28.9				
5	1.0357	5.28	+28.1	41	1.3942	49.47	—35.0
				42	1.4078	50.87	—31.0
6	1.0432	6.37	+27.2	43	1.4216	52.26	—27.0
7	1.0507	7.45	+26.3	44	1.4356	53.66	—23.0
8	1.0584	8.55	+25.1	45	1.4500	55.07	—20.0
9	1.0662	9.66	+24.0				
10	1.0741	10.77	+22.8	46	1.4646	56.48	—14.0
				47	1.4795	57.90	—15.0
11	1.0821	11.89	+21.5	48	1.4948	59.32	—18.0
12	1.0902	13.01	+20.0	49	1.5104	60.75	—22.0
13	1.0985	14.13	+18.3	50	1.5264	62.18	—27.0
14	1.1069	15.25	+16.6				
15	1.1154	16.38	+14.7	51	1.5426	63.36	—33.0
				52	1.5591	65.13	—39.0
16	1.1240	17.53	+12.6	53	1.5761	66.63	—49.0
17	1.1328	18.71	+10.2	54	1.5934	68.13	—59.0
18	1.1417	19.89	+7.7	55	1.6111	69.65	†
19	1.1508	21.07	+4.8				
20	1.1600	22.25	+1.6	56	1.6292	71.17	†
				57	1.6477	72.75	†
21	1.1694	23.43	—1.8	58	1.6667	74.36	†
22	1.1789	24.61	—6.0	59	1.6860	75.99	—7.0
23	1.1885	25.81	—11.0	60	1.7059	77.67	+12.6
24	1.1983	27.03	—16.0				
25	1.2083	28.28	—23.0	61	1.7262	79.43	+27.3
				62	1.7470	81.30	+39.1
26	1.2185	29.53	—30.0	63	1.7683	83.34	+46.1
27	1.2288	30.79	—39.0	64	1.7901	85.66	+46.4
28	1.2393	32.05	—49.0	64¼	1.7957	86.33	+43.6
29	1.2500	33.33	—61.0	64½	1.8012	87.04	+41.1
30	1.2609	34.63	—74.0	64¾	1.8068	87.81	+37.9
				65	1.8125	88.65	+33.1
31	1.2719	35.93	—82.0	65¼	1.8182	89.55	+24.6
32	1.2832	37.26	—96.0	65½	1.8239	90.60	+13.4
33	1.2946	38.58	—97.0	65¾	1.8297	91.80	— 1.0
34	1.3063	39.92	—91.0				
35	1.3182	41.27	—81.0	66	1.8354	93.19	—29.0

*This table has been approved and adopted as a Standard by the Manufacturing Chemists' Association of the United States.

†Below—40°.

Specific Gravity determinations were made at 60° F., compared with water at 60°F.

(*Continued*)

From the Specific Gravities, the corresponding degrees Baumé were calculated by the following formula: Baumé = 145—145/Sp. Gr.

ALLOWANCE FOR TEMPERATURE

At 10° Bé. correction of .029° Bé. or .00023 Sp. G. for every 1°F.
At 20° Bé. correction of .036° Bé. or .00034 Sp. G. for every 1°F.
At 30° Bé. correction of .035° Bé. or .00039 Sp. G. for every 1°F.
At 40° Bé. correction of .031° Bé. or .00041 Sp. G. for every 1°F.
At 50° Bé. correction of .028° Bé. or .00045 Sp. G. for every 1°F.
At 60° Bé. correction of .026° Bé. or .00053 Sp. G. for every 1° F.
At 63° Bé. correction of .026° Bé. or .00057 Sp. G. for every 1°F.
At 66° Bé. correction of .0235° Bé. or .00054 Sp. G. for every 1°F.

For temperatures above 60°F., the correction is added to the observed indication; below 60°F. subtracted.

OLEUM

% Oleum	% Free SO_3	Equiv. % H_2SO_4	Freezing Point °F.
0	0	100.00	50.5
10	10	102.25	32.0
20	20	104.49	22.0
25	25	105.62	47.0
30	30	106.75	66.0
40	40	109.0	91.9
50	50	111.25	91.9
60	60	113.5	62.0
65	65	114.62	38.0
70	70	115.75	56.0
80	80	118.0	78.0

HYDROCHLORIC ACID*
(Muriatic Acid)

By W. C. Ferguson

Degrees Baumé	Specific 60°/60° F. Gravity	Per Cent HCl.	Degrees Baumé	Specific Gravity 60°/60° F.	Per Cent HCl.
1.00	1.0069	1.40	15.25	1.1176	23.33
2.00	1.0140	2.82	15.50	1.1197	23.75
3.00	1.0211	4.25	15.75	1.1219	24.16
4.00	1.0284	5.69	16.0	1.1240	24.57
5.00	1.0357	7.15	16.1	1.1248	24.73
5.25	1.0375	7.52	16.2	1.1256	24.90
5.50	1.0394	7.89	16.3	1.1265	25.06
5.75	1.0413	8.26	16.4	1.1274	25.23
6.00	1.0432	8.64	16.5	1.1283	25.39
6.25	1.0450	9.02	16.6	1.1292	25.56
6.50	1.0469	9.40	16.7	1.1301	25.72
6.75	1.0488	9.78	16.8	1.1310	25.89
7.00	1.0507	10.17	16.9	1.1319	26.06
7.25	1.0526	10.55	17.0	1.1328	26.22
7.50	1.0545	10.94	17.1	1.1336	26.39
7.75	1.0564	11.32	17.2	1.1345	26.56
8.00	1.0584	11.71	17.3	1.1354	26.73
8.25	1.0603	12.09	17.4	1.1363	26.90
8.50	1.0623	12.48	17.5	1.1372	27.07
8.75	1.0642	12.87	17.6	1.1381	27.24
9.00	1.0662	13.26	17.7	1.1390	27.41
9.25	1.0681	13.65	17.8	1.1399	27.58
9.50	1.0701	14.04	17.9	1.1408	27.75
9.75	1.0721	14.43	18.0	1.1417	27.92
10.00	1.0741	14.83	18.1	1.1426	28.09
10.25	1.0761	15.22	18.2	1.1435	28.26
10.50	1.0781	15.62	18.3	1.1444	28.44
10.75	1.0801	16.01	18.4	1.1453	28.61
11.00	1.0821	16.41	18.5	1.1462	28.78
11.25	1.0841	16.81	18.6	1.1471	28.95
11.50	1.0861	17.21	18.7	1.1480	29.13
11.75	1.0881	17.61	18.8	1.1489	29.30
12.00	1.0902	18.01	18.9	1.1498	29.48
12.25	1.0922	18.41	19.0	1.1508	29.65
12.50	1.0943	18.82	19.1	1.1517	29.83
12.75	1.0964	19.22	19.2	1.1526	30.00
13.00	1.0985	19.63	19.3	1.1535	30.18
13.25	1.1006	20.04	19.4	1.1544	30.35
13.50	1.1027	20.45	19.5	1.1554	30.53
13.75	1.1048	20.86	19.6	1.1563	30.71
14.00	1.1069	21.27	19.7	1.1572	30.90
14.25	1.1090	21.68	19.8	1.1581	31.08
14.50	1.1111	22.09	19.9	1.1590	31.27
14.75	1.1132	22.50	20.0	1.1600	31.45
15.00	1.1154	22.92	20.1	1.1609	31.64

(*Continued*)

Degrees Baumé	Specific 60°.60° F. Gravity	Per Cent HCl.	Degrees Baumé	Specific Gravity 60°.60° F.	Per Cent HCl.
20.2	1.1619	31.82	23.2	1.1904	37.58
20.3	1.1628	32.01	23.3	1.1914	37.80
20.4	1.1637	32.19	23.4	1.1924	38.03
20.5	1.1647	32.38	23.5	1.1934	38.26
20.6	1.1656	32.56	23.6	1.1944	38.49
20.7	1.1666	32.75	23.7	1.1953	38.72
20.8	1.1675	32.93	23.8	1.1963	38.95
20.9	1.1684	33.12	23.9	1.1973	39.18
21.0	1.1694	33.31	24.0	1.1983	39.41
21.1	1.1703	33.50	24.1	1.1993	39.64
21.2	1.1713	33.69	24.2	1.2003	39.86
21.3	1.1722	33.88	24.3	1.2013	40.09
21.4	1.1732	34.07	24.4	1.2023	40.32
21.5	1.1741	34.26	24.5	1.2033	40.55
21.6	1.1751	34.45	24.6	1.2043	40.78
21.7	1.1760	34.64	25.7	1.2053	41.01
21.8	1.1770	34.83	24.8	1.2063	41.24
21.9	1.1779	35.02	24.9	1.2073	41.48
22.0	1.1789	35.21	25.0	1.2083	41.72
22.1	1.1798	35.40	25.1	1.2093	41.99
22.2	1.1808	35.59	25.2	1.2103	42.30
22.3	1.1817	35.78	25.3	1.2114	42.64
22.4	1.1827	35.97	25.4	1.2124	43.01
22.5	1.1836	36.16	25.5	1.2134	43.40
22.6	1.1846	36.35			
22.7	1.1856	36.54			
22.8	1.1866	36.73			
22.9	1.1875	36.93			
23.0	1.1885	37.14			
23.1	1.1895	37.36			

*This table has been approved and adopted as a Standard by the Manufacturing Chemists' Association of the United States.

Specific Gravity determinations were made at 60°F., compared with water at 60°F.

From the Specific Gravities, the corresponding degrees Baumé were calculated by the following formula:

$$\text{Baumé} = 145 - \frac{145}{\text{Sp. G.}}$$

ALLOWANCE FOR TEMPERATURE

At 10° to 15° Bé. correction of 1/40° Bé. or .0002 Sp. G. for every 1°F.
At 15° to 22° Bé. correction of 1/30° Bé. or .0003 Sp. G. for every 1° F.
At 22° to 25° Bé. correction of 1/28° Bé. or .00035 Sp. G. for every 1°F.

NITRIC ACID*

By W. C. Ferguson

Degrees Baumé	Specific Gravity 60°/60° F.	Per Cent HNO_3	Degrees Baumé	Specific Gravity 60°/60° F.	Per Cent HNO_3
10.00	1.0741	12.86	21.25	1.1718	28.02
10.25	1.0761	13.18	21.50	1.1741	28.36
10.50	1.0781	13.49	21.75	1.1765	28.72
10.75	1.0801	13.81	22.00	1.1789	29.07
11.00	1.0821	14.13	22.25	1.1813	29.43
11.25	1.0841	14.44	22.50	1.1837	29.78
11.50	1.0861	14.76	22.75	1.1861	30.14
11.75	1.0881	15.07	23.00	1.1885	30.49
12.00	1.0902	15.41	23.25	1.1910	30.86
12.25	1.0922	15.72	23.50	1.1934	31.21
12.50	1.0943	16.05	23.75	1.1959	31.58
12.75	1.0964	16.39	24.00	1.1983	31.94
13.00	1.0985	16.72	24.25	1.2008	32.31
13.25	1.1006	17.05	24.50	1.2033	32.68
13.50	1.1027	17.38	24.75	1.2058	33.05
13.75	1.1048	17.71	25.00	1.2083	33.42
14.00	1.1069	18.04	25.25	1.2109	33.80
14.25	1.1090	18.37	25.50	1.2134	34.17
14.50	1.1111	18.70	25.75	1.2160	34.56
14.75	1.1132	19.02	26.00	1.2185	34.94
15.00	1.1154	19.36	26.25	1.2211	35.33
15.25	1.1176	19.70	26.50	1.2236	35.70
15.50	1.1197	20.02	26.75	1.2262	36.09
15.75	1.1219	20.36	27.00	1.2288	36.48
16.00	1.1240	20.69	27.25	1.2314	36.87
16.25	1.1262	21.03	27.50	1.2340	37.26
16.50	1.1284	21.36	27.75	1.2367	37.67
16.75	1.1306	21.70	28.00	1.2393	38.06
17.00	1.1328	22.04	28.25	1.2420	38.46
17.25	1.1350	22.38	28.50	1.2446	38.85
17.50	1.1373	22.74	28.75	1.2473	39.25
17.75	1.1395	23.08	29.00	1.2500	39.66
18.00	1.1417	23.42	29.25	1.2527	40.06
18.25	1.1410	23.77	29.50	1.2554	40.47
18.50	1.1462	24.11	29.75	1.2582	40.89
18.75	1.1485	24.47	30.00	1.2609	41.30
19.00	1.1508	24.82	30.25	1.2637	41.72
19.25	1.1531	25.18	30.50	1.2664	42.14
19.50	1.1554	25.53	30.75	1.2692	42.58
19.75	1.1577	25.88	31.00	1.2719	43.00
20.00	1.1600	26.24	31.25	1.2747	43.44
20.25	1.1624	26.61	31.50	1.2775	43.89
20.50	1.1647	26.96	31.75	1.2804	44.34
20.75	1.1671	27.33	32.00	1.2832	44.78
21.00	1.1694	27.67	32.25	1.2861	45.24

(*Continued*)

Degrees Baumé	Specific Gravity 60° 60° F.	Per Cent HNO_3	Degrees Baumé	Specific Gravity 60° 60° F.	Per Cent HNO_3
32.50	1.2889	45.68	41.25	1.3976	64.93
32.75	1.2918	46.14	41.50	1.4010	65.67
33.00	1.2946	46.58	41.75	1.4044	66.42
33.25	1.2975	47.04	42.00	1.4078	67.18
33.50	1.3004	47.49	42.25	1.4112	67.95
33.75	1.3034	47.95	42.50	1.4146	68.73
34.00	1.3063	48.42	42.75	1.4181	69.52
34.25	1.3093	48.90	43.00	1.4216	70.33
34.50	1.3122	49.35	43.25	1.4251	71.15
34.75	1.3152	49.83	43.50	1.4286	71.98
35.00	1.3182	50.32	43.75	1.4321	72.82
35.25	1.3212	50.81	44.00	1.4356	73.67
35.50	1.3242	51.30	44.25	1.4392	74.53
35.75	1.3273	51.80	44.50	1.4428	75.40
36.00	1.3303	52.30	44.75	1.4464	76.28
36.25	1.3334	52.81	45.00	1.4500	77.17
36.50	1.3364	53.32	45.25	1.4536	78.07
36.75	1.3395	53.84	45.50	1.4573	79.03
37.00	1.3426	54.36	45.75	1.4610	80.04
37.25	1.3457	54.89	46.00	1.4646	81.08
37.50	1.3488	55.43	46.25	1.4684	82.18
37.75	1.3520	55.97	46.50	1.4721	83.33
38.00	1.3551	56.52	46.75	1.4758	84.48
38.25	1.3583	57.08	47.00	1.4796	85.70
38.50	1.3615	57.65	47.25	1.4834	86.98
38.75	1.3647	58.23	47.50	1.4872	88.32
39.00	1.3679	58.82	47.75	1.4910	89.76
39.25	1.3712	59.43	48.00	1.4948	91.35
39.50	1.3744	60.06	48.25	1.4987	93.13
39.75	1.3777	60.71	48.50	1.5026	95.11
40.00	1.3810	61.38			
40.25	1.3843	62.07			
40.50	1.3876	62.77			
40.75	1.3909	63.48			
41.00	1.3942	64.20			

*This table has been approved and adopted as a Standard by the Manufacturing Chemists' Association of the United States.

Specific Gravity determinations were made at 60° F. compared with water at 60°F.

From the Specific Gravities, the corresponding degrees Baumé were calculated by the following formula:—

$$\text{Baumé} = 145 - \frac{145}{\text{Sp. G.}}$$

(Continued)

ALLOWANCE FOR TEMPERATURE

At from 10° to 20° Bé. correction of 1/30° Bé. or .00029 Sp. G. for every 1°F.
At from 20° to 30° Bé. correction of 1/23° Bé. or .00044 Sp. G. for every 1°F.
At from 30° to 40° Bé. correction of 1/20° Bé. or .00060 Sp. G. for every 1°F.
At from 40° to 48.5° Bé. correction of 1/17° Bé. or .00084 Sp. G. for every 1°F.

ACETIC ACID
60°/60° F.

Oudemanns

Specific Gravity	Per Cent $C_2H_4O_2$	Specific Gravity	Per Cent $C_2H_4O_2$	Specific Gravity	Per Cent $C_2H_4O_2$
1.0000	0	1.0469	34	1.0735	68
1.0016	1	1.0480	35	1.0739	69
1.0032	2	1.0491	36	1.0743	70
1.0047	3	1.0502	37	1.0747	71
1.0062	4	1.0512	38	1.0750	72
1.0077	5	1.0523	39	1.0752	73
1.0093	6	1.0533	40	1.0754	74
1.0108	7	1.0543	41	1.0756	75
1.0123	8	1.0553	42	1.0757	76
1.0137	9	1.0562	43	1.0758	77
1.0152	10	1.0572	44	1.0758	78
1.0167	11	1.0581	45	1.0758	79
1.0181	12	1.0590	46	1.0758	80
1.0195	13	1.0599	47	1.0757	81
1.0210	14	1.0607	48	1.0756	82
1.0224	15	1.0617	49	1.0754	83
1.0238	16	1.0625	50	1.0752	84
1.0252	17	1.0633	51	1.0749	85
1.0266	18	1.0641	52	1.0746	86
1.0280	19	1.0648	53	1.0741	87
1.0294	20	1.0656	54	1.736	88
1.0308	21	1.0663	55	1.0730	89
1.0321	22	1.0670	56	1.0723	90
1.0334	23	1.0676	57	1.0715	91
1.0347	24	1.0683	58	1.0706	92
1.0360	25	1.0689	59	1.0696	93
1.0373	26	1.0695	60	1.0684	94
1.0385	27	1.0701	61	1.0670	95
1.0398	28	1.0707	62	1.0654	96
1.0410	29	1.0712	63	1.0635	97
1.0422	30	1.0717	64	1.0614	98
1.0434	31	1.0722	65	1.0590	99
1.0446	32	1.0727	66	1.0563	100
1.0457	33	1.0731	67		

AQUA AMMONIA*

By W. C. Ferguson

Degrees Baumé	Specific Gravity 60°/60°F.	Per Cent NH_3	Degrees Baumé	Specific Gravity 60°/60°F.	Per Cent NH_3
10.00	1.0000	.00	20.00	.9333	17.76
10.25	.9982	.40	20.25	.9318	18.24
10.50	.9964	.80	20.50	.9302	18.72
10.75	.9947	1.21	20.75	.9287	19.20
11.00	.9929	1.62	21.00	.9272	19.68
11.25	.9912	2.04	21.25	.9256	20.16
11.50	.9894	2.46	21.50	.9241	20.64
11.75	.9876	2.88	21.75	.9226	21.12
12.00	.9859	3.30	22.00	.9211	21.60
12.25	.9842	3.73	22.25	.9195	22.08
12.50	.9825	4.16	22.50	.9180	22.56
12.75	.9807	4.58	22.75	.9165	23.04
13.00	.9790	5.02	23.00	.9150	23.52
13.25	.9773	5.45	23.25	.9135	24.01
13.50	.9756	5.88	23.50	.9121	24.50
13.75	.9739	6.31	23.75	.9106	24.99
14.00	.9722	6.74	24.00	.9091	25.48
14.25	.9705	7.17	24.25	.9076	25.97
14.50	.9689	7.61	24.50	.9061	26.46
14.75	.9672	8.05	24.75	.9047	26.95
15.00	.9655	8.49	25.00	.9032	27.44
15.25	.9639	8.93	25.25	.9018	27.93
15.50	.9622	9.38	25.50	.9003	28.42
15.75	.9605	9.83	25.75	.8989	28.91
16.00	.9589	10.28	26.00	.8974	29.40
16.25	.9573	10.73	26.25	.8960	29.89
16.50	.9556	11.18	26.50	.8946	30.38
16.75	.9540	11.64	26.75	.8931	30.87
17.00	.9524	12.10	27.00	.8917	31.36
17.25	.9508	12.56			
17.50	.9492	13.02	27.25	.8903	31.85
17.75	.9475	13.49	27.50	.8889	32.34
18.00	.9459	13.96	27.75	.8875	32.83
18.25	.9444	14.43	28.00	.8861	33.32
18.50	.9428	14.90	28.25	.8847	33.81
18.75	.9412	15.37	28.50	.8833	34.30
19.00	.9396	15.84	28.75	.8819	34.79
19.25	.9380	16.32	29.00	.8805	35.28
19.50	.9365	16.80			
19.75	.9349	17.28			

*This table has been approved and adopted as a Standard by the Manufacturing Chemists' Association of the United States.

Specific Gravity determinations were made at 60°F. compared with water at 60°F.

(*Continued*)

$$\text{Baumé} = \frac{140}{\text{Sp. G.}} - 130.$$

ALLOWANCE FOR TEMPERATURE

The coefficient of expansion for ammonia solutions varying with the temperature, correction must be applied according to the following table: —

Degrees Baumé	Corrections to be Added for Each Degree Below 60°F.	Corrections to be Subtracted for Each Degree Above 60°F.				
	40°F.	50°F.	70°F.	80°F.	90°F.	100°F.
14°Bé.	.015°Bé.	.017°Bé.	.020°Bé.	.022°Bé.	.024°Bé.	.026°Bé.
16° "	.021° "	.023° "	.026° "	.028° "	.030° "	.032° "
18° "	.027° "	.029° "	.041° "	.033° "	.035° "	.037° "
20° "	.033° "	.036° "	.037° "	.038° "	.040° "	.042° "
22° "	.039° "	.042° "	.043° "	.045° "	.047° "	
26° "	.053° "	.057° "	.057° "	.059° "		

Central Research Department Laboratories, Dayton, Ohio

ANHYDROUS AMMONIA

Temp. Deg. F.	Pressure Lbs. per Sq. In. Abs.	Specific Volume of Liquid Cu. Ft. per Lb.	Specific Volume of Sat. Vapor, Cu. Ft. per Lb.	Heat of Vaporization, B.T.U.
—40	10.12	0.0234	25.45	601.9
—35	11.74	0.0235	22.14	598.3
—30	13.56	0.0236	19.35	594.7
—25	15.61	0.0238	16.95	591.1
—20	17.91	0.0239	14.89	587.4
—15	20.46	0.0240	13.15	583.6
—10	23.30	0.0241	11.63	579.9
— 5	26.46	0.0242	10.32	576.1
0	29.95	0.0244	9.19	572.2
5	33.79	0.0245	8.20	568.3
10	38.02	0.0246	7.34	564.4
15	42.67	0.0248	6.583	560.4
20	47.75	0.0249	5.920	556.3
25	53.50	0.0250	5.336	552.2
30	59.39	0.0252	4.820	548.1
35	65.91	0.0253	4.364	543.9
40	73.03	0.0255	3.959	539.7
45	80.75	0.0256	3.599	535.3
50	89.09	0.0258	3.278	531.0
55	98.03	0.0259	2.992	526.5
60	107.7	0.0261	2.734	522.0
65	118.1	0.0263	2.503	517.5
70	129.2	0.0264	2.296	512.8
75	141.1	0.0266	2.109	508.1
80	153.9	0.0268	1.940	503.4
85	167.4	0.0270	1.788	498.5
90	181.8	0.0271	1.650	493.5
95	197.3	0.0273	1.524	488.5
100	213.8	0.0275	1.408	483.4
105	231.2	0.0277	1.305	478.2
110	249.6	0.0280	1.210	472.9
115	269.2	0.0282	1.122	467.4
120	289.9	0.0284	1.042	461.9
125	311.6	0.0286	0.970	456.3

Sp. G. Liquid 0.6364 at 32°F.

ALUMINUM CHLORIDE

60° 60° F.

Bischoff

Degrees Baumé	Specific Gravity	Per Cent Al_2Cl_6	Lbs. per Gal. $Al_2Cl_6+12H_2O$	Degrees Baumé	Specific Gravity	Per Cent Al_2Cl_6	Lbs. per Gal. $Al_2Cl_6+12H_2O$*
.00	1.0000	.00	.00	17.50	1.1373	14.73	2.53
.50	1.0035	.35	.038	18.00	1.1417	15.16	2.60
1.00	1.0069	.75	.113	18.50	1.1462	15.60	2.69
1.50	1.0105	1.17	.178	19.00	1.1508	16.05	2.78
2.00	1.0140	1.58	.242	19.50	1.1554	16.53	2.88
2.50	1.0175	2.00	.307	20.00	1.1600	16.94	2.96
3.00	1.0211	2.40	.370	20.50	1.1647	17.43	3.06
3.50	1.0247	2.78	.430	21.00	1.1694	17.88	3.15
4.00	1.0284	3.16	.490	21.50	1.1741	18.33	3.25
4.50	1.0320	3.58	.557	22.00	1.1789	18.78	3.34
5.00	1.0357	4.00	.625	22.50	1.1837	19.22	3.43
5.50	1.0394	4.38	.686	23.00	1.1885	19.68	3.53
6.00	1.0432	4.81	.756	23.50	1.1934	20.13	3.62
6.50	1.0469	5.20	.820	24.00	1.1983	20.57	3.72
7.00	1.0507	5.63	.890	24.50	1.2033	21.03	3.81
7.50	1.0545	6.05	.962	25.00	1.2083	21.50	3.90
8.00	1.0584	6.50	1.04	25.50	1.2134	21.98	4.02
8.50	1.0623	6.92	1.11	26.00	1.2185	22.38	4.12
9.00	1.0662	7.32	1.18	26.50	1.2236	22.82	4.21
9.50	1.0701	7.75	1.25	27.00	1.2288	23.20	4.30
10.00	1.0741	8.13	1.32	27.50	1.2340	23.70	4.41
10.50	1.0781	8.57	1.39	28.00	1.2393	24.13	4.50
11.00	1.0821	9.00	1.47	28.50	1.2446	24.58	4.61
11.50	1.0861	9.46	1.55	29.00	1.2500	25.02	4.72
12.00	1.0902	9.90	1.63	29.50	1.2554	25.53	4.83
12.50	1.0943	10.28	1.70	30.00	1.2609	25.99	4.94
13.00	1.0985	10.70	1.77	30.50	1.2664	26.45	5.04
13.50	1.1027	11.15	1.85	31.00	1.2719	26.92	5.16
14.00	1.1069	11.60	1.93	31.50	1.2775	27.38	5.27
14.50	1.1111	12.05	2.02	32.00	1.2832	27.88	5.40
15.00	1.1154	12.50	2.10	32.50	1.2889	28.33	5.50
15.50	1.1197	12.95	2.19	33.00	1.2946	28.78	5.62
16.00	1.1240	13.37	2.27	33.50	1.3004	29.24	5.73
16.50	1.1284	13.83	2.35	34.00	1.3063	29.68	5.85
17.00	1.1328	14.30	2.44	34.50	1.3100	30.00	5.92

*$Al_2Cl_6+12H_2O$, Chloride of Alumina Crystal. For Chloride of Alumina 32°Bé. twice the above pounds per gallon of solution.

ALUMINUM SULFATE

60° 60° F.

Beveridge

Degrees Baumé	Specific Gravity	Per Cent Sulfate Alumina ($17\% Al_2O_3$)	Lbs. per Gal. Sulfate Alumina ($17\% Al_2O_3$)	Per Cent Basic Sulfate Alumina ($17.4\% Al_2O_3$)	Lbs. per Gal. Basic Sulfate Alumina ($17.4\% Al_2O_3$)
.00	1.000	.00	.00	.00	.00
.50	1.0035	.53	.044	0.6	.050
1.00	1.0069	1.07	.090	1.1	.092
1.50	1.0105	1.64	.138	1.7	1.50
2.0	1.0140	2.16	.181	2.3	1.95
2.5	1.0175	2.70	.228	2.9	.246
3.0	1.0211	3.28	.279	3.5	.298
3.5	1.0247	3.79	.323	4.1	.350
4.0	1.0284	4.40	.376	4.7	.403
4.5	1.0320	4.97	.427	5.3	.456
5.0	1.0357	5.52	.476	6.0	.518
5.5	1.0394	6.10	.528	6.7	.581
6.0	1.0432	6.73	.585	7.3	.635
6.5	1.0469	7.33	.638	7.9	.690
7.0	1.0507	7.98	.700	8.5	.745
7.5	1.0545	8.56	.751	9.2	.809
8.0	1.0584	9.18	.808	9.8	.865
8.5	1.0623	9.82	.860	10.5	.931
9.0	1.0662	10.43	.925	11.1	.988
9.5	1.0701	11.05	.980	11.8	1.05
10.0	1.0741	11.65	1.04	12.4	1.11
10.5	1.0781	12.26	1.10	13.1	1.18
11.0	1.0821	12.90	1.16	13.8	1.25
11.5	1.0861	13.53	1.22	14.4	1.30
12.0	1.0902	14.13	1.28	15.1	1.37
12.5	1.0943	14.71	1.34	15.7	1.43
13.0	1.0985	15.32	1.40	16.4	1.50
13.5	1.1027	15.98	1.47	17.1	1.57
14.0	1.1069	16.60	1.53	17.7	1.63
14.5	1.1111	17.25	1.59	18.4	1.70
15.0	1.1154	17.90	1.66	19.1	1.77
15.5	1.1197	18.48	1.72	19.9	1.86
16.0	1.1240	19.13	1.79	20.4	1.91
16.5	1.1284	19.80	1.86	21.1	1.99
17.0	1.1328	20.40	1.92	21.8	2.06
17.5	1.1373	21.06	1.99	22.4	2.12
18.0	1.1417	21.73	2.06	23.1	2.20
18.5	1.1462	22.43	2.14	23.7	2.26
19.0	1.1508	23.10	2.21	24.4	2.34
19.5	1.1554	23.78	2.28	25.1	2.42

(*Continued*)

ALUMINUM SULFATE—Continued

Degrees Baumé	Specific Gravity	Per Cent Sulfate Alumina (17% Al_2O_3)	Lbs. per Gal. Sulfate Alumina (17% Al_2O_3)	Per Cent Basic Sulfate Alumina (17.1% Al_2O_3)	Lbs. per Gal. Basic Sulfate Alumina (17.1% Al_2O_3)
20.0	1.1600	24.38	2.35	25.7	2.49
20.5	1.1647	24.99	2.42	26.4	2.56
21.0	1.1694	25.60	2.49	27.1	2.64
21.5	1.1741	26.22	2.56	27.7	2.71
22.0	1.1789	26.87	2.64	28.4	2.79
22.5	1.1837	27.50	2.71	29.1	2.87
23.0	1.1885	28.16	2.78	29.8	2.95
23.5	1.1934	28.85	2.86	30.3	3.02
24.0	1.1983	29.50	2.94	31.1	3.11
24.5	1.2033	30.18	3.02	31.7	3.18
25.0	1.2083	30.85	3.10	32.4	3.27
25.5	1.2134	31.54	3.18	33.1	3.35
26.0	1.2185	32.24	3.27	33.8	3.44
26.5	1.2236	32.95	3.35	34.5	3.52
27.0	1.2288	33.63	3.44	35.2	3.61
27.5	1.2340	34.35	3.52	35.9	3.70
28.0	1.2393	35.03	3.61	36.7	3.79
28.5	1.2446	35.75	3.70	37.3	3.87
29.0	1.2500	36.46	3.79	38.1	3.97
29.5	1.2554	37.20	3.88	38.8	4.06
30.0	1.2609	37.90	3.98	39.7	4.18
30.5	1.2664	38.58	4.06	40.3	4.26
31.0	1.2719	39.30	4.16	41.0	4.35
31.5	1.2775	40.02	4.25	41.8	4.46
32.0	1.2832	40.73	4.35	42.5	4.55
32.5	1.2889	41.49	4.45	43.3	4.66
33.0	1.2946	42.20	4.54	44.1	4.76
33.5	1.3004	42.96	4.64	44.9	4.87
34.0	1.3063	43.71	4.75	45.7	4.98
34.5	1.3122	44.48	4.86	46.5	5.09
35.0	1.3182	45.20	4.95	47.4	5.21
35.5	1.3242	46.00	5.07	48.3	5.34
36.0	1.3303	46.80	5.18	49.2	5.46
36.5	1.3364	47.58	5.29	50.1	5.59

FREEZING POINTS OF 0.6% BASIC ALUM SOLUTIONS

Baumé at 60°F.	Freezing Points, degrees F.
5	31
10	30
15	29
20	27
25	24
30	21
35	38

SODIUM BISULFITE
60° 60° F.

H. B. Bischoff

Degrees Baumé	Specific Gravity	Per Cent $NaHSO_3$	Per Cent SO_2 Available	Degrees Baumé	Specific Gravity	Per Cent $NaHSO_3$	Per Cent SO_2 Available
.00	1.0000	.00	.00	20.00	1.1600	21.32	13.13
.50	1.0034	.51	.31	20.50	1.1647	21.88	13.46
1.00	1.0069	1.02	.63	21.00	1.1694	22.44	13.81
1.50	1.0104	1.53	.94	21.50	1.1741	23.00	14.15
2.00	1.0140	2.04	1.26	22.00	1.1789	23.57	14.50
2.50	1.0175	2.55	1.57	22.50	1.1837	24.14	14.85
3.00	1.0211	3.06	1.88	23.00	1.1885	24.71	15.20
3.50	1.0247	3.57	2.20	23.50	1.1934	25.28	15.55
4.00	1.0284	4.08	2.51	24.00	1.1983	25.85	15.91
4.50	1.0320	4.59	2.83	24.50	1.2033	26.42	16.23
5.00	1.0357	5.11	3.15	25.00	1.2083	26.99	16.60
5.50	1.0394	5.63	3.47	25.50	1.2134	27.56	16.96
6.00	1.0432	6.15	3.79	26.00	1.2185	28.13	17.32
6.50	1.0469	6.67	4.11	26.50	1.2236	28.70	17.66
7.00	1.0507	7.19	4.43	27.00	1.2288	29.27	18.01
7.50	1.0545	7.71	4.75	27.50	1.2340	29.85	18.37
8.00	1.0584	8.24	5.07	28.00	1.2393	30.43	18.73
8.50	1.0623	8.77	5.40	28.50	1.2446	31.00	19.08
9.00	1.0662	9.30	5.72	29.00	1.2500	31.57	19.33
9.50	1.0701	9.83	6.05	29.50	1.2554	32.14	19.78
10.00	1.0741	10.36	6.38	30.00	1.2609	32.71	20.13
10.50	1.0781	10.89	6.70	30.50	1.2664	33.28	20.48
11.00	1.0821	11.42	7.03	31.00	1.2719	33.86	20.83
11.50	1.0861	11.95	7.36	31.50	1.2775	34.43	21.19
12.00	1.0902	12.48	7.68	32.00	1.2832	35.01	21.55
12.50	1.0943	13.02	8.02	32.50	1.2889	35.62	21.92
13.00	1.0985	13.56	8.35	33.00	1.2946	36.25	22.30
13.50	1.1027	1.410	8.68	33.50	1.3004	36.88	22.70
14.00	1.1069	14.65	9.02	34.00	1.3063	37.51	23.08
14.50	1.1111	15.20	9.36	34.50	1.3122	38.14	23.47
15.00	1.1154	15.75	9.70	35.00	1.3182	38.78	23.87
15.50	1.1197	16.30	10.03	35.50	1.3242	39.42	24.27
16.00	1.1240	16.85	10.37	36.00	1.3303	40.06	24.65
16.50	1.1284	17.40	10.71	36.50	1.3364	40.69	25.03
17.00	1.1328	17.96	11.05	37.00	1.3426	41.30	25.41
17.50	1.1372	18.52	11.39	37.50	1.3488	41.91	25.79
18.00	1.1417	19.08	11.74	38.00	1.3551	42.52	26.17
18.50	1.1462	19.64	12.08	38.50	1.3615	43.12	26.54
19.00	1.1508	20.20	12.43	39.00	1.3680	43.72	26.91
19.50	1.1554	20.76	12.77	39.25	1.3712	44.02	27.10

MERCLOR

Bé.°	Tw.°	Per Cent Available Cl by Volume	Bé.°	Tw.°	Per Cent Available Cl by Volume
.25	.34	.11	9.00	13.24	4.30
.50	.70	.21	9.25	13.62	4.43
.75	1.04	.32	9.50	14.02	4.57
1.00	1.38	.43	9.75	14.42	4.71
1.25	1.74	.54	10.00	14.82	4.84
1.50	2.10	.65	10.50	15.62	5.09
1.75	2.44	.76	11.00	16.42	5.38
2.00	2.80	.87	11.50	17.22	5.65
2.25	3.14	.98	12.00	18.04	5.94
2.50	3.50	1.10	12.50	18.86	6.24
2.75	3.86	1.21	13.00	19.70	6.52
3.00	4.22	1.32	13.50	20.54	6.83
3.25	4.58	1.43	14.00	21.38	7.12
3.50	4.94	1.55	14.50	22.22	7.41
3.75	5.30	1.66	15.00	23.08	7.71
4.00	5.68	1.78	15.50	23.94	8.01
4.25	6.04	1.90	16.00	24.80	8.31
4.50	6.40	2.01	16.50	25.66	8.60
4.75	6.76	2.13	17.00	26.56	8.92
5.00	7.14	2.26	17.50	27.44	9.23
5.25	7.50	2.38	18.00	28.34	9.54
5.50	7.88	2.51	18.50	29.24	9.87
5.75	8.26	2.63	19.00	30.16	10.19
6.00	8.64	2.75	19.50	31.08	10.51
6.25	9.00	2.88	20.00	32.00	10.84
6.50	9.38	3.01	20.50	32.94	11.18
6.75	9.76	3.13	21.00	33.88	11.52
7.00	10.14	3.26	21.50	34.82	11.89
7.25	10.52	3.39	22.00	35.78	12.23
7.50	10.90	3.52	22.50	36.72	12.60
7.75	11.30	3.64	23.00	37.70	12.95
8.00	11.68	3.77	23.50	38.68	13.33
8.25	12.06	3.90	24.00	39.66	13.71
8.50	12.46	4.05	24.50	40.66	14.11
8.75	12.84	4.18	25.00	41.66	14.50

WEIGHTS PER GALLON AT 60° F.

	Pounds
Acetic Acid 28%	8.66
Acetic Acid 56%	8.90
Acetic Acid Glacial	8.81
Aluminum Chloride 32° Bé	10.70
Amyl Acetate	7.2
Aqua Ammonia 18° Bé	7.89
Aqua Ammonia 20° Bé	7.78
Aqua Ammonia 26° Bé	7.48
Battery Acid 1.400	11.67
Butyl Acetate	7.3
Diacetone Alcohol	7.6
Ethyl Acetate	7.4
Iron, True Nitrate 47° Bé.	12.30
Iron, Copperas Nitrate 47° Bé.	12.30
Iron, Perchloride 40° Bé	11.51
Merclor	9.7
Muriatic Acid 18° Bé.	9.52
Muriatic Acid 20° Be.	9.67
Muriatic Acid 22° Bé.	9.83
Nitric Acid 36° Bé.	11.09
Nitric Acid 38° Bé.	11.30
Nitric Acid 40° Bé.	11.51
Nitric Acid 42° Bé.	11.74
Oleum 25% (at 15° C.)	16.12
Oleum 60% (at 15° C.)	16.84
Phosphoric Acid 75%	13.2
Sodium Bisulfite 33° Bé.	10.78
Sulfuric Acid 66° Bé	15.30
Sulfuric Acid 98%	15.36
Sulfuric Acid 100% (Monohydrate)	15.11
Zinc, Cholride 52° Bé.	13.00
Zinc, Cholride 72° Bé.	16.56

Weight per gallon = Sp. Gr. x 8.337
1 Cubic Foot = 7.480 gallons
1 Gallon = 3.785 liters

INTERCONVERSION TABLES FOR

TO CONVERT FROM	MULTIPLY BY To Cu. In.	To Cu. Ft.	To Cu. Yd.	To Fl. Oz.	To Pint	To Quart	To Gallon
Cu. In.	1.00000	$.0_{3}5787$	$.0_{4}2143$	.554112	.034632	.017316	.004329
Cu. Ft.	1728.00	1.00000	.037037	957.505	59.8442	29.9221	7.48052
Cu. Yd.	46656.0	27.0000	1.00000	25852.6	1615.79	807.896	201.974
Fl. Oz.	1.80469	.001044	$.0_{4}3868$	1.00000	.062500	.031250	.007813
Pint	28.8750	.016710	$.0_{3}6189$	16.0000	1.00000	.500000	.125000
Quart	57.7500	.033420	.001238	32.0000	2.00000	1.00000	.250000
Gallon	231.000	.133681	.004951	128.000	8.00000	4.00000	1.00000
Grain	.003954	$.0_{3}2288$	$.0_{7}84^{7}5$	.002191	$.0_{4}1369$	$.0_{4}6850$	$.0_{4}1712$
Oz. Troy	1.89805	.001098	$.0_{4}4068$	1.05173	.065733	.032867	.008217
Lb. Troy	22.7766	.013181	$.0_{3}4882$	12.6208	.788800	.394400	.098600
Oz. Av.	1.72999	.001001	$.0_{4}3708$	.958608	.059913	.029957	.007489
Lb. Av.	27.6799	.016018	$.0_{3}5933$	15.3378	.958611	.479306	.119826
CC or Gram	.061024	$.0_{4}3531$	$.0_{5}1308$	.033814	.002113	.001057	$.0_{3}2642$
Liter or Kg.	61.0237	.035315	.001308	33.8140	2.11337	1.05669	.264172
Cu. M.	61023.7	35.3146	1.30795	33814.0	2113.37	1056.69	264.172

NOTE:—The small subnumeral following a zero indicates that the zero is to be taken that number of times, thus $.0_{3}1428$ is equivalent to .0001428.

Values used in constructing table:

1 inch = 2.540001 cm.

1 cu. in. = 16.387083 cc. = 16.387083 g. H_2O at 4°C.(39°F.)

1 lb. av. = 453.5926 g.

UNITS OF VOLUME AND WEIGHT

MULTIPLY BY

To Grain	To Oz. Troy	To Lb. Troy	To Oz. Av.	To Lb. Av.	To CC. or G.	To Liter Or Kg.	To Cu. M.
252.891	.526857	.043905	.578037	.036127	16.3871	.016387	$.0_4$1639
436996	910.408	75.8674	998.848	62.4280	28316.9	28.3169	.028317
117990_3	24581.0	2048.42	26968.9	1685.56	764556	764.556	.764556
456.390	.950813	.079234	1.04318	.065199	29.5736	.029573	$.0_2$2957
7302.23	15.2130	1.26775	16.6908	1.04318	473.177	.473177	$.0_4$4732
1460.45	30.4260	2.53550	33.3816	2.08635	946.354	.946354	$.0_3$9463
58417.9	121.704	10.1420	133.527	8.34541	3785.42	3.78542	.003785
1.00000	.002083	$.0_3$1736	.002286	$.0_3$1428	.064799	$.0_4$6479	$.0_6$6479
480.000	1.00000	.083333	1.09714	.068571	31.1035	.031104	$.0_3$3110
5760.00	12.0000	1.00000	13.1657	.822857	373.242	.373242	$.0_3$3732
437.500	.911457	.075955	1.00000	.062500	28.3495	.028350	$.0_2$2835
7000.00	14.5833	1.21528	16.0000	1.00000	453.593	.453593	$.0_3$4536
15.4523	.032151	.002679	.035274	.002205	1.00000	.001000	.000001
15432.3	32.1507	2.67923	35.2739	2.20462	1000.00	1.00000	.001000
154320_3	32150.7	2679.23	35273.9	2204.62	1000000	1000.00	1.00000

1 lb. av. = 27.679886 cu. in H_2O at 4°C. (39°F.).

1 lb. av. = 7000 grains

1 gal. = 8.34541 lb.

1 gallon = 58417.87 grains.

231 cu. in. = 1 gal. = 3785.4162 g.

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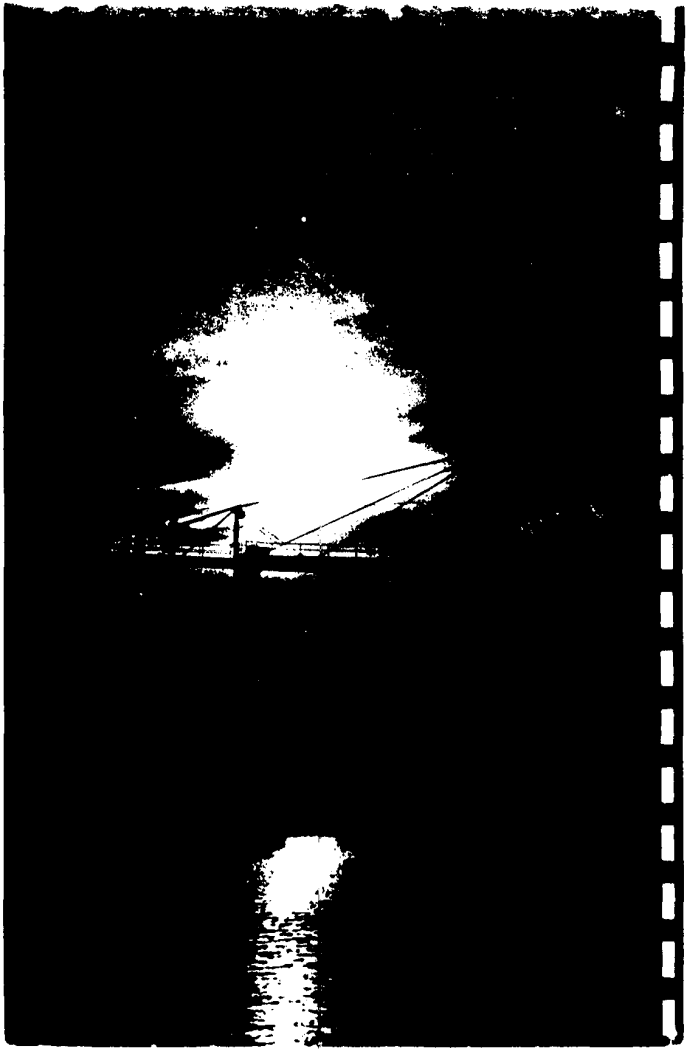

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Monsanto Chemical Company was one of the first to be awarded the Navy "E" and Bureau of Ordnance flag and the All-Navy "E" burgee "in recognition of production of ordnance materiel vital to our national defense." It was also one of the first to be awarded the joint Army-Navy "E" burgee "representing recognition by both the Army and Navy of especially meritorious production of war materials."

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