

*The Condensed  
Chemical  
Dictionary*

# The Condensed CHEMICAL DICTIONARY

A reference volume for all requiring quick access to a large amount of essential data regarding chemicals, and other substances used in manufacturing and laboratory work

Compiled and Edited by  
The Editorial Staff  
of the  
Chemical Engineering Catalog

FRANCIS M. TURNER, JR., Technical Editor

Assistant Editors

DANIEL D. BEROLZHEIMER

WILLIAM P. CUTTER

JOHN HELFRICH

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## Preface

The increased importance of the chemical industries has brought into contact with these industries a large number of people not educated along chemical lines. Exporters and importers, brokers and jobbers, financial houses, lawyers, librarians, purchasing agents, insurance companies and many other classes of firms and individuals have frequent need for detailed information regarding chemicals and chemical products.

The large and constantly increasing volume of such inquiries received by the Information Bureau of The Chemical Catalog Company, Inc., as well as by the public and technical libraries, has made obvious the demand existing for some one book that would supply the outstanding facts regarding the various chemicals and chemical materials ordinarily met with in commerce.

Professional chemists and chemical engineers may find it hard to appreciate that there are large numbers of people in various branches of trade who have to use or buy or sell chemical products (or who have professional or financial relations with firms doing so), who have not the least idea how to secure information on the most elemental points.

The fact that the Information Bureau of The Chemical Catalog Company, Inc., is called on almost daily to answer such questions as "Is acetone a solid or a liquid?", "Is sulfuric acid explosive?", "What is alum used for?", "What is the boiling point of toluol?", "Where does perilla oil come from?", etc., shows that the sources of such information are none too available to non-professionals.

Moreover, after asking a number of such questions, the inquirers would frequently ask, "Is there no book where we can look up things like this for ourselves? We often need information like this in our business."

A thorough search of chemical literature revealed no publication that would meet exactly the requirements of these people. Undoubtedly a collection of literature could be made that would give all the facts commonly needed, but few business men would be likely to go to the expense of accumulating such a library. The excellent facilities of the public technical libraries avail little, as business men have not the time to visit them, and moreover, good technical libraries are not convenient to all trade and manufacturing centers. Finally, the books in which the information could be obtained would contain so much more commer-

cially irrelevant material that men unaccustomed to the use of large scientific reference works would soon be in difficulties.

One of the most frequent classes of inquiries concerned the uses of things. Importers and brokers would frequently find chemicals, oils, ores, etc., on their hands, the market for which was unfamiliar. In order to find whom to approach, it was necessary first to know the uses of the substances. In the Condensed Chemical Dictionary an attempt has been made to collect a mass of information on this subject scattered through hundreds of textbooks, periodicals, government bulletins, etc., as well as to set down a great deal that is not known to be anywhere in print.

The only solution of the above problem seemed to be the compilation of a new reference book that would meet the requirements we have attempted to outline in the previous paragraphs. Consequently, early in 1918 the work of compilation was begun by the Editorial Staff of The Chemical Catalog Company, Inc.

No attempt has been made to produce an exhaustive work. In addition to properties and uses it was thought advisable to insert brief notes as to how things are manufactured, when they are not natural products. These notes have been restricted to giving a very general idea of the process and are not intended to instruct anyone in the manufacture of the substances in question.

The properties described have been restricted to those likely to be of commercial importance, and many substances scientifically interesting have, in the interest of brevity, been omitted entirely when of no commercial importance.

While the great value of this Dictionary to the non-technical user is very apparent, it must not be lost sight of that to the chemist, even one having access to a good library, the book is invaluable as a time-saver.

Frequently a moment's reference to the Dictionary will answer a question, whereas much more time would be consumed in getting the same information from other sources. It is believed by the editors and publishers that the Dictionary will soon make a place for itself close to the hand of any chemist.

Every precaution has been taken to make the book accurate and complete within the limits set for it. In all probability some errors and omissions will be noted and the editors will be very grateful for having their attention drawn to such matters so that corrections can be made in future editions.

On a subsequent page, acknowledgment is made of the generous assistance numerous chemists, chemical engineers and others have given in connection with the compilation of the book.

THE EDITORS.

New York, September 1st, 1919.

## Acknowledgments

The Editors wish to express their appreciation of the assistance of Dr. John C. Olsen, Polytechnic Institute, Brooklyn, N. Y., who read the proofs of the entire manuscript, offering many valuable suggestions; also, to Dr. B. T. Brooks, Consulting Chemist, New York; Bureau of Explosives, American Railway Association, New York; Mr. C. C. Dominge, Great American Insurance Company, New York; Dr. Chas. H. Herty, Editor of The Journal of Industrial and Engineering Chemistry, New York; Dr. B. C. Hesse, of the General Chemical Company, New York; Dr. J. Merritt Matthews, Consulting Chemist, New York; Mr. H. A. Plusch, Research Engineer, Abrasive Company, Philadelphia; Dr. Allen Rogers, Pratt Institute, Brooklyn, N. Y.; Mr. Donald R. Staddon, Consulting Chemist, New York; Dr. John E. Teeple, Consulting Chemical Engineer, New York; Mr. H. P. Trevithick, Chemist, New York Produce Exchange, New York, and numerous other persons throughout the chemical profession and industry whose cooperation has contributed in no small degree to the work in hand.

## References Consulted

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## Explanation of the Arrangement, Terms and Symbols used in this Volume

The Dictionary is arranged in a straight alphabetical classification. Thus, "Methyl Alcohol" is under "M", not "Alcohol, Methyl." The only deviation from this rule is in the case of acids, all of which are grouped together under "A" with cross-references under the name proper, thus: "Sulfuric Acid. See Acid sulfuric."

**Cross-Indexing:**—The Dictionary has been carefully cross-indexed as a further assistance toward ready location of items sought.

**Organic Nomenclature:**—Organic derivatives in the names of which the prefixed "meta-", "ortho-" "para-", "alpha-" and "beta-" occur are listed under the main name. For instance, look for "Naphthol, Beta-" under "N", not "Beta-naphthol" under "B".

**Spelling:**—Spelling follows the rules of the American Chemical Society, as used in Chemical Abstracts, and where some other spelling is commercially in use and differs materially from the A. C. S. standard, a cross-indexing will be found.

**Temperatures:**—Temperatures are given in degrees Centigrade. A conversion table will be found on page 514 for those who desire Fahrenheit temperatures.

**Densities:**—Tables giving the relations for Baumé degrees and Specific Gravities (Densities) for liquids both heavier and lighter than water will be found on pages 523 and 524.

**Formula (Molecular) Weights:**—Formula (Molecular) Weights are not given, but a table of Combining (Atomic) weights is given on page 511, and the formula weights may be calculated from that table and the formulas given.

**Made in America:**—An asterisk (\*) has been used to indicate those substances that, according to the best information available, are now made in America, many of which were not made here before the Great War. As some of these were strictly war products, the manufacture of which in this country may have been discontinued, the editors will appreciate corrections and additions.

**Proprietary Names:**—Important trade and proprietary names have been included, as it is frequently not recognized in trade that those names are of a proprietary nature. Where a proprietary name is given it is generally stated that it is such.

**Dyestuffs:**—No attempt has been made to complete the information

given regarding synthetic dyestuffs, as excellent reference works exist on that subject, and the inclusion of the complete information would unnecessarily expand the Dictionary. It has, however, been deemed advisable to include those dyestuffs, the names of which do not indicate that they are dyestuffs, for the reason that inquiries are frequently made in commerce with regard to these substances, and the people to whom the inquiries are addressed do not know whether they are dyestuffs or drugs or what not.

**Containers:**—In addition to the containers mentioned for the various chemicals, glass bottles may always be inferred when small amounts are under consideration.

**Grades:**—The terms U. S. P. and B. P. used under Grades refer respectively to the United States Pharmacopeia and British Pharmacopeia, and signify that the substances are sold under the mark "U. S. P." or "B. P." and comply with the requirements of these standards as to quality, purity, etc. The grade "C. P." is usually the purest obtainable. The grade "Technical" is the ordinary commercial product and may be crude, pure or "C. P."

**Railroad Shipping Regulations:**—The notes on Railroad Shipping Regulations are based on the Interstate Commerce Commission "Regulations for the Transportation of Explosives and Other Dangerous Articles by Freight and Express" published by the Bureau of Explosives, 30 Vesey Street, New York. (A copy of this pamphlet, which is for public distribution, should be in the hands of everyone dealing in chemicals and allied products.) Certain extracts from this publication defining the terms "Red label," "Yellow label," etc., and giving other information of value to shippers will be found on page 529.

**Fire Hazards:**—The notes on Fire Hazards are based on the practice of the inspectors of the New York Board of Fire Underwriters. Ordinarily, we have classed as "dangerous" all substances which are obviously so when stored or transported in quantity. It is obvious that a great number of circumstances must be considered in deciding whether a substance is hazardous or not. A small amount of an oil in a bottle in a laboratory may not present any fire hazard, whereas a 50,000-gal. tank of the same oil would. Almost any combustible substance may present a marked fire hazard under certain conditions. We have attempted to restrict the term "dangerous" to such substances as warrant more than ordinary precaution.

**Further Information:**—For sources of supply of the majority of chemicals and chemical materials listed in the Dictionary consult the current edition of the "Chemical Engineering Catalog," where the most prominent firms supplying each product will be found listed.

For makers of equipment for manufacturing or refining any of the

substances dealt with in the Dictionary consult the current edition of the "Chemical Engineering Catalog," where descriptions, accompanied by tables of sizes, capacities, etc., of the leading makes of industrial chemical equipment will be found.

The Information Bureau of The Chemical Catalog Company, Inc., 1 Madison Avenue, New York, will always be pleased to advise as to the sources of supply of any of the items listed in the Dictionary, or as to equipment for manufacturing or refining them.

For Technical Books dealing with any of the items listed in the Dictionary consult the Technical Book Section of the Chemical Engineering Catalog, or communicate with the Book Department, The Chemical Catalog Company, Inc., 1 Madison Avenue, New York, which can procure any technical book in print at the publisher's own net price.

## Provision for Memoranda

Appreciating that many owners of this Dictionary may wish to amplify the data under some of the headings by making notes and memoranda of particular interest to themselves, the Publishers have adopted a format unusual in a book of this character which should add greatly to the convenience of many.

A generous space is left between all items, room for a line or so of text; and, to provide for more extended notes, a wide margin is carried at the bottom of each page. It is hoped that this departure from the usual crowded arrangement will prove its value to those who use this book.

# The Condensed Chemical Dictionary

## A

**Abaiser.** See Charcoal, Animal.

**Abelmoschus** (Musk mallow, Musk seed, Amber seed, Ambrette).

Derivation: Seeds of *Abelmoschus*.

Habitat: Egypt, India and Tropical America.

Grades: Technical.

Containers: Bags.

Uses: Manufacture of perfumes; adulterating musk; preserving woollens from moths.

Fire hazard: None.

Railroad shipping regulations: None.

**Abietic Acid.** See Acid abietic.

**Abietinic Acid.** See Acid abietic.

**Abrasives.** See Aloxite, Alundum, Borolon, Burrstone, Carborundum, Corundum, Crystolon, Electrolon, Emery, Garnet, Grindstone, Kieselgur, Millstone, Novaculite, Oilstone, Pumice, Scythestone, Tripoli, Volcanic ash, Whetstone.

**Abraumssalze.**

Derivation: A mixture of potassium and magnesium chlorides and sulfates and other salts, overlying the rock-salt deposits at Stassfurt, Germany.

This mineral was most important source of potash salts prior to 1914.

Fire hazard: None.

Railroad shipping regulations: None.

**Absinthe Oil.** See Wormwood oil.

**Absinthin\*** (Absinthiin, Absynthin)  
 $C_{40}H_{56}O_8 \cdot H_2O$ .

Color and properties: Yellowish-brown, amorphous powder; very bitter taste.

Constants: Melting-point  $120^{\circ}$ - $125^{\circ}$ C. Soluble in alcohol and chloroform; insoluble in water.

Derivation: From *Artemisia absinthium*.

Method of purification: Crystallization.

Grades: Technical.

Containers: Glass bottles.

Uses: Medicine.

Fire hazard: None.

Railroad shipping regulations: None.

**Absinthium\*** (Wormwood).

Derivation: Leaves and tops of *Artemisia absinthium*.

Habitat: Europe, Northern and Western Asia, and Africa; cultivated in U. S.

Grades: Technical.

Containers: Bags; boxes.

Uses: Medicine.

Fire hazard: None.

Railroad shipping regulations: None.

**Absynthin.** See Absinthin.

**Acacia.**

Derivation: Gummy exudation from *Acacia senegal* and other species of *Acacia*.

Habitat: Africa, Arabia and India.

Grades: Technical; U. S. P.; B. P.

Containers: Wooden kegs; tins.

Uses: Medicine; adhesives.

Fire hazard: None.

Railroad shipping regulations: None.

**Acaciae Cortex, B. P.** *Acacia* bark.

**Acaciae Gummi, B. P.** (Acacia gum).  
See Acacia.

**Acanthite.** A natural silver sulfide,  $\text{Ag}_2\text{S}$ . It contains 87 per cent silver. Colorado.

**Acenaphthene\*** (Ethylenenaphthene, Ethylenenaphthalene)  $\text{C}_{10}\text{H}_6(\text{CH}_2)_2$ .  
Color and properties: White needles.  
Constants: Specific gravity 1.0687; melting-point  $95^\circ\text{C}$ .; boiling-point  $277^\circ\text{C}$ .  
Soluble in hot alcohol.  
Derivation: From coal-tar.  
Grades: Technical.  
Containers: Wooden casks.  
Uses: Dyestuff intermediates.  
Fire hazard: None.  
Railroad shipping regulations: None.

**Acerdol.** See Calcium permanganate.

**Acetal\*** (Diethylacetal, Ethylenediethyl ether, Diethylaldehyde)  $\text{CH}_3\text{CH}(\text{OC}_2\text{H}_5)_2$ .  
Color and properties: Colorless, volatile liquid; agreeable odor; nutty after-taste.  
Constants: Specific gravity 0.831; boiling-point  $103^\circ\text{--}104^\circ\text{C}$ .  
Soluble in water, alcohol and ether.  
Derivation: By the imperfect oxidation of ethyl alcohol.  
Method of purification: Rectification.  
Grades: Technical.  
Containers: Glass bottles; iron drums.  
Uses: Medicine; solvent.  
Fire hazard: None.  
Railroad shipping regulations: None.

**Acetaldehyde\*** (Ethyl aldehyde, Acetic aldehyde, Ethanol, Aldehyde)  $\text{CH}_3\text{CHO}$ .  
Color and properties: Colorless, light, inflammable liquid; pungent, fruity odor.  
Constants: Specific gravity 0.801; boiling-point  $21^\circ\text{C}$ .  
Soluble in water, alcohol and ether.  
Derivation: (1) Commercially obtained (a) from "first runnings" of alcohol stills by fractionation in a special still; (b) by passing alcohol vapor over

platinum black; (c) by synthesis from acetylene gas. (2) By pouring a mixture of 90 per cent. alcohol and concentrated sulfuric acid into a solution of potassium bichromate. The mixture is heated in a reflux apparatus and subsequently distilled.

Method of purification: Rectification in a special type of still.

Grades: Technical.

Containers: Steel cylinders.

Uses: Paraldehyde; organic synthesis; silvering mirrors; dyestuffs.

Fire hazard: Dangerous.

Railroad shipping regulations: Red label.

**Acetamide\*** (Acetic acid amine)  $\text{CH}_3\text{CONH}_2$ .

Color and properties: Colorless crystals; mousy odor.

Constants: Specific gravity 1.139; melting-point  $82^\circ\text{C}$ .; boiling-point  $223^\circ\text{C}$ .

Soluble in water and alcohol.

Derivation: By the interaction of ethyl acetate and ammonium hydroxide.

Method of purification: Crystallization.

Grades: Technical.

Containers: Wooden barrels.

Uses: Organic synthesis.

Fire hazard: None.

Railroad shipping regulations: None.

**Acetaminosalol.** See Salophen, page 508.

**Acetanilide\*** (Phenylacetamide, Antifebrin)  $\text{C}_6\text{H}_5\text{NH}(\text{COCH}_3)$ .

Color and properties: White, shining, crystalline scales; slightly burning taste.

Constants: Specific gravity 1.2105; melting-point  $113^\circ\text{C}$ .; boiling-point  $305^\circ\text{C}$ .

Soluble in water, alcohol, ether and chloroform.

Derivation: By the acetylation of aniline with glacial acetic acid.

Method of purification: Crystallization.

Grades: Technical; U. S. P.; B. P.

Containers: Wooden kegs; glass bottles.

Uses: Medicine; preservative for hy-

drogen peroxide; addition to cellulose ester "dopes" and lacquers.  
Fire hazard: None.  
Railroad shipping regulations: None.

**Acetanilidum, U. S. P., B. P.** See Acetanilide.

**Acetanisidin.** See Methacetin, page 506.

**Acetic Acid.** See Acid acetic.

**Acetic Acid Amine.** See Acetamide.

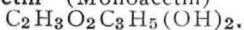
**Acetic Aldehyde.** See Acetaldehyde.

**Acetic Anhydride.** See Acid acetic, Anhydride.

**Acetic Ether.** See Ethyl acetate.

**Acetic Oxide.** See Acid acetic, Anhydride.

**Acetin\* (Monoacetin)**



Color and properties: Colorless, thick liquid.

Constants: Specific gravity 1.2212; boiling-point: Decomposes.

Soluble in water, alcohol and ether.

Derivation: By heating glycerine and strong acetic acid, distilling off the weak acetic acid formed and again heating with strong acetic acid and distilling.

Method of purification: Rectification.  
Impurities: Uncombined acetic acid.

Grades: Technical.

Containers: Iron drums.

Uses: Gelatinizing smokeless powders; preparing non-congealing dynamites; production of dinitroacetyl-glycerin.

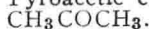
Fire hazard: None.

Railroad shipping regulations: None.

**Acetocinnamone.** See Benzylidene acetone.

**Acetone\*** (Dimethylketone, Dimethyl-

ketal, Ketopropane, Methylacetyl, Pyroacetic ether, Propanone)



Color and properties: Colorless liquid; fragrant, mint-like odor; inflammable.

Constants: Specific gravity 0.7900; melting-point  $-94.3^\circ\text{C}$ .; boiling-point  $56.48^\circ\text{C}$ .

Soluble in water, alcohol and ether.

Derivation: (a) By the dry distillation of brown or gray calcium acetate. (b) Acetylene, obtained by the action of water on calcium carbide, passes through several synthetic processes, in which mercuric oxide is employed as a catalytic agent, until acetic acid is formed. This is converted into acetone. (c) A special ferment is added to a grain mash, the product of the fermentation being butyl alcohol and acetone as a by-product. The acetone is obtained by distillation.

Method of purification: Rectification.

Grades: Technical; U. S. P.; B. P.

Containers: Iron drums; tank cars; carboys; tin cans.

Uses: Explosive manufacture where it is employed as a solvent in making smokeless powder; solvent; varnishes; lacquers; organic synthesis; manufacture of chloroform; manufacture of celluloid; absorbent for acetylene gas.

Fire hazard: Dangerous.

Railroad shipping regulations: Red label.

**Acetone Alcohol.** See Methyl alcohol.

**Acetone Chloroform.** See Chloretone, page 504.

**Acetone, Monochlorated.** See Chloroacetone.

**Acetone Oil\***

Derivation: An oily residuum obtained as a by-product in the distillation of acetone.

Uses: Solvent; denaturant for alcohol.

Grades: Technical.

Containers: Iron drums.

Fire hazard: Dangerous.

Railroad shipping regulations: Red label.

**Acetonitrile.** See Methyl cyanide.

**Acetone, U. S. P., B. P.** See Acetone.

**Acetphenetidinum, U. S. P.** See Acetophenetidine.

**Acetphenetidine\*** (Para-acetphenetidine, Phenacetin, Oxyethylacetanilide)  
 $\text{CH}_3\text{CONHC}_6\text{H}_4\text{OC}_2\text{H}_5$ .

Color and properties: Colorless crystals.

Constants: Melting-point:  $135^\circ\text{C}$ .

Soluble in water, alcohol and ether.

Derivation: By the interaction of phenetidine and glacial acetic acid.

Method of purification: Crystallization.

Grades: Technical; U. S. P.

Containers: Boxes; glass bottles.

Uses: Medicine.

Fire hazard: None.

Railroad shipping regulations: None.

**Acetophenone\*** (Hypnone)

$\text{C}_6\text{H}_5\text{COCH}_3$ .

Color and properties: Laminated, white crystals; pungent taste.

Constants: Specific gravity: 1.0329; melting-point  $20.5^\circ\text{C}$ ; boiling-point  $202^\circ\text{C}$ .

Soluble in alcohol and ether; insoluble in water.

Derivation: By treating benzol with acetyl chloride in presence of aluminum chloride.

Method of purification: Crystallization.

Grades: Technical; U. S. P.

Containers: Glass bottles.

Uses: Medicine; perfumery.

Fire hazard: None.

Railroad shipping regulations: None.

**Acetyl Bromide\***  $\text{CH}_3\text{COBr}$ .

Color and properties: Colorless, fuming liquid; turns yellow in air; reacts violently with water; fumes irritate the eyes.

Constants: Boiling point  $81^\circ\text{C}$ .

Soluble in ether.

Derivation: By the interaction of acetic acid and phosphorus pentabromide.

Method of purification: Rectification.

Grades: Technical.

Containers: Iron drums; metal bottles.

Uses: Organic synthesis.

Fire hazard: None.

Railroad shipping regulations: White label.

**Acetyl Chloride\***  $\text{CH}_3\text{COCl}$ .

Color and properties: Colorless, highly refracting, fuming liquid.

Constants: Specific gravity 1.1051; melting-point  $50.9^\circ\text{C}$ .

Soluble in ether.

Derivation: By mixing glacial acetic acid and phosphorus trichloride in the cold and heating a short time to drive off hydrochloric acid. The acetyl chloride is then distilled.

Method of purification: Rectification.

Grades: Technical.

Containers: Iron drums; carboys.

Uses: Organic preparations.

Fire hazard: None.

Railroad shipping regulations: White label.

**Acetyl Iodide\***  $\text{CH}_3\text{COI}$ .

Color and properties: Brown, transparent, fuming liquid.

Constants: Specific gravity 1.98; boiling-point  $105^\circ\text{C}$ - $108^\circ\text{C}$ .

Soluble in ether.

Derivation: By the interaction of acetic acid, iodine and phosphorus.

Method of purification: Distillation.

Grades: Technical.

Containers: Glass bottles.

Uses: Organic synthesis.

Fire hazard: None.

Railroad shipping regulations: White label.

**Acetyl Oxide.** See Acid acetic, Anhydride.

**Acetyl-para-aminosalol.** See Salophen, page 508.

**Acetyl-para-aminophenyl Salicylate.** See Salophen, page 508.

**Acetyl-para-phenylenediamine.** See Phenylenediamine, Para-.

**Acetylphenylenediamine.** See Phenylenediamine, Para-.

**Acetylsalicylic Acid.** See Acid acetylsalicylic.

**Acetyltannin.** See Diacetyltannin.

**Acetylene\***  $C_2H_2$ .

Color and properties: Colorless gas; highly inflammable.

Constants: Specific gravity 0.91; melting-point  $-81.5^{\circ}C$ .; boiling-point  $-83.6^{\circ}C$ .

Soluble in alcohol, acetone and water. Derivation: By the action of water on calcium carbide.

Grades: Technical.

Containers: Steel cylinders; also sold in cylinders, dissolved in acetone.

Uses: Organic synthesis; illumination; oxy-acetylene welding and cutting of metals.

Fire hazard: Dangerous.

Railroad shipping regulations: Red label.

**Acetylene Tetrabromide\*** (Muthmann's liquid)  $CHBr_2 \cdot CHBr_2$ .

Color and properties: Yellowish liquid. Constants: Specific gravity 2.98-3.00; boiling-point  $239^{\circ}$ - $242^{\circ}C$ .

Soluble in alcohol, ether; insoluble in water.

Derivation: By the interaction of acetylene and bromine, and subsequent distillation.

Method of purification: Rectification.

Grades: Technical.

Containers: Glass bottles.

Uses: Separating minerals by specific gravity; solvent.

Fire hazard: None.

Railroad shipping regulations: None.

**Acetylene Tetrachloride\*** (Tetrachloroethane).  $CHCl_2 \cdot CHCl_2$ .

Color and properties: Colorless liquid. Constants: Specific gravity 1.582; melting-point  $-36^{\circ}C$ .; boiling-point  $147.2^{\circ}C$ .

Soluble in alcohol and ether; insoluble in water.

Derivation: By the interaction of acetylene and chlorine, and subsequent distillation.

Method of purification: Rectification.

Grades: Technical.

Containers: Iron drums.

Uses: Solvent for greases and waxes.

Fire hazard: None.

Railroad shipping regulations: None.

**Acid Abietic\*** (Acid abietinic.)

$C_{44}H_{64}O_5$ .

Color and properties: Yellowish resinous powder.

Constants: Melting-point  $182^{\circ}C$ .

Soluble in alcohol, ether, chloroform and benzol; insoluble in water.

Derivation: By digesting colophony with weak alcohol.

Method of purification: Crystallization.

Grades: Technical.

Containers: Wooden kegs.

Uses: Resinates of heavy metals as varnish dryers.

Fire hazard: Dangerous.

Railroad shipping regulations: Yellow label.

**Acid Abietinic.** See Acid Abietic.

**Acid Acetic\*** (Acid methanecarboxylic, Vinegar acid)  $HC_2H_3O_2$ .

Color and properties: Clear, colorless liquid. Vinegar is a dilute, impure acetic acid.

Constants: Specific gravity 1.049; melting-point  $16.7^{\circ}C$ .; boiling-point  $118.1^{\circ}C$ .

Soluble in water, alcohol and ether.

Derivation: (a) The pyroligneous acid obtained from the destructive distillation of wood is neutralized with lime. The acetate of lime obtained is dissociated with hydrochloric acid in copper or iron stills and the acetic acid recovered by distillation. It is further purified by re-distillation over potassium bichromate and filtering through freshly burned charcoal.

When pyroligneous acid is distilled without neutralization, the distillate coming over at  $100^{\circ}$ - $120^{\circ}C$ ., is known as wood vinegar. It is used for some technical purposes, but is generally purified by converting into a calcium salt and distilling with a mineral acid.

(b) By the oxidation of dilute ethyl alcohol, promoted by bacterial action. The solution is concentrated by fractional distillation until a little water remains. Finally by freezing, the



acetic acid may be crystallized out. Pure acetic acid, in consequence of its freezing, is known as "glacial acetic acid." Acetic anhydride is produced when acetic acid is decomposed so that water is driven off.

(c) By direct synthesis from acetylene gas using mercuric oxide as a catalyst.

Method of purification: Rectification.

Grades: Commercial, specific gravity 1.040 (8° Tw) 30 per cent anhydrous acid; U. S. P.; B. P. Strength of solutions 90 per cent, 80 per cent, 60 per cent, 36 per cent, 30 per cent, 28 per cent; redistilled 56 per cent.

Containers: Glass carboys; barrels.

Uses: Acetates; organic synthesis; perfumes; food-flavoring extracts; textile industry; lead whites; manufacture of cellulose acetate; medicine; pharmacy; solvent.

Fire hazard: None.

Railroad shipping regulations: White label.

**Acid Acetic Amide.** See Acetamide.

**Acid Acetic Amine.** See Acetamide.

**Acid Acetic, Anhydride** (Acetic anhydride, Acetyl oxide, Acetic oxide)  $(\text{CH}_3\text{CO})_2\text{O}$ .

Color and properties: Colorless, very mobile, strongly refractory liquid; very strong acetic odor.

Constants: Specific gravity 1.082; boiling-point 139.5°C.

Soluble in alcohol and ether; decomposes in water forming acetic acid.

Derivation: By distilling acetyl chloride with an alkali acetate.

Method of purification: Rectification.

Grades: Technical.

Containers: Glass bottles; carboys.

Uses: Organic synthesis.

Fire hazard: None.

Railroad shipping regulations: White label.

**Acid Acetic, Glacial\*** (Crystallizable acetic acid, Methanecarboxylic acid)  $\text{CH}_3\text{COOH}$ .

Color and properties: Clear, colorless, strongly acid liquid; crystallizes a few degrees below 15°C.

Constants: Specific gravity 1.0553; boiling-point 117°-118°C.

Soluble in water, alcohol and ether.

Derivation: See acetic acid.

Method of purification: Redistillation.

Grades: Technical; U. S. P.; B. P.

Strength of solutions 99½ per cent, 90 per cent, 80 per cent.

Containers: Glass bottles; carboys.

Uses: Organic synthesis; manufacture of colors, drugs, etc.; also for manufacture of cellulose acetate used as air plane "dope" and for other purposes; medicine; solvent.

Fire hazard: None.

Railroad shipping regulations: White label.

**Acid Acetylsalicylic\*** (Aspirin)

$\text{C}_2\text{H}_3\text{O}_2\text{C}_6\text{H}_9\text{CO}_2\text{H}$ .

Color and properties: White, crystalline powder.

Constants: Melting-point 132°-135°C. Soluble in alcohol and ether; slightly soluble in water.

Derivation: By the acetylation of salicylic acid.

Method of purification: Crystallization.

Impurities: Salicylic acid.

Grades: Technical; B. P.

Containers: Wooden kegs; tins; glass bottles.

Uses: Medicine.

Fire hazard: None.

Railroad shipping regulations: None.

**Acid Adipic\*** (Acid adipinic)

$(\text{CH}_2)_4(\text{COOH})_2$ .

Color and properties: Yellowish crystalline powder.

Constants: Melting-point 153°C.; boiling-point 265°C.

Soluble in alcohol and ether; slightly soluble in water.

Derivation: Obtained from animal and plant fats by oxidation with nitric acid.

Method of purification: Crystallization.

Grades: Technical.

Containers: Tins; glass bottles.

Uses: Medicine.

Fire hazard: None.

Railroad shipping regulations: None.