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MILITARY STANDARD

ACS CHEMICALS



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DEPARTMENT OF DEFENSE
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ACS Chemicals

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FOREWORD

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1. SCOPE

1.1 Coverage: This standard is a presentation of nomenclature, symbols, physical and chemical properties and requirements, typical military uses, packaging data and labeling, storage information, and shelf life of military standard ACS grade chemicals. ACS grade chemicals for medical use and litmus paper are included in a different federal supply classification class. This standard covers the following 494 items:

<u>NAME</u>	<u>NO. OF ITEMS</u>
ACETIC ACID, GLACIAL, ACS	2
ACETIC ANHYDRIDE, ACS	1
ACETONE, ACS	2
ACETONE, FOR SPECTROPHOTOMETRY, ACS	2
ACETONITRILE, ACS	2
ALUMINUM, ACS	1
ALUMINUM POTASSIUM SULFATE, DODECAHYDRATE, ACS	2
AMMONIUM ACETATE, ACS	2
AMMONIUM CARBONATE, ACS	1
AMMONIUM CHLORIDE, ACS	2
AMMONIUM CITRATE, DIBASIC, ACS	1
AMMONIUM HYDROXIDE, ACS	2
AMMONIUM IODIDE, ACS	1
AMMONIUM MOLYBDATE, TETRAHYDRATE, ACS	2
AMMONIUM NITRATE, ACS	1
AMMONIUM OXALATE, MONOHYDRATE, ACS	2
AMMONIUM PERSULFATE, ACS	2
AMMONIUM PHOSPHATE, DIBASIC, ACS	2
AMMONIUM PHOSPHATE, MONOBASIC, ACS	1
AMMONIUM SULFATE, ACS	2
AMMONIUM THIOCYANATE, ACS	2
AMYL ALCOHOL, ACS	1
ANILINE, ACS	2
ARSENIC TRIOXIDE, ACS	1
AURINTRICARBOXYLIC ACID, AMMONIUM SALT, ACS	2
BARIUM ACETATE, ACS	2
BARIUM CARBONATE, ACS	1
BARIUM CHLORIDE, DIHYDRATE, ACS	3
BARIUM HYDROXIDE, OCTAHYDRATE, ACS	2
BARIUM NITRATE, ACS	2
BENZENE, ACS	3
BENZENE, FOR SPECTROPHOTOMETRY, ACS	3
BENZOIC ACID, ACS	1
BORIC ACID, ACS	1
BROMINE, ACS	2
BROMOCRESOL GREEN, ACS	2

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BROMOPHENOL BLUE, ACS	2
BROMOTHYMOL BLUE, ACS	2
BUTYL ALCOHOL, ACS	1
CADMIUM CHLORIDE, ANHYDROUS, ACS	1
CADMIUM CHLORIDE, CRYSTALS, ACS	1
CADMIUM SULFATE, ANHYDROUS, ACS	2
CADMIUM SULFATE, CRYSTALS, ACS	1
CALCIUM CARBONATE, ACS	2
CALCIUM CARBONATE, LOW IN ALKALIES, ACS	1
CALCIUM CHLORIDE, ANHYDROUS, ACS	3
CALCIUM CHLORIDE, DIHYDRATE, ACS	1
CARBON DISULFIDE, ACS	1
CARBON TETRACHLORIDE, ACS	2
CARBON TETRACHLORIDE, FOR SPECTROPHOTOMETRY, ACS	1
CERIC AMMONIUM NITRATE, ACS	1
CHLOROFORM, ACS	2
CHLOROFORM, FOR SPECTROPHOTOMETRY, ACS	1
CHROMIUM POTASSIUM SULFATE, DODECAHYDRATE, ACS	1
CHROMIUM TRIOXIDE, ACS	1
CITRIC ACID, ANHYDROUS, ACS	1
CITRIC ACID, MONOHYDRATE, ACS	1
COBALT CHLORIDE, HEXAHYDRATE, ACS	1
COBALT NITRATE, HEXAHYDRATE, ACS	1
COPPER, ACS	3
CUPFERRON, ACS	1
CUPRIC ACETATE, MONOHYDRATE, ACS	1
CUPRIC AMMONIUM CHLORIDE, DIHYDRATE, ACS	1
CUPRIC NITRATE, TRIHYDRATE, ACS	1
CUPRIC OXIDE, POWDERED, ACS	1
CUPRIC OXIDE, WIRE, ACS	1
CUPRIC SULFATE, PENTAHYDRATE, ACS	3
CUPROUS CHLORIDE, ACS	1
CYCLOHEXANE, ACS	2
CYCLOHEXANE, FOR SPECTROPHOTOMETRY, ACS	3
DEXTROSE, ANHYDROUS, ACS	1
DICHLOROETHANE, ACS	3
DICHLOROETHANE, FOR SPECTROPHOTOMETRY, ACS	3
DICHLOROMETHANE, ACS	3
DICHLOROMETHANE, FOR SPECTROPHOTOMETRY, ACS	3
2,6-DICHLOROPHENOL-INDOPHENOL SODIUM, ACS	2
DIMETHYLFORMAMIDE, ACS	3
DIMETHYLFORMAMIDE, FOR SPECTROPHOTOMETRY, ACS	3
DIMETHYLGLYOXIME, ACS	1
DIOXANE, ACS	3
DIPHENYLAMINE, ACS	1
DISODIUM (ETHYLENEDINITRILE) TETRAACETATE, ACS	2
DITHIZONE, ACS	1
ETHER, ACS	2
ETHER ABSOLUTE, ACS	2
ETHYL ACETATE, ACS	1
ETHYL ACETATE, FOR SPECTROPHOTOMETRY, ACS	2

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ETHYL ALCOHOL, ACS	3
ETHYL ALCOHOL, ABSOLUTE, ACS	3
ETHYL ALCOHOL, FOR SPECTROPHOTOMETRY, ACS	2
(ETHYLENEDINITRIL) TETRAACETIC ACID, ACS	3
FERRIC AMMONIUM SULFATE, DODECAHYDRATE, ACS	2
FERRIC CHLORIDE, HEXAHYDRATE, ACS	2
FERRIC NITRATE NONAHYDRATE, ACS	1
FERROUS AMMONIUM SULFATE, HEXAHYDRATE, ACS	1
FERROUS SULFATE, HEPTAHYDRATE, ACS	2
FORMALDEHYDE SOLUTION, ACS	1
FORMIC ACID, 88%, ACS	1
FORMIC ACID, 98%, ACS	1
GLYCEROL, ACS	2
GOLD CHLORIDE, TRIHYDRATE, ACS	2
HEXANES, ACS	2
HEXANES, FOR SPECTROPHOTOMETRY, ACS	2
HYDRAZINE SULFATE, ACS	1
HYDRIODIC ACID, ACS	2
HYDROBROMIC ACID, 48%, ACS	1
HYDROCHLORIC ACID, ACS	2
HYDROFLUORIC ACID, ACS	1
HYDROGEN PEROXIDE, ACS	2
HYDROXYLAMINE HYDROCHLORIDE, ACS	1
HYDROXYNAPHTHOL BLUE, ACS	1
8-HYDROXYQUINOLINE, ACS	3
IODINE, ACS	1
IRON, ACS	1
IRON, LOW IN MANGANESE, ACS	1
ISOBUTYL ALCOHOL, ACS	1
ISOBUTYL ALCOHOL, FOR SPECTROPHOTOMETRY, ACS	3
ISOOCTANE, ACS	1
ISOOCTANE, FOR SPECTROPHOTOMETRY, ACS	2
LEAD, ACS	3
LEAD ACETATE, TRIHYDRATE	3
LEAD CARBONATE, ACS	1
LEAD CHROMATE, ACS	2
LEAD DIOXIDE, ACS	2
LEAD NITRATE, ACS	2
LEAD SUBACETATE, ACS	1
LITHIUM CARBONATE, ACS	1
MAGNESIUM ACETATE, ACS	1
MAGNESIUM CHLORIDE, HEXAHYDRATE, ACS	3
MAGNESIUM NITRATE, HEXAHYDRATE, ACS	2
MAGNESIUM OXIDE, ACS	2
MAGNESIUM SULFATE, HEPTAHYDRATE, ACS	2
MANGANESE SULFATE, MONOHYDRATE, ACS	2
MANNITOL, ACS	2
MERCURIC ACETATE, ACS	2
MERCURIC BROMIDE, ACS	2
MERCURIC CHLORIDE, ACS	2
MERCURIC IODIDE, RED, ACS	2

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MERCURIC OXIDE, RED, ACS	3
MERCURIC OXIDE, YELLOW, ACS	1
MERCUROUS CHLORIDE, ACS	2
MERCURY, ACS	3
METHANOL, ACS	2
METHANOL, FOR SPECTROPHOTOMETRY, ACS	2
METHYL ORANGE, ACS	3
4-METHYL-2-PENTANONE, ACS	3
METHYL RED, ACS	2
METHYL SULFOXIDE, ACS	1
MOLYBDENUM TRIOXIDE, ACS	2
MOLYBDIC ACID, 85%, ACS	3
NICKEL SULFATE, ACS	2
NITRIC ACID, ACS	2
NITRIC ACID, FUMING, ACS	1
NITROBENZENE, ACS	2
OXALIC ACID, DIHYDRATE, ACS	2
PERCHLORIC ACID, 70%, ACS	1
PERCHLORIC ACID, 60%, ACS	1
PETROLEUM ETHER, ACS	1
O-PHENANTHROLINE, ACS	2
PHENOL, ACS	1
PHENOLPHTHALEIN, ACS	2
PHENOL RED, ACS	2
PHOSPHOMOLYBDIC ACID, ACS	2
PHOSPHORIC ACID, ACS	-
PHOSPHORIC ACID, META-, ACS	3
PHOSPHORUS PENTOXIDE, ACS	1
PICRIC ACID, ACS	2
PLATINIC CHLORIDE, HEXAHYDRATE, ACS	1
POTASSIUM ACETATE, ACS	1
POTASSIUM BICARBONATE, ACS	2
POTASSIUM BIPHTHALATE, ACS	2
POTASSIUM BROMATE, ACS	2
POTASSIUM BROMIDE, ACS	2
POTASSIUM CARBONATE, ANHYDROUS, ACS	1
POTASSIUM CARBONATE, CRYSTALS, ACS	1
POTASSIUM CHLORATE, ACS	1
POTASSIUM CHLORIDE, ACS	2
POTASSIUM CHROMATE, ACS	3
POTASSIUM CYANIDE, ACS	1
POTASSIUM DICHROMATE, ACS	3
POTASSIUM FERRICYANIDE, ACS	2
POTASSIUM FERROCYANIDE, TRIHYDRATE, ACS	2
POTASSIUM HYDROXIDE, ACS	3
POTASSIUM IODATE, ACS	1
POTASSIUM IODIDE, ACS	1
POTASSIUM NITRATE, ACS	2
POTASSIUM NITRITE, ACS	1
POTASSIUM OXALATE, MONOHYDRATE, ACS	2

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POTASSIUM PERIODATE, ACS	2
POTASSIUM PERMANGANATE, ACS	2
POTASSIUM PHOSPHATE, DIBASIC, ANHYDROUS, ACS	3
POTASSIUM PHOSPHATE, MONOBASIC, ACS	2
POTASSIUM PYROSULFATE, ACS	3
POTASSIUM SODIUM TARTRATE, TETRAHYDRATE, ACS	1
POTASSIUM SULFATE, ACS	6
POTASSIUM THIOCYANATE, ACS	3
2-PROPANOL, ACS	2
2-PROPANOL, FOR SPECTROPHOTOMETRY, ACS	2
PYRIDINE, ACS	1
SILVER NITRATE, ACS	3
SILVER SULFATE, ACS	2
SODA LIME, ACS	1
SODIUM, ACS	2
SODIUM ACETATE, TRIHYDRATE, ACS	3
SODIUM BICARBONATE, ACS	1
SODIUM BISMUTHATE, ACS	1
SODIUM BISULFATE, FUSED, ACS	2
SODIUM BISULFITE, ACS	2
SODIUM BORATE, DECAHYDRATE, ACS	1
SODIUM CARBONATE, ALKALIMETRIC STANDARD, ACS	1
SODIUM CARBONATE, ANHYDROUS, ACS	3
SODIUM CARBONATE, MONOHYDRATE, ACS	1
SODIUM CHLORIDE, ACS	2
SODIUM COBALTINITRITE, ACS	1
SODIUM CYANIDE, ACS	3
SODIUM DIETHYLDITHIOCARBAMATE, ACS	2
SODIUM FLUORIDE, ACS	3
SODIUM HYDROXIDE, ACS	3
SODIUM META-BISULFITE, ACS	2
SODIUM NITRATE, ACS	2
SODIUM NITRITE, ACS	3
SODIUM NITROFERRICYANIDE, DIHYDRATE, ACS	2
SODIUM OXALATE, ACS	2
SODIUM PERIODATE, ACS	1
SODIUM PEROXIDE, ANHYDROUS, ACS	3
SODIUM PHOSPHATE, DIBASIC, ANHYDROUS, ACS	3
SODIUM PHOSPHATE, DIBASIC, HEPTAHYDRATE, ACS	3
SODIUM PHOSPHATE, MONOBASIC, ACS	3
SODIUM PHOSPHATE, TRIBASIC, ACS	2
SODIUM SULFATE, ANHYDROUS, ACS	4
SODIUM SULFIDE, NONAHYDRATE, ACS	2
SODIUM SULFITE, ANHYDROUS, ACS	3
SODIUM TARTRATE, ACS	3
SODIUM TETRAPHENYLBORATE, -ACS	1
SODIUM THIOCYANATE, ACS	2
SODIUM THIOSULFATE, PENTAHYDRATE, ACS	2
SODIUM TUNGSTATE, DIHYDRATE, ACS	2
STANNOUS CHLORIDE, DIHYDRATE, ACS	4
STARCH, SOLUBLE, ACS	3

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STRONTIUM NITRATE, ANHYDROUS, ACS	2
SUCROSE, ACS	2
SULFANILIC ACID, MONOHYDRATE, ACS	2
SULFOSALICYLIC ACID, ACS	2
SULFURIC ACID, ACS	2
SULFURIC ACID, FUMING, ACS	1
SULFUROUS ACID, ACS	2
TARTARIC ACID, ACS	4
THIOACETAMIDE, ACS	2
THORIUM NITRATE, ACS	3
THYMOL BLUE, ACS	3
THYMOLPHTHALEIN, ACS	2
TIN, ACS	1
TOLUENE, ACS	2
TOLUENE, FOR SPECTROPHOTOMETRY	2
TRICHLOROACETIC ACID, ACS	1
URANYL ACETATE, ACS	2
URANYL NITRATE, HEXAHYDRATE, ACS	1
UREA, ACS	1
XYLENE, ACS	3
ZINC, ACS	1
ZINC CHLORIDE, ACS	3
ZINC OXIDE, ACS	2
ZINC SULFATE, HEPTAHYDRATE, ACS	2

1.2 Application. Items listed herein accommodate essential requirements of the military and defense agencies, and will effect continued economies in all logistics functions when properly employed in new applications. This standard supersedes all military sheet form standards which pertain solely to ACS chemicals and those parts of other military sheet form standards for chemicals which pertain to ACS grade chemicals.

2. REFERENCED DOCUMENTS

The issues of the following documents in effect on the date of invitations for bid form a part of this standard to the extent specified herein.

Federal Specifications

O-C-265	Chemicals, Analytical; General Specification For
PPP-C-300	Chemicals, Liquid; Packaging and Packing of
PPP-C-301	Chemicals, Dry and Paste; Packaging and Packing of

Military Specifications

MIL-M-19590	Marking of Commodities and Containers to Indicate Radioactive Materials
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Regulations

Code of Federal Regulations, Title 49 - Transportation, Department of Transportation.

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Other Documents

Manual L-1, Guide to Precautionary Labeling of Hazardous Chemicals,
Manufacturing Chemists' Association (1961)

Reagent Chemicals (ACS Specifications), American Chemical Society (1968)

3. GLOSSARY

3.1 Definitions

Absolute alcohol - An expression used for dehydrated ethyl alcohol,
 C_2H_5OH , which is at least 99 percent pure.

Acidity - The property of a dissolved substance which yields an excess of
free H^+ ions. In terms of pH, an acidic solution may be between pH 0
(very strongly acidic) and pH 6.9 (very weakly acidic).

ACS grade - The high quality grade of chemicals able to meet the tests,
requirements, standards, and definitions prepared by the Committee on
Analytical Reagents of the American Chemical Society.

Alkali - A term which designates the hydroxides and carbonates of the
alkali metals and the ammonium radical. The term is applied more
generally to any strong base in aqueous solution, such as a substance
which gives a high concentration of hydroxyl ions (OH^-).

Alkalinity - Having the nature of a base; a property in solution of a
substance that yields an excess of OH^- ions. In terms of pH, the
basic range is from pH 7.1 (very weakly basic) to pH 14 (very strongly
basic).

Amorphous - An amorphous substance is one which has no definite form or
is not crystallized.

Anhydride - An oxide which, when combined with water, yields an acid or
a base.

Anhydrous - Pertaining to a salt which has no water of hydration present
in the crystalline structure.

Assay - Analysis of a substance to determine the amount, expressed as a
percent by weight, of one or more main ingredients.

Atomic weight - The relative weight of the naturally occurring mixture of
isotopes of an element as referred to an element chosen as a standard.

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In this standard, all atomic weights are referred to the carbon-12 isotope, which is defined as having an atomic weight of 12.0000.

Base - A general term for compounds which yield hydroxyl ions (OH^-) in aqueous solution. It is also a name applied to a substance which neutralizes acids. Most bases react with acids by combining with the H^+ ion released by the acid in solution.

Baume' - A hydrometer scale used for the measurement of specific gravity. There are two kinds in use: heavy Be', for liquids heavier than water and light Be', for liquids lighter than water. In the former, 0° corresponds to a sp gr 1.0000 (water at 4°C) and 66° corresponds to a sp gr 1.842; in the lighter than water scale, 0° Be', is equivalent to the gravity of a 10% solution of sodium chloride and 60° Be' corresponds to a sp gr of 0.745.

Boiling point - The temperature at which the vapor pressure of a liquid is equal to the external pressure. In this standard, if there is no mention of the external pressure at which the boiling point was determined, it is understood to be approximately one atmosphere (760 mm mercury).

Calomel - A synonym for mercurous chloride, Hg_2Cl_2 . In solution with potassium chloride and mercury, it is used in reference electrodes in the electrometric determination of pH.

Calorie - The average quantity of heat required to raise one gram of water one degree Celsius at a temperature of 15°C .

Catalyst - A substance whose presence changes the rate of a chemical reaction. A positive catalyst increases the rate of reaction; a negative catalyst decreases the rate of reaction.

Caustic - This term designates a substance, usually a strong base or a strong acid, which has a corroding action on metal or a desintegrating action on living tissue.

Constant boiling solution - A constant boiling solution is a liquid mixture of two or more substances which behaves like a single substance in that the vapor produced by the partial evaporation of the liquid has the same composition as the liquid. The constant boiling solution exhibits either a maximum or minimum boiling point as compared with that of other mixtures of the same substances. A constant-boiling solution is also known as an "azeotrope" or an "azeotropic mixture".

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Corrosive - A caustic material or acid which causes a burning sensation and destruction of living tissue or which causes a destructive effect on metal. "Rust" is a common form of metal corrosion.

Decomposition - The chemical separation of a substance into two or more simpler substances, which differ from each other and from the original substance.

Dehydration - The removal of water from a substance through ordinary drying or heating, absorption, adsorption, chemical reaction, condensation of water vapor, or centrifugation.

Deliquescent - Able to take up water vapor until dissolved.

Density - The mass per unit volume of a material at a specified temperature. It is usually expressed as grams per milliliter or pounds per cubic foot.

Desiccant - A substance used to absorb water vapor within a container; a dehydrating agent.

Ductile - Capable of being drawn out into a rod or wire.

Efflorescent - A crystalline material which loses water of hydration upon exposure to air. This may result in surface changes or a change from a crystalline form to a whitish, mealy or crystalline powder.

Element - A substance composed of atoms all having the same atomic number. An element cannot be decomposed into two or more simpler substances by chemical means, nor can it be produced by the chemical union of other substances.

Esters - Organic compounds corresponding in structure to salts in inorganic chemistry. They may be derived in the laboratory by the reaction of an organic or inorganic acid with an alcohol.

Flash point - The temperature to which a substance must be heated under specific conditions to give off sufficient vapor to form a mixture with air that can be ignited momentarily by a specified flame.

Formula weight - The sum of the atomic weights of all the atoms appearing in a chemical formula. In this standard, the formula weight is computed according to the international atomic weight values of 1967.

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Freezing point - The temperature at which the liquid and solid exist together in equilibrium and the transition from liquid to solid occurs. For pure substances, the freezing point and melting point are the same temperature.

Hazardous substance - Any substance or mixture of substances which is toxic, corrosive, an irritant, a strong sensitizer, flammable, or which generates pressure through decomposition, heat, or other means, if such substance or mixture of substances may cause substantial personal injury or substantial illness during or as a direct result of any customary or reasonably anticipated handling or use.

Hydrate - A compound formed by the bonding of molecules of water with other molecules or atoms. Usually, there is a definite number of water molecules per molecule or atom of parent substance.

Hydride - A compound of hydrogen with some element or radical. This term is usually reserved for compounds in which hydrogen shows a negative oxidation state.

Hydrolysis - The reaction of an ion with water to form either H^+ or OH^- ions and a weak acid or weak base.

Hygroscopic - The property of absorbing moisture from the atmosphere but not particularly enough to dissolve. All deliquescent substances are hygroscopic, but not all hygroscopic substances are deliquescent.

Indicator - A substance, which by some visible change, such as change of color, indicates the condition of a solution as to the presence of free acid, alkali, or other substance. Indicators are employed in volumetric (titrimetric) analysis to indicate the end points of reactions.

Intermediate - A chemical produced because it is a necessary intermediate stage in the manufacture of one or more end-products such as dyes and drugs.

Isotopes - Forms of an element which have the same atomic number, the same number of valence electrons, and identical chemical properties, but which differ slightly in atomic weight.

Malleable - Capable of being extended or shaped by beating with a hammer, or by the pressure of rollers.

Melting point - The temperature at which a liquid and solid exist together in equilibrium and the transition from solid to liquid occurs. For pure substances, the melting point and freezing point are the same temperature.

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Miscible - The property of liquids which enables them to be mixed with one another in all proportions.

Mole - The weight of a substance equal numerically to its formula weight. A gram-mole is the weight in grams equal to the formula weight; a pound-mole is the weight in pounds equal to the formula weight.

Molecule - The smallest unit of a compound which has the same chemical properties of the compound. Upon decomposition, molecules break down into simpler molecules or atoms, or both.

Narcotic - A drug which first excites and stimulates all body functions, then causes profound sleep, stupor, coma, and which may cause death by paralyzing certain brain centers.

Nonactinic - A material, such as amber-colored glass, that will not permit light radiation to affect a chemical.

Organic - Pertaining to the branch of chemistry which is concerned with compounds containing carbon and hydrogen as the fundamental elements.

Oxidation - In a broad sense oxidation is the increase in positive valence or decrease in negative valence of any element in a substance. On the basis of the electron theory, oxidation is a process in which an element loses electrons. In a narrow sense, oxidation means the chemical addition of oxygen to a substance.

Oxidizing agent - A chemical reagent which causes oxidation of other substances and is itself thereby reduced.

pH - A means of expressing the degree of acidity or basicity of an aqueous solution. It is defined as the logarithm of the reciprocal of the hydrogen ion concentration in gram-equivalents per liter of solution $pH = \log \frac{1}{[H^+]}$.

A pH of 7.0 is neutral (neither acidic nor basic); a pH below 7.0 indicates an acidic solution, while a pH above 7.0 indicates a basic solution.

Primary standard - A term in analytical chemistry designating a substance of constant composition and of sufficient purity to be used for standardizing volumetric (titrimetric) solutions, or which may be used for the preparation of volumetric (titrimetric) solutions, and when made up to an exact volume the solution requires no further standardization.

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Reducing agent - A chemical reaction which brings about the reduction of some other substance and is itself simultaneously oxidized.

Reduction - In a narrow sense, reduction means the decrease in the oxygen content, or the increase in the hydrogen content of a substance. In a broad sense, reduction is the decrease in positive valence or the increase in the negative valence of an element.

Refractive index - A constant characteristic of each substance which represents the ratio of the velocity of light in a vacuum to that in the substance.

Solubility - The weight of a substance which will dissolve in a specific volume of solvent at a specified temperature to produce a saturated solution. In this standard, the solubility will be expressed as the weight of solvent in grams dissolved in 100 ml of the specific solvent.

Specific gravity - The ratio of the mass of a unit volume of a material at a stated temperature to the mass of the same volume of gas-free distilled water at a stated temperature. In this standard, the first temperature indicates the temperature of the material, and the second indicates the temperature of water to which it is referred. If there is no mention of temperature, (20/4°C) is to be assumed.

Sublimation - The direct conversion of a solid to a vapor without passing through a liquid phase.

Synthesis - The formation of a compound or substance by the chemical union of simpler compounds, radicals, and/or elements.

Vapor pressure - The pressure exerted when a solid or liquid is in equilibrium with its own vapor. The vapor pressure is a function of the substance and the temperature.

Volatile - A substance which evaporates rapidly due to its high vapor pressure.

Water of hydration - A general term used to denote water added to an acidic or basic anhydride to form an acid or a base or water combined in the structure of many crystalline substances. The latter is also known as "water of crystallization". Water of hydration can be removed by heating a substance to a critical temperature that varies for different substance.

3.2 Abbreviations. The same abbreviation is used for all tenses, the possessive case, and the singular and plural forms of a given word.

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AW - Atomic weight
C - Celsius (Centigrade)
cal - calorie
DoT - Department of Transportation
F - Fahrenheit
FW - Formula weight
g - gram
gal - gallon
IUPAC - International Union of Pure and Applied Chemistry
kg-cal - Kilocalorie
lb - pound
mg - milligram
ml - milliliter
mm - millimeter
oz - ounce
pt - pint
qt - quart

4. GENERAL REQUIREMENTS

4.1 Chemical and physical requirements. All ACS grade reagents meet the requirements of the Committee on Analytical Reagent of the American Chemical Society and will not be reproduced in this standard. In some cases, such as with formic acid, assay requirements will be cited to distinguish between two or more forms of a reagent having different assays. Where these values are given, they shall be expressed in maximum percent by weight unless otherwise indicated.

4.2 Nomenclature. The Department of Defense item names, as used throughout this standard, are in capital letters. Other names that are sometimes used commercially are in small letters immediately beneath.

4.3 Packaging data and labeling. All dry chemicals included in this standard shall be packaged in accordance with Federal Specification PPP-C-301 and all applicable documents mentioned in this specification. All liquid chemicals in this standard shall be packaged in accordance with Federal Specification PPP-C-300 and all applicable documents mentioned in this specification. The label caution legends given in the "Detail Requirements" are based on the latest (Sixth Edition - 1961) edition of the Manufacturing Chemists' Association Manual L-1, Guide to Precautionary Labeling of Hazardous Chemicals. Legends given in later editions of this manual comply with the requirements of this standard. When the label caution legend includes the word POISON at the base of the label, it shall be flanked on each side with the skull-and-crossbones symbol. The precautionary labeling prescribed in this standard is intended solely to safeguard the safety and health of personnel engaged in the intended use of the materials. It is not intended to replace or substitute for precautionary labeling required by federal or state laws or regulations. When labels required by statute contain essentially the same information, the label

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prescribed by this standard is not required in addition thereto. Should the precautionary labeling prescribed herein be in conflict with a manufacturer's normal commercial practice, the conflict shall be resolved by the appropriate departmental medical and safety authorities.

4.4 Substitutability and Interchangeability. No substitutability or interchangeability exist among the chemicals included in this project except where indicated under use data. Certain of the items may serve as a temporary substitute for a specific application for another item. This limited substitutability, however, would be at the discretion of the chemist or technician for a specific purpose.

4.5 Safety. All hazardous chemicals in this standard are indicated as such immediately beneath each item name. General safety and hygienic measures should be exercised in the handling and use of all chemicals. For more specific information on hazardous chemicals the appropriate safety and medical authorities must be consulted in order to determine personal protective measures and environmental controls.

4.6 Shelf life. Factors such as moisture, temperature, type and condition of container, and exposure to sunlight and the atmosphere cause variations in shelf life. The term "cool" denotes temperatures from above freezing up to 110 degrees Fahrenheit but not consistently over 100 degrees when stored out of direct sunlight. The term "dry" is usually used to denote an area where condensation does not come in contact with the packages or contents. For applications where quality may be critical each compound should be analyzed prior to use. Although most ACS reagents are packaged in nonactinic containers as a matter of course, this standard will specify the use of nonactinic containers for these items which could definitely be affected adversely by exposure to light. The ACS reagents are considered indefinitely stable if kept tightly capped, in a cool place, and stored away from those chemicals which might affect their purity or quality. Exceptions to this will be noted where applicable. Shelf life is dated from the date of manufacture. All chemicals in this standard shall not be older than one year from the date of manufacture when purchased except where specified otherwise under storage data.

4.7 Solubility data. Solubility data is given for the most common solvents.

4.8 Temperature. If the temperature at which a property was determined is not specified, it is understood to be room temperature (20° to 25°C or 68° to 77°F).

4.9 Use data. All ACS chemicals listed in this standard are intended for military use as general laboratory reagents and it is not the intent

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of this standard to list all possible laboratory applications for them. Only typical applications will be indicated. Commercial applications are the same as for the military.

4.10 Specifications. Federal Specification O-C-265, Chemicals, Analytical; General Specification For, is applicable for all chemicals listed in this standard.

5. DETAIL REQUIREMENTS

5.1 Name. ACETIC ACID, GLACIAL, ACS CH_3COOH FW 60.05
Ethanoic Acid (IUPAC)
(HAZARDOUS)

5.1.1 Specifications. See Specifications para 4.10.

5.1.2 Technical description. The term "glacial acetic acid" is applied to the pure concentrated form. In aqueous (water) solution, it is known simply as "acetic acid." Glacial acetic acid is a clear, colorless liquid with a very pungent, penetrating odor.

TABLE I. - Properties of glacial acetic acid

Boiling point	118.1°C
Flash point (closed cup)	104°F
(open cup)	110°F
Melting point	16.6°C
Refractive index (20°C)	1.37182
Solubility data	Soluble in: Alcohol, ether, organic solvents, and water. Insoluble in: Carbon Disulfide
Specific gravity (20/4°C)	1.0491

5.1.3 Use data. Glacial Acetic Acid ACS is used as an acid, solvent, intermediate in chemical reactions, plus many other laboratory applications.

5.1.4 Packaging data and labeling. For military use glacial acetic acid, ACS is packaged in 1 pt (1 lb) and 5 pt (5 lb) unit quantity glass bottles with acid-resistant plastic screw-caps. The screw-cap and label are color-coded brown for acetic acid. Unless exempt under section 173.244 of Title 49, Code of Federal Regulations, each package for shipment must bear the DoT white label for corrosive liquids. Individual containers must bear the following precautionary label:

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ACETIC ACID, GLACIAL
DANGER! CAUSES SEVERE BURNS

Do not get liquid or vapor in eyes, on skin, or clothing.
Keep away from heat and open flame.

In case of contact, immediately flush skin or eyes with
plenty of water for at least 15 minutes; for eyes, get
medical attention.

Glacial acetic acid freezes at 62°F, forming hard lumps
which may break container when moved.

Store in area maintained above 62°F.

If frozen, thaw by carefully moving container to warm area.

5.1.5 Storage data. Glacial acetic should be stored in tightly closed containers in a cool well ventilated place maintained above 62°F to prevent freezing. When frozen, the acid expands and may burst its container. If frozen, carefully thaw containers by moving them to a warm area. This acid should not be stored with some metals as it can react to form hydrogen gas, which is explosive. Do not store acetic acid near chromic acid, nitric acid, or sodium peroxide. Contact with these materials produces highly hazardous compounds. The acetic acid should be periodically inspected and monitored. Under these conditions the shelf life is indefinite.

5.2 Name ACETIC ANHYDRIDE, ACS $(\text{CH}_3\text{CO})_2\text{O}$ FW 102.09
Ethanoic Anhydride (IUPAC)
(HAZARDOUS)

5.2.1 Specifications. See Specifications para 4.10.

5.2.2 Technical description. Acetic anhydride is a colorless, corrosive liquid with a very strong, pungent odor.

TABLE II. - Physical constants of acetic anhydride

Boiling point	140.8°C
Flash point	150°F
Freezing point	-73.1°C
Refractive index	1.39038
Solubility data	Soluble in: Alcohol, benzene chloroform, ether, cold water.
Specific gravity (20/20°C)	1.0830

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5.2.3 Use data. Acetic Anhydride, ACS is used widely in organic synthesis, as dehydrating agent in nitrations and other reactions where removal of water is necessary.

5.2.4 Packaging data and labeling. For military use acetic anhydride, ACS is packaged in 1/4 lb unit quantity screw-cap glass bottles. Unless exempted under section 173.244 of Title 49, Code of Federal Regulations, each package for shipment must bear the DoT white label for corrosive liquids. Individual containers must bear the following precautionary label:

ACETIC ANHYDRIDE
DANGER! CAUSES SEVERE BURNS
VAPOR HARMFUL

Do not get liquid or vapor in eyes, on skin, or on clothing.
Do not breathe vapor.

In case of contact, immediately remove contaminated clothing and flush skin or eyes with plenty of water for at least 15 minutes; for eyes, get medical attention.

5.2.5 Storage data. Acetic anhydride should be stored in a cool, well ventilated, dry place in tightly closed containers and away from heat and the direct rays of the sun. It should be located at least 100 ft from continuous sources of ignition. Acetic anhydride should be periodically inspected and monitored. Under these storage conditions, the shelf life is indefinite.

5.3 Name. ACETONE, ACS $(CH_3)_2CO$ FW 58.08
Dimethyl Ketone
2-Propanone (IUPAC)
(HAZARDOUS)

5.3.1 Specifications. See Specifications para 4.10.

5.3.2 Technical description. Acetone is a colorless, volatile, highly flammable liquid and has a characteristic pungent, sweetish odor.

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TABLE III. - Properties of acetone

Boiling point	56.2°C
Flash point (closed cup) (open cup)	0°F 15°F
Freezing point	-93.9°C
Heat of fusion	1.360 kg-cal/mole
Heat of vaporization at boiling point	7.092 kg-cal/mole
Refractive index	1.3589
Solubility data	Soluble in: alcohol, benzene, chloroform, ether, other organic solvents, and water
Specific gravity (20/20°C)	0.7911

5.3.3 Use data. Acetone, ACS is used as a solvent for extractions, in organic synthesis, and in many other laboratory applications.

5.3.4 Packaging data and labeling. For military use acetone, ACS is packaged in 1 pt and 1 gal unit quantity glass bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids. Individual containers must bear the following precautionary label:

ACETONE
DANGER! EXTREMELY FLAMMABLE

Keep away from heat, sparks, and open flame.
Keep container closed.
Use with adequate ventilation.
Avoid prolonged or repeated contact with skin.

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5.3.5 Storage data. Acetone should be stored in a cool, well ventilated place. It should be stored away from heat and open flame. The container should be kept tightly closed when not in use. Under proper storage conditions, the shelf life is indefinite.

5.4 Name. ACETONE, FOR SPECTROPHOTOMETRY, ACS $(\text{CH}_3)_2\text{CO}$ FW 58.08
(HAZARDOUS)

5.4.1 Specifications. See Specifications para 4.10.

5.4.2 Technical description. Acetone, for spectrophotometry differs from acetone, ACS in that it is triply refined. For physical data, see ACETONE, 5.3.2.

5.4.3 Use data. Acetone, for spectrophotometry, ACS is intended for use in spectrophotometry.

5.4.4 Packaging data and labeling. For military use acetone, for spectrophotometry, ACS is packaged in 1 pt and 1 qt unit quantity nonactinic glass bottles. See ACETONE, 5.3.4 for labeling requirements.

5.4.5 Storage data. See ACETONE, 5.3.5.

5.5 Name ACETONITRILE, ACS CH_3CN FW 41.05
Cyanomethane
Ethanenitrile (IUPAC)
Methyl Cyanide
(HAZARDOUS)

5.5.1 Specifications. See Specifications para 4.10.

5.5.2 Technical description. Acetonitrile is a colorless liquid with an ether-like odor.

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TABLE IV. - Physical constants of acetonitrile

Boiling point	81.6°C
Flash point (Cleveland open cup)	42°F
Melting point	-44.9°C
Refractive index (20°C)	1.3441
Solubility data	Miscible in water, alcohol, most organic solvents, and unsaturated hydrocarbons. Immiscible with many saturated hydrocarbons.
Specific gravity (20°C)	0.7856

5.5.3 Use data. Acetonitrile, ACS is used in organic synthesis, to extract fatty acids, to recrystallize steroids and as a solvent in non-aqueous titrations.

5.5.4 Packaging data and labeling. For military use, acetonitrile, ACS is packaged in 1 pt and 1 qt unit bottles. Unless exempted under section 173.118 of Title 49, Code of Federal Regulations, each shipping container must bear the DOT red label for flammable liquids. In addition, each bottle must bear the following precautionary label:

ACETONITRILE
WARNING! FLAMMABLE
EMITS HIGHLY TOXIC FUMES
WHEN HEATED TO DECOMPOSITION

Keep away from heat, sparks, or open flame.
Use with adequate ventilation.
Avoid breathing vapor or fumes.
Avoid contact with skin or eyes.
In case of contact, immediately flush skin or eyes
with plenty of water for at least 15 minutes;
for eyes, get medical attention.

5.5.5 Storage data. Acetonitrile should be stored in tightly closed, plainly labeled containers in a cool, dry, well ventilated area away from acute fire hazards, open flame, and oxidizing materials. Under these storage conditions, the shelf life is indefinite. Periodic inspections for leakage or spillage should be made.

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5.6 Name. ALUMINUM, ACS

Al

AW 26.98

5.6.1 Specifications. See Specifications para 4.10.

5.6.2 Technical description. Aluminum is a tin-white, malleable, ductile metal with a somewhat bluish tint. In moist air it gradually oxidizes superficially. It does not vaporize even at high temperatures. Its specific gravity is 2.70, its melting point is 660.1°C and its boiling point is 2450°C. It is dissolved by dilute hydrochloric acid, sulfuric acid and alkalies.

5.6.3 Use data. Aluminum, ACS is used in testing for gold, arsenic, and mercury; for coagulating colloidal solutions of arsenic or antimony; and as a reducer for determining nitrates and nitrites.

5.6.4 Packaging data and labeling. For military use aluminum, ACS is packaged in wire form in 1 lb unit quantity bottles or cans. There are no applicable DoT packaging or shipping regulations for this chemical.

5.6.5 Storage data. Aluminum should be stored in a dry area at a temperature between 50°F and 80°F and at least one yard from radiators or steam pipes. Aluminum will last indefinitely when kept in tightly closed containers.

5.7 Name. ALUMINUM POTASSIUM SULFATE, DODECAHYDRATE, ACS $\text{AlK}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$
 Alum FW 474.39

5.7.1 Specifications. See Specifications para 4.10.

5.7.2 Technical description. Aluminum potassium sulfate, dodecahydrate, is in the form of colorless crystals or a white, crystalline powder. Its specific gravity (20/14°C) is 1.757. At a temperature of 64.5°C, the salt loses 75% of its water of hydration to form the trihydrate. Its melting point is 92°C. Aluminum potassium sulfate, dodecahydrate, is soluble in dilute acid, in cold water, and very soluble in hot water. It is insoluble in ethyl alcohol or acetone.

5.7.3 Use data. See Use data para 4.9.

5.7.4 Packaging data and labeling. For military use this inorganic salt is packaged in 1 lb and 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.7.5 Storage data. Aluminum potassium sulfate, dodecahydrate should be stored in a cool, dry place in containers tightly closed. Under these storage conditions, the shelf life is indefinite.

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5.8 Name. AMMONIUM ACETATE, ACS $\text{CH}_3\text{COONH}_4$ FW 77.08

5.8.1 Specifications See Specifications para 4.10.

5.8.2 Technical description. Ammonium acetate is in the form of colorless, very hygroscopic, deliquescent crystals or white, crystalline masses. Its specific gravity is 1.073. It melts at a temperature of 114°C and decomposes upon further heating. It has a slight odor of acetic acid. It is very soluble in cold water, in which it has a solubility of 148 grams in 100 cc of water at 4°C ; it decomposes in hot water. It is soluble in ethyl alcohol or methanol and is slightly soluble in acetone.

5.8.3 Use data. Ammonium acetate, ACS is used as a reagent in analytical chemistry for determining lead and iron and for separating lead sulfate from other sulfate.

5.8.4 Packaging data and labeling. For military use this salt is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.8.5 Storage data. Ammonium acetate should be stored in a cool, dry place in tightly closed containers. Under these conditions, the shelf life is indefinite.

5.9 Name. AMMONIUM CARBONATE, ACS

Note. This product is a mixture of variable proportions of ammonium carbonate and ammonium carbamate.

5.9.1 Specifications. See Specifications para 4.10.

5.9.2 Technical description. Ammonium carbonate, ACS is in the form of colorless crystals or plates or white powder. It is unstable in air, converting to the bicarbonate. It has a strong ammonia odor. At a temperature of 58°C , ammonium carbonate decomposes. It has a solubility in water of 100 grams per 100 ml at 15°C and it decomposes in hot water. It is soluble in dilute methanol and insoluble in ammonia, or carbon disulfide.

5.9.3 Use data. See Use data para 4.9.

5.9.4 Packaging data and labeling. For military use ammonium carbonate, ACS is packaged in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

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5.9.5 Storage data. Ammonium carbonate should be stored in a cool, dry area away from acids, acid salts, and salts of iron, zinc, or alum. This material decomposes upon exposure to air and must be kept in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.10 Name. AMMONIUM CHLORIDE, ACS NH_4Cl FW 53.49

5.10.1 Specifications. See Specifications para 4.10.

5.10.2 Technical description. Ammonium chloride is in the form of a colorless, cubic, crystalline solid or a white granular powder. It has a cool, saline taste, is somewhat hygroscopic, and is odorless. Its specific gravity is 1.527. At 200°C, it decomposes; at 337.8°C, the salt sublimates. In water at 0°C, ammonium chloride has a solubility of 29.7 grams per 100 ml of water; at 100°C, its solubility is 75.8 grams per 100 ml of water. It is also soluble in glycerol and liquid ammonia and is slightly soluble in ethyl alcohol. It is insoluble in acetone or ether. Ammonium chloride has a refractive index of 1.642.

5.10.3 Use data. See Use data para 4.9.

5.10.4 Packaging data and labeling. For military use ammonium chloride, ACS is packaged in 1 lb and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.10.5 Storage data. Ammonium chloride should be stored in a cool dry area in tightly closed containers. Under these storage conditions the shelf life is indefinite.

5.11 Name. AMMONIUM CITRATE, DIBASIC, ACS $(\text{NH}_4)_2\text{HC}_6\text{H}_5\text{O}_7$ FW 226.19
Diammonium Citrate

5.11.1 Specifications. See Specifications para 4.10.

5.11.2 Technical description. Ammonium citrate, dibasic, exists in the form of white deliquescent granules or powder. Its specific gravity is 1.48 and it decomposes upon heating. It is very soluble in water and slightly soluble in alcohol.

5.11.3 Use data. Ammonium citrate, dibasic is used as an analytical reagent for determining the amount of phosphate in fertilizer.

5.11.4 Packaging data and labeling. For military use ammonium citrate, dibasic, ACS is packaged in 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

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5.11.5 Storage data. Ammonium citrate should be stored in a cool dry area in tightly closed containers. Under these conditions the shelf life is indefinite.

5.12 Name. AMMONIUM HYDROXIDE, ACS NH_4OH FW 35.05
(HAZARDOUS)

5.12.1 Specifications. See Specifications para 4.10.

5.12.2 Technical description. Ammonium hydroxide, ACS is a colorless liquid with an intense pungent odor of ammonium. The average specific gravity is 0.90. It is soluble in water and produces a strong alkaline reaction.

5.12.3 Use data. Ammonium hydroxide ACS is used in organic synthesis, in inorganic analysis and has a multitude of other applications in the laboratory.

5.12.4 Packaging data and labeling. For military use ammonium hydroxide, ACS is packaged in 5 pt and 1 pt unit quantity bottles with plastic screw-cap. Unless exempted under section 173.244 of Title 49, Code of Federal Regulations, each shipping container must bear the DoT white label for corrosive liquids. Individual containers must bear the following precautionary label:

AMMONIUM HYDROXIDE
WARNING! LIQUID CAUSES BURNS
VAPOR EXTREMELY IRRITATING

Loosen closure cautiously before opening.
Avoid breathing vapor.
Avoid contact with eyes, skin, and clothing
In case of contact, immediately flush skin or eyes with
plenty of water for at least 15 minutes; for eyes, get
medical attention.

5.12.5 Storage data. Ammonium hydroxide should be stored at room temperature in a well-ventilated area. It is a slight fire hazard as it can react with oxidizing materials. Store away from acids and oxidizing materials. Upon prolonged storage, ammonium hydroxide will attack glass, forming a white, siliceous precipitate, after which it should be discarded. Concentrated ammonium hydroxide has a minimum shelf life of one year.

5.13 Name. AMMONIUM IODIDE, ACS NH_4I FW 144.94

5.13.1 Specifications. See Specifications para 4.10.

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5.13.2 - Technical description. Ammonium iodide exists either as white, very hygroscopic crystals or as a granular powder. It is odorless and has a sharp, saline taste. The refractive index of ammonium iodide is 1.7031, and its specific gravity is 2.56. It sublimes with decomposition at 551°C. It is quite soluble in water, having a solubility of 154.2 grams per 100 ml of water at 0°C and a solubility of 250.3 grams per 100 ml of water at 100°C. It is very soluble in alcohol and in acetone and it is slightly soluble in ether.

5.13.3 Use data. See Use data para 4.9.

5.13.4 Packaging data and labeling. For military use, ammonium iodide, ACS is packaged in 1/4 lb unit quantity nonactinic glass bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.13.5 Storage data. Ammonium iodide should be stored in tightly closed nonactinic glass bottles and away from light. Upon exposure to air and light, this compound decomposes somewhat with the liberation of iodine, which will discolor the material to yellow or brown. This material should be discarded if it becomes discolored. Its shelf life depends upon the amount of decomposition it undergoes.

5.14 Name. AMMONIUM MOLYBDATE, TETRAHYDRATE, ACS (HAZARDOUS) $(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$
FW 1235.86

5.14.1 Specifications. See Specifications para 4.10.

5.14.2 Technical description. Ammonium molybdate, tetrahydrate, is in the form of colorless or slightly greenish or yellowish crystals or crystalline powder. The specific gravity of the tetrahydrate is 2.498 and it decomposes upon heating. The solubility of the compound in water at 20°C is 44 grams per 100 ml of water. It is soluble in acid and insoluble in alcohol, ammonia, or acetone.

5.14.3 Use data. Ammonium molybdate, ACS is used to detect and determine phosphates, arsenates, and lead. It is also used as a reagent for alkaloids and many other substances.

5.14.4 Packaging data and labeling. For military use ammonium molybdate, tetrahydrate, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Individual containers must bear the following precaution.

AMMONIUM MOLYBDATE, TETRAHYDRATE
CAUTION! HARMFUL IF SWALLOWED
DUST IRRITATING

Do not take internally.
Avoid contact with skin and eyes.

5.14.5 Storage data. Ammonium molybdate should be stored in tightly closed containers in a cool, dry area. Under these storage conditions its shelf life is indefinite.

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5.15 Name. AMMONIUM NITRATE, ACS NH_4NO_3 FW 80.04
(HAZARDOUS)

5.15.1 Specifications. See Specifications para 4.10.

5.15.2 Technical description. Ammonium nitrate is in the form of transparent, odorless, deliquescent crystals or white granules of specific gravity 1.725. The melting point is 169.6°C ; it decomposes at 210°C . In water, its solubility is 118.3 grams per 100 ml at 0°C and 871 grams per 100 ml at 100°C . Its solubility in ethyl alcohol is 3.8 grams per 100 at 20°C and in methanol is 17.1 grams per 100 ml at 20°C . It is soluble in acetone and ammonia.

5.15.3 Use data. Ammonium nitrate, ACS is used in analytical chemistry in preparation of buffer solution and as a source of ammonium ions.

5.15.4 Packaging data and labeling. For military use ammonium nitrate, ACS is packaged in 1 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. In addition, each bottle must bear the following precautionary label:

AMMONIUM NITRATE
CAUTION! STRONG OXIDANT

Keep away from heat, sparks, and open flame.
Store separately from and avoid contact with combustible materials.

5.15.5 Storage data. Ammonium nitrate should be stored in a cool dry area away from organic and other easily oxidizable substances, acids, and flammable liquids in tightly sealed glass or polyethylene containers. Under these storage conditions its shelf life is indefinite.

5.16 Name. AMMONIUM OXALATE, MONOHYDRATE, ACS $(\text{COONH}_4)_2 \cdot \text{H}_2\text{O}$ FW 142.11
(HAZARDOUS)

5.16.1 Specifications. See Specifications para 4.10.

5.16.2 Technical description. Ammonium oxalate, monohydrate, exists as colorless crystals or white granules. It is odorless and has a specific gravity of 1.501. Upon heating, it decomposes. Its solubility in water is 2.54 grams per 100 ml at 0°C and 11.8 grams per 100 ml at 50°C . It is slightly soluble in alcohol and insoluble in ammonia.

5.16.3 Use data. Ammonium oxalate, monohydrate, ACS, is used in the detection and determination of calcium, lead, and rare earth metals.

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5.16.4 Packaging data and labeling. For military use ammonium oxalate, monohydrate, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Individual containers must bear the following precautionary label:

AMMONIUM OXALATE, MONOHYDRATE
WARNING! MAY BE FATAL IF SWALLOWED
CAUSES IRRITATION

Avoid contact with skin, eyes, and clothing.
In case of contact, immediately flush skin
or eyes with plenty of water for at least
15 minutes; for eyes, get medical attention.

5.16.5 Storage data. Ammonium oxalate should be stored in tightly sealed glass or polyethylene containers in a cool, dry place away from acids and oxidizing agents. Under these conditions the shelf life is indefinite.

5.17 Name. AMMONIUM PERSULFATE, ACS $(\text{NH}_4)_2\text{S}_2\text{O}_8$ FW 228.20
(HAZARDOUS)

5.17.1 Specifications. See Specifications para 4.10.

5.17.2 Technical description. Ammonium persulfate is in the form of colorless crystals or as a white powder. Its refractive index is 1.5016, it is odorless, and it has a specific gravity of 1.98. Heating will cause it to decompose at a temperature of 120°C. Its solubility in water at 0°C is 58.2 grams per 100 ml; it is very soluble in hot water.

5.17.3 Use data. Ammonium persulfate, ACS is used in the detection and determination of manganese.

5.17.4 Packaging data and labeling. For military use ammonium persulfate, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. Unless exempted under section 173.153 of Title 49, Code of Federal Regulations, shipping containers must bear the DoT yellow label for oxidizing materials. In addition, each bottle must bear the following precautionary label:

AMMONIUM PERSULFATE
CAUTION! STRONG OXIDANT

Store separately from and avoid contact
with combustible materials.

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5.17.5 Storage data. Ammonium persulfate should be stored in a cool dry area away from reducing agents and organic matter in tightly sealed containers. Because of inherent instability this reagent may be expected to decrease in strength and to increase in acidity during storage. After storage for some time the reagent may fail to meet specified requirements. The shelf life of this reagent is approximately 8 to 10 months. Although there is no specific timetable for periodic inspections, it should be inspected frequently.

5.18 Name. AMMONIUM PHOSPHATE, DIBASIC, ACS $(\text{NH}_4)_2\text{HPO}_4$ FW 132.06
 Ammonium Phosphate, Secondary
 Diammonium hydrogen phosphate

5.18.1 Specifications. See Specifications para 4.10.

5.18.2 Technical description. Ammonium phosphate, dibasic is in the form of white crystals or a white, crystalline powder. The material is odorless, has a cool, saline taste, and has a specific gravity of 1.619. Its refractive index is 1.53. Its solubility in water at 15°C is 131 grams per 100 ml and it is insoluble in alcohol or acetone. It decomposes upon heating.

5.18.3 Use data. See Use data para 4.9.

5.18.4 Packaging data and labeling. For military use, ammonium phosphate, dibasic, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.18.5 Storage data. Ammonium phosphate, dibasic should be stored in glass or polyethylene containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.19 Name. AMMONIUM PHOSPHATE, MONOBASIC, ACS $\text{NH}_4\text{H}_2\text{PO}_4$ FW 115.03
 Ammonium Phosphate, Primary
 Ammonium Dihydrogen Phosphate

5.19.1 Specifications. See Specifications para 4.10.

5.19.2 Technical description. Ammonium phosphate, monobasic, is in the form of brilliant white crystals or a white crystalline powder. It has a specific gravity of 1.803, a refractive index of 1.5246, and is odorless. Its solubility in water at 0°C is 22.7 grams per 100 ml and at 100°C is 173.2 grams per 100 ml. It is slightly soluble in alcohol and insoluble in acetone.

5.19.3 Use data. See Use data para 4.9.

5.19.4 Packaging data and labeling. For military use ammonium phosphate, monobasic, ACS is packaged in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

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5.19.5 Storage data. See AMMONIUM PHOSPHATE, DIBASIC, 5.18.5

5.20 Name. AMMONIUM SULFATE, ACS $(\text{NH}_4)_2\text{SO}_4$ FW 132.14

5.20.1 Specifications. See Specifications para 4.10.

5.20.2 Technical description. Ammonium sulfate is in the form of colorless crystals or a white, crystalline powder. Its specific gravity is 1.769 and it is odorless. At temperatures above 235°C it decomposes. It dissolves well in water, having a solubility of 76 grams per 100 ml of water at 25°C. It is insoluble in alcohol and acetone.

5.20.3 Use data. See Use data para 4.9.

5.20.4 Packaging data and labeling. For military use ammonium sulfate, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.20.5 Storage data. Ammonium sulfate, ACS should be stored in tightly closed glass or polyethylene containers in a cool, dry place. When stored under these conditions, the shelf life is indefinite.

5.21 Name. AMMONIUM THIOCYANATE ACS NH_4SCN FW 76.12
Ammonium Sulfocyanate

5.21.1 Specifications. See Specifications para 4.10.

5.21.2 Technical description. Ammonium thiocyanate is in the form of white or slightly yellow, deliquescent crystals. Its specific gravity is 1.305 and its refractive index is 1.685. The crystals will melt at a temperature of 149.6°C and will decompose at a temperature of 170°C. In water, the compound is quite soluble, having a solubility of 170 grams per 100 ml of water at 20°C. It is soluble in alcohol, acetone, and ammonia.

5.21.3 Use data. Ammonium thiocyanate, ACS is used for detecting small quantities of iron and for determining silver and mercury.

5.21.4 Packaging data and labeling. For military use, ammonium thiocyanate, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.21.5 Storage data. Ammonium thiocyanate should be stored in tightly sealed nonactinic glass containers in a cool, dry place. When stored as recommended the shelf life is indefinite.

5.22 Name. AMYL ALCOHOL, ACS $(\text{CH}_3)_2\text{CHCH}_2\text{CH}_2\text{OH}$ FW 88.15
Isopentyl Alcohol
Isoamyl Alcohol
3-Methyl-1-butanol (IUPAC)
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5.22.1 Specifications. See Specifications para 4.10.

5.22.2 Technical description. Amyl alcohol, ACS is not to be confused with other isomers bearing the name "amyl alcohol." All isomers have the same chemical formula, but differ in their molecular structure. Usually, the manufacturer's label will bear one of the three synonyms listed in 5.22. This alcohol is a colorless liquid with a very disagreeable odor and a pungent, repulsive taste.

TABLE V. - Physical constants of amyl alcohol

Boiling point	132.0°C
Flash point (closed cup)	114°F
Freezing point	-117.2°C
Refractive index	1.4075
Solubility data	Solubility in water: 2.67 grams per 100 ml at 22°C. Miscible in alcohol or ether.
Specific gravity (15/4°C)	0.813

5.22.3 Use data. Amyl alcohol, ACS is used in organic synthesis, for the determination of fat in milk, in microscopy, and as a general laboratory solvent.

5.22.4 Packaging data and labeling. For military use amyl alcohol, ACS is packaged in 1/4 lb unit quantity bottles. There are no applicable DOT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

AMYL ALCOHOL
WARNING! POISONOUS IF SWALLOWED
IRRITATING TO THE EYES,
NOSE, AND THROAT

Use with adequate ventilation.
Avoid breathing vapor.
Wash thoroughly after handling.
Keep away from heat, sparks, or
open flame.

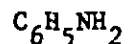
POISON
CALL A PHYSICIAN

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5.22.5 Storage data. Amyl alcohol should be stored in tightly sealed containers in a cool, well ventilated place out of the direct rays of the sun and other sources of heat or flame. Under these storage conditions, the shelf life is indefinite.

5.23 Name. ANILINE, ACS
Aminobenzene
Phenylamine
(HAZARDOUS)



FW 93.13

5.23.1 Specifications. See Specifications para 4.10.

5.23.2 Technical description. Aniline is a colorless, oily liquid; exposure to air and light, however, rapidly give aniline a reddish brown color. It has a characteristic odor and a burning taste.

TABLE VI. - Physical constants of aniline

Boiling point	184.4°C
Flash point (open cup)	168°F
Freezing point	-6.2°C
Refractive index (20°C)	1.5863
Solubility data:	Solubility in water: 3.4 grams per 100 ml (20°C). Soluble in alcohol, benzene, or ether.
Specific gravity	1.022

5.23.3 Use data. See Use data para 4.9.

5.23.4 Packaging data and labeling. For military use aniline, ACS is packaged in 1/4 pint and 1 pint unit quantity nonactinic bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT poison B label. Individual containers must bear the following precautionary label:

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ANILINE

DANGER! EXTREMELY HAZARDOUS LIQUID AND VAPOR
RAPIDLY ABSORBED THROUGH SKIN

Do not get in eyes, on skin, on clothing.

Avoid breathing vapor.

Use only with adequate ventilation.

In case of contact, immediately remove all contaminated clothing, including shoes, and flush skin or eyes with plenty of water for at least 15 minutes; get medical attention.

POISON

CALL A PHYSICIAN

5.23.5 Storage data. Aniline should be stored in tightly sealed, nonactinic containers in a cool, well-ventilated area out of the direct rays of the sun and away from sources of heat and flame and away from oxidizing agents. Aniline should be periodically inspected and monitored while in storage for leakage or breakage. Under these storage conditions, the shelf life is indefinite.

5.24	Name.	ARSENIC TRIOXIDE, ACS	As_2O_3	FW 197.84
		Arsenous Acid		
		Arsenous Acid Anhydride		
		Arsenous Oxide		
		(HAZARDOUS)		

5.24.1 Specifications. See Specifications para 4.10.

5.24.2 Technical description. Arsenic trioxide is in the form of odorless white or transparent glassy amorphous lumps or crystalline powder. When slowly heated it sublimes unchanged without fusion, while the amorphous first fuses, then sublimes. It is only very slightly soluble in cold water, slightly soluble in hot water, dilute hydrochloric acid, and in alkali hydroxide or carbonate solutions. It is practically insoluble in alcohol, chloroform or ether. It is freely soluble in glycerol. Arsenic trioxide has a refractive index of 1.755 and a specific gravity of 3.865 at 25/4°C.

5.24.3 Use data. Arsenic trioxide, ACS is used in analytical chemistry as a primary standard as it is of sufficient purity to be used for standardizing titrimetric solutions or which may be used for the preparation of volumetric solutions.

5.24.4 Packaging data and labeling. For military use arsenic trioxide is packaged in 1/4 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT poison B label unless exempted under section 173.364 of Title 49, Code of Federal Regulations. Individual containers must bear the following precautionary label:

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ARSENIC TRIOXIDE

DANGER! MAY BE FATAL IF SWALLOWED

Avoid breathing dust or spray mist.
 Avoid contact with skin, eyes, and clothing.
 Wash thoroughly after handling.

5.24.5 Storage data. Arsenic trioxide should be stored in tightly sealed glass containers away from food products. This material is nondeliquescent, nonhygroscopic, nonexplosive, and noncombustible and it is not sensitive to light. When stored under these conditions, its shelf life is indefinite.

5.25 Name. AURINTRICARBOXYLIC ACID, AMMONIUM SALT, ACS
 $(\text{HOC}_6\text{H}_3\text{COONH}_4)_2\text{C}:\text{C}_6\text{H}_3(\text{COONH}_4):0$ FW 473.44

5.25.1 Specifications. See Specifications para 4.10.

5.25.2 Technical description. Aurintricarboxylic acid, ammonium salt is a yellowish-brown, glassy powder which is freely soluble in water. It is prepared by reacting sodium nitrite with salicylic acid and adding formaldehyde, then treating with ammonia.

5.25.3 Use data. Aurintricarboxylic acid, ammonium salt, ACS is used in the detection and colorimetric estimation of aluminum in water, foods and tissues.

5.25.4 Packaging data and labeling. For military use, aurintricarboxylic acid, ammonium salt, ACS is packaged in 25 gram and 100 gram unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.25.5 Storage data. Aurintricarboxylic acid, ammonium salt should be stored in tightly closed containers in a cool, dry area away from direct sunlight. Under these conditions, the shelf life is indefinite.

5.26 Name. BARIUM ACETATE, ACS $(\text{CH}_3\text{COO})_2\text{Ba}$ FW 255.43

5.26.1 Specifications. See Specifications para 4.10.

5.26.2 Technical description. Barium acetate is in the form of colorless crystals. It has a specific gravity of 2.468. Melting point and boiling point are not known. It has a solubility in water of 58.8 grams per 100 ml at 0°C and 75.0 grams per 100 ml at 100°C.

5.26.3 Use data. See Use data para 4.9.

5.26.4 Packaging data and labeling. For military use barium acetate, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

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5.26.5 Storage data. Barium acetate should be stored in tightly closed glass containers in a cool, dry place. Under these storage conditions, its shelf life is indefinite.

5.27 Name. BARIUM CARBONATE, ACS BaCO_3 FW 197.35

5.27.1 Specifications. See Specifications para 4.10.

5.27.2 Technical description. Barium carbonate is an odorless, heavy, white powder. It has a refractive index of 1.676, a specific gravity of 4.275, and melting point of 811°C . It decomposes at a temperature of 1450°C . It dissolves in dilute hydrochloric acid, nitric acid, or acetic acid and it is also soluble in a solution of ammonium chloride or ammonium nitrate. It is insoluble in water.

5.27.3 Use data. See Use data para 4.9.

5.27.4 Packaging data and labeling. For military use barium carbonate, ACS is packaged in 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.27.5 Storage data. Barium carbonate should be stored in tightly sealed containers in a cool, dry area. If stored under these conditions the shelf life is indefinite.

5.28 Name. BARIUM CHLORIDE, DIHYDRATE, ACS $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ FW 244.28
(HAZARDOUS)

5.28.1 Specifications. See Specifications para 4.10.

5.28.2 Technical description. Barium chloride, dihydrate, exists as colorless, flat crystals or as granules or powder. At 100°C , the material loses its water of hydration and at 962°C , the anhydrous barium chloride melts. It has a bitter, salty taste. Its refractive index is 1.646 and its specific gravity is 3.097. In water at 20°C , its solubility is 35.7 grams per 100 ml; it is insoluble in alcohol.

5.28.3 Use data. See Use data para 4.9.

5.28.4 Packaging data and labeling. Barium chloride, dihydrate, ACS is packaged for military use in 5 lb, 1 lb, and 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. It must bear the following precautionary label:

BARIUM CHLORIDE
DANGER! MAY BE FATAL IF SWALLOWED
Do not take internally.
Avoid breathing dust.
Wash thoroughly after handling.

POISON
CALL A PHYSICIAN

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5.28.5 Storage data. Barium chloride, dihydrate, should be stored in tightly sealed containers in a cool dry area. It is not a fire hazard. Under these storage conditions, the shelf life is indefinite.

5.29 Name. BARIUM HYDROXIDE, OCTAHYDRATE, ACS $\text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$ FW 315.48

5.29.1 Specifications. See Specifications para 4.10.

5.29.2 Technical description. Barium hydroxide, octahydrate is in the form of transparent crystals or white masses. It has a refractive index of 1.5071 and a specific gravity of 2.188. Its melting point is 77.9°C. At 100°C, the substance loses seven water molecules. Its solubility in water at 15°C is 5.6 grams per 100 ml and it is soluble in ether and slightly soluble in alcohol.

5.29.3 Use data. See Use data para 4.9.

5.29.4 Packaging data and labeling. For military use barium hydroxide, octahydrate, ACS is packaged in 1 lb and 1/4 lb quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.29.5 Storage data. Barium hydroxide, octahydrate should be stored in a cool, dry place in tightly sealed containers. The material will absorb carbon dioxide rapidly if exposed to the air. The material presents no fire hazard. The shelf life is from six to twelve months.

5.30 Name. BARIUM NITRATE, ACS $\text{Ba}(\text{NO}_3)_2$ FW 261.35
(HAZARDOUS)

5.30.1 Specifications. See Specifications para 4.10.

5.30.2 Technical description. Barium nitrate is in the form of lustrous, white crystals or a crystalline powder. Its refractive index is 1.572 and its specific gravity is 3.244. It melts at a temperature of 590°C and decomposes at higher temperatures. Its solubility in water at 20°C is 8.7 grams per 100 ml. It is insoluble in alcohol.

5.30.3 Use data. See Use data para 4.9.

5.30.4 Packaging data and labeling. Barium nitrate, ACS is packaged for military use in 1 lb and 1/4 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. In addition, each bottle must bear the following precautionary label:

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BARIUM NITRATE
WARNING! HARMFUL IF SWALLOWED
STRONG OXIDANT

Do not take internally.
Avoid breathing dust.
Wash thoroughly after handling.
Store separately from and avoid contact with
combustible materials.

5.30.5 Storage data. Barium nitrate should be stored in tightly sealed containers in a cool dry place away from areas of acute fire hazard. Under these conditions the shelf life is indefinite.

5.31 Name. BENZENE, ACS C_6H_6 FW 78.11
Benzol
(HAZARDOUS)

5.31.1 Specification. See Specifications para 4.10.

5.31.2 Technical description. Benzene, ACS is a clear, colorless liquid with a characteristic odor. It is highly flammable.

TABLE VII. - Physical constants of benzene

Boiling point	80.1°C
Flash point (closed cup)	12°F
Freezing point	5.5°C
Refractive index	1.5011
Solubility data	Slight solubility in water miscible with: alcohol, chloroform, ether, carbon disulfide, carbon tetra- chloride, glacial acetic acid, acetone, oils.
Specific gravity (15/4°C)	0.8787

5.31.3 Use data. Benzene, ACS is used in the laboratory in organic synthesis and as a general laboratory solvent.

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5.31.4 Packaging data and labeling. For military use benzene, ACS is packaged in 1 pt, 1 qt, and 1 gal unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Individual containers must bear the following precautionary label:

BENZENE
DANGER! EXTREMELY FLAMMABLE
VAPOR HARMFUL

Keep away from heat, sparks, and open flame.
Keep container closed.
Use only with adequate ventilation.
Avoid prolonged or repeated breathing of vapor.
Avoid prolonged or repeated contact with skin.

POISON
CALL A PHYSICIAN

5.31.5 Storage data. Benzene is an extremely volatile, flammable liquid. Store in tightly closed containers in a cool place away from heat, sparks, or open flames. Periodic checks for leakage are recommended. Under these storage conditions, the shelf life is indefinite.

5.32 Name. BENZENE, FOR SPECTROPHOTOMETRY, ACS C_6H_6 FW 78.11
(HAZARDOUS)

5.32.1 Specifications. See Specifications para 4.10.

5.32.2 Technical description. Benzene, for spectrophotometry, ACS is especially refined for use in spectrophotometry where a low absorbance in the ultraviolet range is necessary. For physical constants, see BENZENE, 5.31.2.

5.32.3 Use data. Benzene, for spectrophotometry, ACS is intended for military use in spectrophotometry.

5.32.4 Packaging data and labeling. For military use benzene, for spectrophotometry, ACS is packaged in 1 pt, 1 qt, and 1 gal unit quantity bottles. See BENZENE, 5.31.4, for labeling requirements.

5.32.5 Storage data. See BENZENE, 5.31.5.

5.33 Name. BENZOIC ACID, ACS C_6H_5COOH FW 122.12
Benzene Carboxylic Acid
Phenylformic Acid

5.33.1 Specifications. See Specifications para 4.10.

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5.33.2 Technical description. Benzoic acid is in the form of white scales or needlelike crystals and has the odor of benzoin or benzaldehyde.

TABLE VIII. - Physical constants of benzoic acid

Boiling point	249.2°C
Flash point (closed cup)	250°F
Melting point	122.4°C begins to sublime around 100°C
Refractive index	1.5397 (15°C)
Solubility data	Slightly soluble in water Solubility in: alcohol 47.1 g per 100 ml at 15°C. Ether - 40 g per 100 ml at 15°C. Soluble in benzene, carbon disulfide, carbon tetrachloride, chloroform, and turpentine.
Specific gravity	1.321 (also reported as 1.266)

5.33.3 Use data. Benzoic acid, ACS is used in analytical chemistry as a standard in volumetric and colorimetric analysis.

5.33.4 Packaging data and labeling. Benzoic acid, ACS is packaged for military use in 1 lb unit quantity bottles. There are no applicable DOT packaging or shipping regulations for this chemical.

5.33.5 Storage data. Benzoic acid should be stored in tightly sealed containers in a cool, well-ventilated area, away from open flame, areas of acute fire hazard, and powerful oxidizing agents. Shelf life is indefinite under these storage conditions.

5.34 Name. BORIC ACID, ACS H_3BO_3 FW 61.83
Boracic Acid
(HAZARDOUS)

5.34.1 Specifications. See Specifications para 4.10.

5.34.2 Technical description. Boric acid is in the form of transparent, colorless odorless crystals or a smooth, white powder. It is the hydrous form of boric oxide; it is stable in air but volatilizes with water vapor. The specific gravity is 1.435(15/4°C); the refractive indexes

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are 1.337, 1.461, and 1.462. At $169 \pm 1^\circ\text{C}$ it transforms to HBO_2 , at 300°C it loses 1-1/2 molecules of water. Boric acid has a solubility of 5.15 grams per 100 ml of water at 21°C and is soluble in alcohol and glycerol.

5.34.3 Use data. See Use data para 4.9.

5.34.4 Packaging data and labeling. For military use, boric acid, ACS is packaged in 1 lb unit quantity glass bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

BORIC ACID
CAUTION! HARMFUL IF SWALLOWED
MAY BE ABSORBED THROUGH
BROKEN SKIN

Do not take internally.
Avoid contact with eyes and
broken skin.
Avoid breathing dust.

5.34.5 Storage data. Boric acid should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.35 Name. BROMINE, ACS Br FW 79.904
(HAZARDOUS)

5.35.1 Specifications. See Specifications para 4.10.

5.35.2 Technical description. Bromine is a very dark reddish brown, fuming liquid with a suffocating, irritating odor. It has a refractive index of 1.661; its specific gravity at 20°C is 3.12 and at 59°C is 2.928. Its melting point is -7.3°C and its boiling point is 58.78°C . Its solubility in water at 20°C is 3.58 grams per 100 ml; it is very soluble in alcohol, ether, chloroform, and carbon disulfide.

5.35.3 Use data. See Use data para 4.9.

5.35.4 Packaging data and labeling. For military use bromine, ACS is packaged in 1 lb and 1/4 lb unit quantity ampules. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT white label for corrosive liquids. Individual containers must have the following precautionary label:

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BROMINE
DANGER! CAUSES SEVERE BURNS
VAPOR HAZARDOUS

Do not get in eyes, on skin, on clothing.
Do not breathe vapor.
Use only with adequate ventilation.
Wear protective clothing when handling.
In case of contact, immediately remove all
contaminated clothing and flush with plenty
of water for at least 15 minutes. Flush eyes
for 30 minutes.
Get medical attention in all cases.
If inhaled, move patient to fresh air, keep
him warm and quiet until physician arrives.

5.35.5 Storage data. Bromine should be stored in a cool, dry place away from direct sunlight and away from areas of acute fire hazard and oxidizable materials, as bromine can cause fires. Bromine attacks all metals and organic tissues. The ampules are not to be opened until actually needed for use. In unopened ampules, the shelf life is indefinite. Periodic inspections should be made to check for leakage.

5.36 Name. BROMOCRESOL GREEN, ACS
Tetrabromo-m-cresolsulfonphthalein
Bromocresol Green

5.36.1 Specifications. See Specifications para 4.10.

5.36.2 Technical description. Bromocresol green is in the form of small, slightly yellow crystals. Its melting range is 218-219°C. It is sparingly soluble in water and soluble in alcohol, ether, and ethyl acetate.

5.36.3 Use data. Bromocresol green, ACS is used as a pH indicator in the pH range of 4.0 to 5.4. At pH 4.0, the indicator solution is yellow; at pH 5.4, the solution is blue.

5.36.4 Packaging data and labeling. For military use bromocresol green, ACS is packaged in 1 gram and 5 gram unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.36.5 Storage data. Store in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.37 Name. BROMOPHENOL BLUE, ACS
Bromphenol Blue
Tetrabromophenolsulfonphthalein

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5.37.1 Specifications. See Specifications para 4.10.

5.37.2 Technical description. Bromophenol blue is in the form of small crystals. It decomposes at 279°C. It is soluble in water, ethyl alcohol, methanol, and benzene.

5.37.3 Use data. Bromophenol blue is a pH indicator for the pH range of 3.0 to 4.6. At pH 3.0, a bromophenol blue solution is yellow in color; at pH 4.6, the solution is purple.

5.37.4 Packaging data and labeling. See BROMOCRESOL GREEN, 5.36.4.

5.37.5 Storage data. See BROMOCRESOL GREEN, 5.36.5.

5.38 Name. BROMOTHYMOL BLUE, ACS
Bromthymol Blue
3,3-dibromothymolsulfonphthalein

5.38.1 Specifications. See Specifications para 4.10.

5.38.2 Technical description. Bromothymol blue is in the form of cream-colored crystals. It is sparingly soluble in water. It is soluble in aqueous solutions of alkalies, alcohol, and ether.

5.38.3 Use data. Bromothymol blue, ACS is a pH indicator in the pH range of 6.0 to 7.6. At pH 6.0, a bromothymol blue solution is yellow; at pH 7.6, the solution is blue.

5.38.4 Packaging data and labeling. For military use, bromothymol blue, ACS is packaged in 1 gram and 5 gram unit quantity bottles. See BROMOCRESOL GREEN, 5.36.4.

5.38.5 Storage data. See BROMOCRESOL GREEN, 5.36.5.

5.39 Name. n-BUTYL ALCOHOL, ACS $\text{CH}_3(\text{CH}_2)_2\text{CH}_2\text{OH}$ FW 74.12
1-Butanol
Butyric Alcohol
(HAZARDOUS)

5.39.1 Specifications. See Specifications para 4.10.

5.39.2 Technical description. Butyl alcohol is a colorless, highly refractive liquid with an odor similar to that of fusel oil, but weaker. It burns with a strongly luminous flame and leaves a transitory greasy spot on paper.

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TABLE IX. - Physical constants of butyl alcohol

Boiling point	117.7°C
Flash point (open cup)	110°F
Freezing point	-79.9°C
Refractive index	1.3974 (25°C)
Solubility data	Solubility in water: 7.9 grams per 100 cc at 20° Miscible in alcohol, ether, and many other organic solvents.
Specific gravity	0.8109 (20/20°C)

5.39.3 Use data. Butyl alcohol, ACS is used in organic synthesis, in microscopy and as a general laboratory solvent.

5.39.4 Packaging data and labeling. Butyl alcohol, ACS is packaged for military use in 1 gal unit quantity bottles. Each bottle must bear the following precautionary label:

n-BUTYL ALCOHOL
WARNING! LIQUID CAUSES EYE BURNS
COMBUSTIBLE

Keep away from heat and open flame.
Avoid contact with the eyes.
Avoid prolonged breathing of vapor.
Do not take internally.
Use with adequate ventilation.
Avoid prolonged or repeated contact with skin.
In case of contact with eyes, immediately flush with
plenty of water for at least 15 minutes;
get medical attention.

5.39.5 Storage data. See AMYL ALCOHOL, 5.22.5.

5.40 Name. CADMIUM CHLORIDE, ANHYDROUS, ACS CdCl_2 FW 183.3
(HAZARDOUS)

5.40.1 Specifications. See Specifications para 4.10.

5.40.2 Technical description. Cadmium chloride, anhydrous, is in the

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form of small, colorless, odorless crystals with a specific gravity of 4.047 at 25°C. Its melting point is 568°C and its boiling point is 960°C. Its solubility in water at 20°C is 140 grams per 100 ml; in alcohol at 15°C, the solubility is 1.52 grams per 100 ml. It is insoluble in acetone and ether.

5.40.3 Use data. Cadmium chloride, anhydrous, ACS is used analytically in testing for pyridine bases and to absorb hydrogen sulfide in the analysis of sulfides.

5.40.4 Packaging data and labeling. For military use anhydrous cadmium chloride, ACS is packaged in 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

CADMIUM CHLORIDE
DANGER! MAY BE FATAL IF SWALLOWED
OR INHALED

Do not take internally.
Do not breathe dust or vapor.
Wash thoroughly after handling.

POISON
CALL A PHYSICIAN

5.40.5 Storage data. Cadmium chloride, anhydrous should be stored in a cool, dry place in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.41 Name. CADMIUM CHLORIDE, CRYSTALS, ACS $\text{CdCl}_2 \cdot 2-1/2\text{H}_2\text{O}$ FW 228.34
(HAZARDOUS)

5.41.1 Specifications. See Specifications para 4.10.

5.41.2 Technical description. This form of cadmium chloride is in the form of small, white crystals with a specific gravity of 3.327. Its refractive index is 1.6513. It undergoes transition to the anhydrous cadmium chloride before its melting point is reached, so its melting and boiling points would be the same as those of the anhydrous form. It has a solubility of 168 grams per 100 ml of water at 20°C and is soluble in alcohol.

5.41.3 Use data. See CADMIUM CHLORIDE, ANHYDROUS, 5.40.3.

5.41.4 Packaging data and labeling. See CADMIUM CHLORIDE, ANHYDROUS, 5.40.4.

5.41.5 Storage data. See CADMIUM CHLORIDE, ANHYDROUS, 5.40.5.

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5.42 Name. CADMIUM SULFATE, ANHYDROUS, ACS CdSO_4 FW 208.46
(HAZARDOUS)

5.42.1 Specifications. See Specifications para 4.10.

5.42.2 Technical description. Cadmium sulfate, anhydrous, is in the form of white crystals with a specific gravity of 4.691. The compound is odorless and melts at 1000°C . Its solubility in water is 76.5 grams per 100 ml at 0°C and 60.8 grams per 100 ml at 100°C . It is insoluble in alcohol, acetone, and ammonia.

5.42.3 Use data. Cadmium sulfate, anhydrous, ACS is used as a catalyst in the Marsh test for arsenic, for determining hydrogen sulfide, and for detecting fumaric acid.

5.42.4 Packaging data and labeling. For military use, anhydrous cadmium sulfate, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. See CADMIUM CHLORIDE, ANHYDROUS, 5.40.4, for labeling requirements.

5.42.5 Storage data. Cadmium sulfate, anhydrous should be stored in a cool, dry place in tightly sealed containers. Under these storage conditions, the shelf life is indefinite.

5.43 Name. CADMIUM SULFATE, CRYSTALS, ACS $3\text{CdSO}_4 \cdot 8\text{H}_2\text{O}$ FW 769.5
(HAZARDOUS)

5.43.1 Specifications. See Specifications para 4.10.

5.43.2 Technical description. Cadmium sulfate, crystals, is in the form of white, efflorescent crystals with a specific gravity of 3.09 and a refractive index of 1.565. It undergoes transition to the anhydrous form before its melting point is reached. Its solubility in water at 0°C is 114.2 grams per 100 ml; at 100°C , the solubility is 87 grams per 100 ml.

5.43.3 Use data. See CADMIUM SULFATE ANHYDROUS 5.42.3

5.43.4 Packaging data and labeling. For military use cadmium sulfate crystals, ACS is packaged in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. See CADMIUM CHLORIDE, ANHYDROUS, 5.40.4, for labeling requirement.

5.43.5 Storage data. See CADMIUM SULFATE, ANHYDROUS, 5.42.5.

5.44 Name. CALCIUM CARBONATE, ACS CaCO_3 FW 100.09

5.44.1 Specifications. See Specifications para 4.10.

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5.44.2 Technical description. Calcium carbonate is in the form of colorless crystals or a white powder. It is tasteless and odorless. Its specific gravity is 2.71; it decomposes at 825°C. It has a very slight solubility in water. It will react with dilute acids to release carbon dioxide gas. Solubility in water increased by ammonium salts.

5.44.3 Use data. Calcium carbonate, ACS is used in analytical chemistry for detecting and determining halogens in organic combinations; with ammonium chloride for decomposing silicates; for preparing calcium chloride solutions for standardizing soap solutions for water analysis.

5.44.4 Packaging data and labeling. For military use, calcium carbonate, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.44.5 Storage data. Calcium carbonate should be stored in a cool, dry place in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.45 Name. CALCIUM CARBONATE, LOW IN ALKALIES, ACS CaCO_3 FW 100.09

5.45.1 Specifications. See Specifications para 4.10.

5.45.2 Technical description. See CALCIUM CARBONATE, 5.44.2. This form of calcium carbonate differs in that it contains a lower percentage of potassium and sodium salts and a generally lower percentage of heavier metals, such as barium.

5.45.3 Use data. See CALCIUM CARBONATE 5.44.3.

5.45.4 Packaging data and labeling. For military use calcium carbonate, ACS, low in alkalies, is packaged in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.45.5 Storage data. See CALCIUM CARBONATE, 5.44.5.

5.46 Name. CALCIUM CHLORIDE, ANHYDROUS, ACS CaCl_2 FW 110.99

5.46.1 Specifications. See Specifications para 4.10.

5.46.2 Technical description. Calcium chloride, anhydrous, in the form of very hygroscopic, colorless crystals, granules, or fused masses of specific gravity 2.152. Its refractive index is 1.52; it melts at 772°C and boils at a temperature greater than 1600°C. Its solubility in water at 0°C is 59.5 grams per 100 ml and at 100°C is 159 grams per 100 ml. It is soluble in alcohol and in acids.

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5.46.3 Use data. Calcium chloride, anhydrous, ACS is generally used as a drying agent. It is used in desiccators, as a drying and dehydrating agent for organic liquids, and for drying gases in chemical analysis.

5.46.4 Packaging data and labeling. Calcium chloride anhydrous, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.46.5 Storage data. Calcium chloride, anhydrous should be stored in a cool, dry place in tightly sealed containers. Avoid any exposure of the chemical to moisture. Under these storage conditions, the shelf life is indefinite.

5.47 Name. CALCIUM CHLORIDE, DIHYDRATE, ACS $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ FW 147.02

5.47.1 Specifications. See Specifications para 4.10.

5.47.2 Technical description. Calcium chloride, dihydrate, is in the form of white, deliquescent granules with an apparent specific gravity of 0.835. Since it loses its water of hydration at a temperature below the melting point of anhydrous calcium chloride (see 5.46.2), its melting and boiling points are those of the anhydrous form. Its solubility in water at 20°C is 130 grams per 100 ml and it is soluble in alcohol.

5.47.3 Use data. See Use data para 4.9.

5.47.4 Packaging data and labeling. For military use calcium chloride, dihydrate, ACS is packaged in 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.47.5 Storage data. See CALCIUM CHLORIDE, ANHYDROUS, 5.46.5.

5.48 Name. CARBON DISULFIDE, ACS CS_2 FW 76.14
(HAZARDOUS)

5.48.1 Specifications. See Specifications para 4.10.

5.48.2 Technical description. Carbon disulfide is a highly refractive, mobile, very flammable, colorless or faintly yellow liquid. It is miscible with anhydrous methanol, ethanol, ether, benzene, chloroform, and carbon tetrachloride.

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TABLE X. - Physical constants of carbon disulfide

Boiling point	46.3°C
Flash point (closed cup)	-22°F
Freezing point	-108.6°C
Refractive index	1.6232
Solubility data	Slight solubility in water.
Specific gravity	1.2626 (20°C)

5.48.3 Use data. Carbon disulfide, ACS is used as a solvent for phosphorus, sulfur, selenium, bromine, iodine, fats, and resins.

5.48.4 Packaging data and labeling. For military use carbon disulfide, ACS is packaged in 1 pt unit quantity screw-cap bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids. Individual containers must bear the following precautionary label:

CARBON DISULFIDE
DANGER! EXTREMELY FLAMMABLE
VAPOR HARMFUL
HIGHLY VOLATILE

Keep away from fire, sparks, or heated surfaces.
Store in cool place and keep container closed.
Use only with adequate ventilation.
Avoid breathing vapor.
Avoid contact with skin and eyes.

POISON
CALL A PHYSICIAN

5.48.5 Storage data. Carbon disulfide presents an acute fire and explosion hazard as it can be ignited by hot steam pipes or heat from a lighted electric bulb. It should be stored in a cool, dry, well-ventilated area in tightly sealed, nonactinic glass bottles away from all possible sources of heat, flame, or sparks. Under these storage conditions, the shelf life is indefinite.

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5.49 Name. CARBON TETRACHLORIDE, ACS CCl_4 FW 153.82
Tetrachloromethane
(HAZARDOUS)

5.49.1 Specifications. See Specifications para 4.10.

5.49.2 Technical description. Carbon tetrachloride is a clear, colorless, nonflammable, heavy liquid of specific gravity 1.594 and refractive index 1.4607. Its melting point (freezing point) is -23°C and its boiling point is 76.75°C . It has a characteristic odor. It is slightly soluble in water and miscible with alcohol, ether, chloroform, benzene, and solvent naphtha.

5.49.3 Use data. Carbon tetrachloride, ACS is used as a chlorinating agent in organic synthesis and as a general laboratory solvent.

5.49.4 Packaging data and labeling. For military use carbon tetrachloride, ACS is packaged in 1 pt unit quantity bottles and 5 gal unit quantity cans. There are no applicable DOT packaging or shipping regulations for this chemical. Individual containers must bear the following precautionary label:

CARBON TETRACHLORIDE
DANGER! HAZARDOUS VAPOR AND LIQUID
MAY BE FATAL IF INHALED OR SWALLOWED

Use only with adequate ventilation.
Do not breathe vapor.
Avoid prolonged or repeated contact with skin.
Do not take internally.

POISON
CALL A PHYSICIAN

5.49.5 Storage data. Carbon tetrachloride should be stored in a cool, dry, well-ventilated area in tightly sealed containers, away from heat and the direct rays of the sun. Under these storage conditions the shelf life is indefinite.

5.50 Name. CARBON TETRACHLORIDE, FOR SPECTROPHOTOMETRY, ACS CCl_4 FW 153.82
(HAZARDOUS)

5.50.1 Specifications. See Specifications para 4.10.

5.50.2 Technical description. Carbon tetrachloride, for spectrophotometry, ACS is three times refined for the purity required for spectrophotometry. For physical constants, see CARBON TETRACHLORIDE, 5.49.2.

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5.50.3 Use data. Carbon tetrachloride, for spectrophotometry, ACS is intended for use in spectrophotometry.

5.50.4 Packaging data and labeling. For military use carbon tetrachloride, for spectrophotometry, ACS is packaged in 1 qt unit quantity bottles. See CARBON TETRACHLORIDE, 5.49.4., for labeling requirements.

5.50.5 Storage data. See CARBON TETRACHLORIDE, 5.49.5.

5.51 Name. CERIC AMMONIUM NITRATE, ACS $(\text{NH}_4)_2\text{Ce}(\text{NO}_3)_6$ FW 548.23
Ammonium Cerium Nitrate
(HAZARDOUS)

5.51.1 Specifications. See Specifications para 4.10.

5.51.2 Technical description. Ceric ammonium nitrate is in the form of small, prismatic, orange crystals. It is very soluble in water, soluble in alcohol, and insoluble in nitric acid.

5.51.3 Use data. Ceric ammonium nitrate, ACS is used as an oxidant for organic compounds.

5.51.4 Packaging data and labeling. For military use ceric ammonium nitrate, ACS is packaged in 1/4 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Unless exempted under section 173.153 of Title 49, Code of Federal Regulations, shipping containers must bear the DoT yellow label for oxidizing material. In addition, each bottle must bear the following precautionary label:

CERIC AMMONIUM NITRATE
CAUTION! STRONG OXIDANT

Store separately from and avoid contact with combustible materials.

Keep away from heat and open flame.

5.51.5 Storage data. See BARIUM NITRATE, 5.30.5.

5.52 Name. CHLOROFORM, ACS CHCl_3 FW 119.38
Trichloromethane
(HAZARDOUS)

5.52.1 Specifications. See Specifications para 4.10.

5.52.2 Technical description. Chloroform is a clear, colorless, heavy, volatile liquid with a pleasant, sweet odor and a burning sweet taste. On exposure to air and sunlight, chloroform slowly oxidizes to phosgene. Chloroform is nonflammable and nonexplosive in air. It will not support combustion.

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TABLE XI. - Physical constants of chloroform

Boiling point	61.26°C (Range: 58-61.5°C)
Freezing point	63.5°C
Refractive index	1.4476
Solubility data	Solubility in water: 1.0 gram per 100 cc at 15°C. Miscible with alcohol, benzene ether, petroleum ether, carbon disulfide, carbon tetrachloride, and oils.
Specific gravity	1.489 (20°C)

5.52.3 Use data. Chloroform, ACS is used as a solvent for fats, oils, and alkaloids.

5.52.4 Packaging data and labeling. For military use chloroform, ACS is packaged in 1 pt and 5 pt unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Individual containers must bear the following precautionary label:

CHLOROFORM
WARNING! VAPOR HARMFUL

Use only with adequate ventilation.
Avoid breathing vapor.
Avoid prolonged or repeated contact with skin.
Do not take internally.

5.52.5 Storage data. Chloroform should be stored in tightly closed, nonactinic glass bottles in a cool, dry, well-ventilated area away from light. Store away from strong alkalies and moisture. It is corrosive to iron. On exposure to air and sunlight, chloroform slowly oxidizes to phosgene. Chloroform is nonflammable and nonexplosive in air. It will not support combustion. When stored under these conditions, its shelf life is at least 12 months. It should be periodically inspected and monitored for leakage.

5.53 Name. CHLOROFORM, FOR SPECTROPHOTOMETRY, ACS CHCl_3 FW 119.38
(HAZARDOUS)

5.53.1 Specifications. See Specifications para 4.10.

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5.53.2 Technical description. Chloroform for spectrophotometry is triply purified. For physical data, see CHLOROFORM, 5.52.2.

5.53.3 Use data. This grade of chloroform is intended for use in spectrophotometry.

5.53.4 Packaging data and labeling. For military use chloroform for spectrophotometry is packaged in 1 qt unit quantity bottles. For further information, see CHLOROFORM, 5.52.4.

5.53.5 Storage data. See CHLOROFORM, 5.52.5.

5.54 Name. CHROMIUM POTASSIUM SULFATE, DODECAHYDRATE, ACS
 $\text{CrK}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$ FW 499.41
 Potassium chromium sulfate
 (HAZARDOUS)

5.54.1 Specifications. See Specifications para 4.10.

5.54.2 Technical description. Chromium potassium sulfate, dodecahydrate, is in the form of violet-red, slightly efflorescent crystals, or lavender-colored granules or powder; its specific gravity is 1.83. This material melts at 89°C; at 100°C, it loses 10 molecules of its water of hydration and at 400°C it loses all of its water of hydration. It has a solubility in water of 24.39 grams per 100 ml at 25°C; it is soluble in dilute acids and insoluble in alcohol.

5.54.3 Use data. See Use data para 4.9.

5.54.4 Packaging data and labeling. For military use this material is packaged in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

CHROMIUM POTASSIUM SULFATE
 DANGER! HARMFUL IF SWALLOWED
 MAY CAUSE BURNS

Keep container closed.
 Do not get in eyes, on skin, on clothing.
 Do not breathe dust or mist from solutions.
 In case of contact, immediately flush skin
 or eyes with plenty of water for at least
 15 minutes; for eyes, get medical attention.

5.54.5 Storage data. Chromium potassium sulfate, dodecahydrate should be stored in tightly closed containers in a cool, dry well-ventilated place. Under these storage conditions, the shelf life is indefinite.

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5.55 Name. CHROMIUM TRIOXIDE, ACS CrO_3 FW 99.99
 Chromic Acid
 Chromic Anhydride
 (HAZARDOUS)

5.55.1 Specifications. See Specifications para 4.10.

5.55.2 Technical description. Chromium trioxide is in the form of dark, purplish red, deliquescent needles, crystals, or granular powder. It has a specific gravity of 2.70 and its melting point is 196°C . It decomposes above 230°C . Its solubility in water at 15°C is 166 grams per 100 ml. It is a powerful oxidizer and oxidizes alcohol and most other organic solvents, sometimes with dangerous violence.

5.55.3 Use data. See Use data para 4.9.

5.55.4 Packaging data and labeling. For military use, chromium trioxide, ACS is packaged in 1/4 lb bottles. Shipping containers must have a DOT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Each bottle must bear the following precautionary label:

CHROMIUM TRIOXIDE
 DANGER! STRONG OXIDANT
 CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE
 MAY CAUSE BURNS OR EXTERNAL ULCER

Keep container closed.
 Do not get in eyes, on skin, on clothing.
 Do not breathe dust or mist from solutions.
 In case of contact, immediately flush skin
 or eyes with plenty of water for at least
 15 minutes; for eyes, get medical attention.

5.55.5 Storage data. Chromium trioxide should be stored in tightly closed containers in a cool, dry place away from acute fire hazards, reducing agents, and organic materials. Chromium trioxide is not combustible but may ignite other substances. When stored under these conditions, the shelf life is indefinite.

5.56 Name. CITRIC ACID, ANHYDROUS, ACS $\text{HOCOCH}_2\text{C}(\text{OH})(\text{COOH})\text{CH}_2\text{COOH}$
 beta-Hydroxytricarballic acid ² FW 192.13
 2-Hydroxyl-1,2,3-propanetricarboxylic acid

5.56.1 Specifications. See Specifications para 4.10.

5.56.2 Technical description. Citric acid, anhydrous is in the form of colorless crystals with a specific gravity of 1.665. It has a pleasant, sour taste. This compound melts at 153°C , and decomposes upon further heating. It has a solubility in cold water of 133 grams per 100 ml, and in alcohol at 25°C of 116 grams per 100 ml; it is soluble in ether.

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5.56.3 Use data. Citric acid, anhydrous, ACS is used in analytical chemistry for determining citrate soluble phosphorous pentoxide and as a reagent for albumin, mucin, glucose and bile pigments.

5.56.4 Packaging data and labeling. For military use citric acid, anhydrous, ACS is packaged in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.56.5 Storage data. Citric acid, anhydrous, should be stored in a cool, dry place in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.57 Name. CITRIC ACID, MONOHYDRATE, ACS $\text{HOCOCH}_2\text{C}(\text{OH}(\text{CHOH})\text{CH}_2\text{COOH})\cdot\text{H}_2\text{O}$
FW 210.14

5.57.1 Specifications. See Specifications para 4.10.

5.57.2 Technical description. Citric acid, monohydrate, is in the form of colorless, transparent crystals or a white powder of specific gravity 1.542. It is odorless, has a pleasant, sour taste, and is slightly deliquescent in moist air. At 75°C, it loses its water of hydration and exists as the anhydrous form (see 5.56.2). It is soluble in water, alcohol, and ether.

5.57.3 Use data. See CITRIC ACID, ANHYDROUS, ACS, 5.56.3.

5.57.4 Packaging data and labeling. For military use citric acid, monohydrate, ACS is packaged in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.57.5 Storage data. Citric acid, monohydrate should be stored in a cool place in tightly closed containers at temperatures not in excess of 75°F and at a relative humidity of about 50%. This material begins to lose water of crystallization when heated to temperatures of 75°C or more and in dry air. Under these storage conditions the shelf life is indefinite.

5.58 Name. COBALT CHLORIDE, HEXAHYDRATE, ACS $\text{CoCl}_2\cdot 6\text{H}_2\text{O}$ FW 237.93
Cobaltous chloride

5.58.1 Specifications. See Specifications para 4.10.

5.58.2 Technical description. Cobalt chloride, hexahydrate, is in the form of dark-red, slightly deliquescent crystals with specific gravity 1.924 (25/25°C). Its melting point is 86.75°C; at 110°C, it loses its water of hydration; and at 1049°C, the anhydrous form boils. It is soluble in alcohol, ether, acetone, and glycerol. In water, its solubility is 76.7 grams per 100 ml at 0°C and 190.7 grams per 100 ml at 100°C.

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5.58.3 Use data. Cobalt chloride, hexahydrate, ACS is used as an absorbent for gases and in barometers and hygrometers.

5.58.4 Packaging data and labeling. For military use cobalt chloride, ACS is packaged in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.58.5 Storage data. Cobalt chloride, hexahydrate should be stored in a cool, dry place in tightly closed containers. The shelf life should be indefinite if stored under these conditions.

5.59 Name. COBALT NITRATE, HEXAHYDRATE, ACS $\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ FW 291.04
Cobaltous Nitrate
(HAZARDOUS)

5.59.1 Specifications. See Specifications para 4.10.

5.59.2 Technical description. Cobalt nitrate, hexahydrate, is in the form of red, deliquescent crystals or granules with specific gravity 1.88. It melts at 56°C with loss of some water of hydration. Its solubility in water at 0°C is 133.8 grams per 100 ml. It is soluble in alcohol and acetone. Its refractive index is 1.4.

5.59.3 Use data. See Use data para 4.9.

5.59.4 Packaging data and labeling. For military use cobalt nitrate; ACS is packaged in 1 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. In addition, each bottle must bear the following precautionary label:

COBALT NITRATE
CAUTION! STRONG OXIDANT

Store separately from and avoid contact with
combustible materials.

Keep away from heat and open flame.
Do not take internally.

5.59.5 Storage data. Cobalt nitrate, hexahydrate should be stored in a cool, dry area in tightly sealed containers away from readily oxidizable material as it is a strong oxidizer. Under these conditions the shelf life is indefinite.

5.60 Name. COPPER, ACS Cu AW 63.54

5.60.1 Specifications. See Specifications para 4.10.

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5.60.2 Technical description. Copper is a reddish, lustrous, ductile, malleable metal in the form of ingots, sheets, wire or powder. It becomes dull when exposed to air and in moist air it gradually becomes coated with green basic carbonate. Its specific gravity is 8.94, its melting point is 1083°C, and its boiling point is 2582°C. It is soluble in nitric acid, hot concentrated sulfuric acid, and hot concentrated hydrobromic acid. It is slowly soluble in ammonia water.

5.60.3 Use data. See Use data para 4.9.

5.60.4 Packaging data and labeling. For military use copper, ACS (granular form) is packaged in 1 lb and 5 lb unit quantity bottles and copper foil is packaged in 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.60.5 Storage data. Copper should be stored in a cool dry area in tightly sealed containers away from acids and alkalies. Under these storage conditions the shelf life is indefinite.

5.61 Name. CUPFERRON, ACS $C_6H_5N.NO.ONH_4$ FW 155.16
Ammonium nitrosophenylhydroxylamine

5.61.1 Specifications. See Specifications para 4.10.

5.61.2 Technical description. Cupferron is in the form of creamy-white crystals which melt at a temperature of 163-164°C. It is very soluble in water, alcohol, and ether.

5.61.3 Use data. Cupferron, ACS is used as a reagent for separating copper and iron from other metals. It precipitates iron quantitatively from strongly acid solutions. It is also used as a quantitative reagent for vanadates and is suitable for the colorimetric estimation of aluminum.

5.61.4 Packaging data and labeling. For military use cupferron, ACS is packaged in 100 gram unit quantity bottles. Packages of this reagent usually contain a lump or a small cloth-wrapped package of ammonium carbonate as a preservative. There are no applicable DoT shipping regulations for this chemical.

5.61.5 Storage data. Cupferron should be stored in a cool, dry place in tightly closed containers. Cupferron gradually decomposes in long storage. It is recommended that it be used within a year of procurement.

5.62 Name. CUPRIC ACETATE, MONOHYDRATE, ACS $(CH_3COO)_2Cu.H_2O$ FW 199.65
Copper Acetate

5.62.1 Specifications. See Specifications para 4.10.

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5.62.2 Technical description. Cupric acetate is in the form of bluish-green crystals or a green powder with an odor of acetic acid. Its specific gravity is 1.882. It melts at 115°C and decomposes at 240°C. Its solubility in water at 20°C is 7.2 grams per 100 ml; it is soluble in alcohol or ether.

5.62.3 Use data. See Use data para 4.9.

5.62.4 Packaging data and labeling. For military use cupric acetate, monohydrate, ACS is packaged in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.62.5 Storage data. Store in tightly closed containers in a cool, dry place. This material will give off some of its water of crystallization if exposed to dry air. Under these storage conditions, the shelf life is indefinite.

5.63 Name. CUPRIC AMMONIUM CHLORIDE, DIHYDRATE, ACS $\text{CuCl}_2 \cdot 2\text{NH}_4\text{Cl} \cdot 2\text{H}_2\text{O}$
Copper Ammonium Chloride FW 277.46

5.63.1 Specifications. See Specifications para 4.10.

5.63.2 Technical description. Cupric ammonium chloride, dihydrate, is in the form of bluish-green tetragonal crystals or granules with specific gravity 1.98. It decomposes at 110°C. It has a solubility in water of 33.8 grams per 100 ml at 0°C; it is soluble in alcohol and slightly soluble in ammonia.

5.63.3 Use data. See Use data para 4.9.

5.63.4 Packaging data and labeling. Cupric ammonium chloride, dihydrate, ACS is packaged for military use in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.63.5 Storage data. Cupric ammonium chloride should be stored in tightly closed containers in a cool, dry place. The shelf life is indefinite under these storage conditions.

5.64 Name. CUPRIC NITRATE, TRIHYDRATE, ACS $\text{Cu}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$ FW 241.60
Copper Nitrate
(HAZARDOUS)

5.64.1 Specifications. See Specifications para 4.10.

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5.64.2 Technical description. Cupric nitrate, trihydrate, is in the form of blue, prismatic, deliquescent crystals with specific gravity 2.047 at 3.9°C. Its melting point is 114.5°C; at 170°C, the substance loses an HNO_3 molecule. It is very soluble in water, having a solubility of 1270 grams per 100 ml at 100°C; it is soluble in alcohol.

5.64.3 Use data. See Use data para 4.9.

5.64.4 Packaging data and labeling. Cupric nitrate, trihydrate, ACS is packaged for military use in 1 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. In addition, each bottle must bear the following precautionary label:

CUPRIC NITRATE
WARNING! STRONG OXIDANT
HARMFUL IF SWALLOWED

Store separately from and avoid contact with
combustible materials.

5.64.5 Storage data. Cupric nitrate, trihydrate should be stored in tightly closed containers in a dry place away from flammable, easily oxidized material and organic substances. Under these storage conditions, the shelf life is indefinite.

5.65	Name.	CUPRIC OXIDE, POWDERED, ACS	CuO	FW 79.55
		Copper Oxide		

5.65.1 Specifications. See Specifications para 4.10.

5.65.2 Technical description. Cupric oxide is in the form of a brownish-black, amorphous or crystalline powder with specific gravity of 6.45 and refractive index 2.63. It decomposes at 1026°C. It is insoluble in water and soluble in acids.

5.65.3 Use data. Cupric oxide, powdered, ACS is used as an analytical reagent in the determination of carbon in organic compounds.

5.65.4 Packaging data and labeling. For military use cupric oxide, powdered, ACS is packaged in 1/4 lb unit quantity bottles. There are applicable DoT packaging or shipping regulations for this chemical.

5.65.5 Storage data. Cupric oxide, powdered should be stored in tightly closed containers in a cool, dry place. Avoid extremes of heat and cold. This material is somewhat hygroscopic. Under these storage conditions, the shelf life is at least one year.

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5.66 Name. CUPRIC OXIDE, WIRE, ACS CuO FW 79.55

5.66.1 Specifications. See Specifications para 4.10.

5.66.2 Technical description. This form of cupric oxide is in the form of black, thin, short rods (wire). It usually contains a thin core of metallic copper and some cuprous oxide, Cu_2O . The physical constants are the same as those of cupric oxide, powdered, 5.65.2.

5.66.3 Use data. See CUPRIC OXIDE, POWDERED, 5.65.3.

5.66.4 Packaging data and labeling. For military use cupric oxide, wire ACS is packaged in 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.66.5 Storage data. See CUPRIC OXIDE, POWDERED, 5.65.5.

5.67 Name. CUPRIC SULFATE, PENTAHYDRATE, ACS $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ FW 249.68
Copper Sulfate
(HAZARDOUS)

5.67.1 Specifications. See Specifications para 4.10.

5.67.2 Technical description. Cupric sulfate, pentahydrate, is in the form of large, blue, transparent crystals, blue granules, or a light blue powder; its specific gravity is 2.284 and its refractive index is 1.537. At 110°C , the substance loses 4 molecules of its water of hydration; at 150°C , all water is lost. It begins to decompose slowly at 200°C ; above 650°C , the material decomposes to form cupric oxide. Its solubility in water is 31.6 grams per 100 ml at 0°C and 203.3 grams per 100 ml at 100°C . It is soluble in methanol.

5.67.3 Use data. Cupric sulfate, pentahydrate is used as a primary standard in analytical chemistry.

5.67.4 Packaging data and labeling. For military use, cupric sulfate, pentahydrate, ACS is packaged in 1 lb and 170 gram unit quantity bottles in a fine crystalline form, and in 1 lb unit quantity bottles as the larger crystals. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

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CUPRIC SULFATE

CAUTION! HARMFUL IF SWALLOWED
MAY CAUSE SKIN IRRITATION

Avoid contact with skin and eyes.
Wash thoroughly after handling.

5.67.5 Storage data. Cupric sulfate, pentahydrate should be stored in tightly sealed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.68 Name. CUPROUS CHLORIDE, ACS CuCl FW 99.00
(HAZARDOUS)

5.68.1 Specifications. See Specifications para 4.10.

5.68.2 Technical description. Cuprous chloride is in the form of a white or grayish-white crystalline powder with specific gravity 3.53 and refractive index 1.973. Its melting point is 422°C and its boiling point is 1366°C. It is soluble in hydrochloric acid or in ammonia solutions, in which it will form complex ions. It is insoluble in water and alcohol. It oxidizes rapidly in air and becomes greenish in color. It becomes brown on exposure to light.

5.68.3 Use data. Cuprous chloride, ACS, is used in gas analysis to absorb carbon monoxide.

5.68.4 Packaging data and labeling. For military use, cuprous chloride, ACS is packaged in 1 lb unit quantity nonactinic bottles. There are no applicable DOT packaging or shipping regulations for this chemical. See CUPRIC SULFATE, 5.67.4, for labeling requirement.

5.68.5 Storage data. Cuprous chloride, should be stored in tightly closed nonactinic bottles in a cool, dry place away from light. It should be checked periodically for discoloration. Its shelf life is proportional to the amount of exposure to air.

5.69 Name. CYCLOHEXANE, ACS CH₂(CH₂)₄CH FW 84.16
(IUPAC)
Hexahydrobenzene
Hexamethylene
Hexanaphthene
(HAZARDOUS)

5.69.1 Specifications. See Specifications para 4.10.

5.69.2 Technical description. Cyclohexane is a clear, colorless, flammable liquid with a solvent odor, which is pungent when impure.

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TABLE XII. - Physical constants of cyclohexane

Boiling point (755 mm)	81°C
Flash point (closed cup)	-1°F
Melting point	6.5°C
Refractive index (19.5°C)	1.4266
Solubility	Insoluble in water. Miscible with alcohol, methanol, higher alcohols, ether, hydrocarbons, chlori- nated hydrocarbons, amines, and high formula weight fatty acids.
Specific gravity	0.7791

5.69.3 Use data. Cyclohexane, ACS is used in analytical chemistry for molecular weight determination and as a recrystallizing medium in organic synthesis.

5.69.4 Packaging data and labeling. Cyclohexane, ACS is packaged for military use in 1 pt and 1 qt unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Individual containers must bear the following precautionary label:

CYCLOHEXANE
DANGER! EXTREMELY FLAMMABLE

Keep away from heat, sparks, and open flame.
Keep container closed.
Use with adequate ventilation.
Avoid prolonged breathing of vapor.

5.69.5 Storage data. Cyclohexane should be stored in tightly closed containers in a cool, dry, well-ventilated area away from acute fire hazards, open flame, and oxidizing materials. Under these storage conditions the shelf life is indefinite. Periodic checks should be made for leakage or spillage.

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5.70 Name. CYCLOHEXANE, FOR SPECTROPHOTOMETRY, ACS C_6H_{12} FW 84.16
(HAZARDOUS)

5.70.1 Specifications. See Specifications para 4.10.

5.70.2 Technical description. Cyclohexane, for spectrophotometry, ACS is especially refined for use in spectrophotometry where a low absorbance in the ultraviolet range is necessary. For physical constants, see CYCLOHEXANE, 5.69.2.

5.70.3 Use data. Cyclohexane for spectrophotometry, ACS is intended for use in spectrophotometry.

5.70.4 Packaging data and labeling. For military use cyclohexane, for spectrophotometry, ACS is packaged in 500 ml, 1 qt, and 1 gal unit quantity bottles. See CYCLOHEXANE, 5.69.4, for labeling requirements.

5.70.5 Storage data. See CYCLOHEXANE, 5.69.5.

5.71 Name. DEXTROSE, ANHYDROUS, ACS $CH_2OH(CHOH)_4CHO$ FW 180.16
D-Glucose, Anhydrous

5.71.1 Specifications. See Specifications para 4.10.

5.71.2 Technical description. Dextrose is in the form of colorless, needlelike crystals which have a sweet taste; its specific gravity is 1.56 (18/4°C). It decomposes at 147°C. Its solubility in water at 17.5°C is 83 grams per 100 ml; in alcohol at 17.5°C, its solubility is 1.94 grams per 100 ml.

5.71.3 Use data. See Use data para 4.9.

5.71.4 Packaging data and labeling. For military use dextrose, anhydrous, ACS is packaged in 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.71.5 Storage data. Dextrose, anhydrous should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.72 Name. DICHLOROETHANE, ACS CH_2ClCH_2Cl FW 98.96
1,2-Dichloroethane (IUPAC)
Ethylene Chloride
Ethylene Dichloride
(HAZARDOUS)

5.72.1 Specifications. See Specifications para 4.10.

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5.72.2 Technical description. Dichloroethane is a heavy, colorless, flammable liquid with a distinctive, chloroform-like odor and a sweet taste.. Its vapors are irritating.

TABLE XIII. - Physical constants of dichloroethane

Boiling point	84°C
Flash point (open cup)	70°F
Melting point	-35°C
Refractive index (20°C)	1.4448
Solubility	Slightly soluble in water. Very soluble in alcohol.
Specific gravity	1.256

5.72.3 Use data. Dichloroethane, ACS is used in organic synthesis and as a laboratory solvent.

5.72.4 Packaging data and labeling. For military use dichloroethane, ACS is packaged in 1 pt, 1 qt, and 1 gal unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Individual containers must bear the following precautionary label:

DICHLOROETHANE
WARNING! FLAMMABLE
VAPOR HARMFUL

Keep away from heat, sparks, and open flame.
Keep container closed.
Use with adequate ventilation.
Avoid prolonged or repeated breathing of vapor.
Avoid prolonged or repeated contact with skin.
Do not take internally.

5.72.5 Storage data. Dichloroethane should be stored in tightly closed, plainly labeled containers in a cool, dry, ventilated area away from acute fire hazards, open flame, oxidizing materials, and direct sunlight. Under these storage conditions, the shelf life is indefinite. Periodic inspections should be made for leakage or spillage.

5.73 Name. DICHLOROETHANE, FOR SPECTROPHOTOMETRY, ACS $\text{CH}_2\text{ClCH}_2\text{Cl}$ FW 98.96 (HAZARDOUS)

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5.73.1 Specifications. See Specifications para 4.10.

5.73.2 Technical description. Dichloroethane, for spectrophotometry, ACS is especially refined for use in spectrophotometry where a low absorbance in the ultraviolet range is necessary. For physical constants, see DICHLOROETHANE, 5.72.2.

5.73.3 Use data. Dichloroethane, for spectrophotometry, ACS is intended for use in spectrophotometry.

5.73.4 Packaging data and labeling. For military use dichloroethane, for spectrophotometry, ACS is packaged in 100 ml, and 1 lb unit quantity bottles. See DICHLOROETHANE, 5.72.4, for labeling requirements.

5.73.5 Storage data. See DICHLOROETHANE, 5.72.5.

5.74	Name.	DICHLOROMETHANE, ACS	CH_2Cl_2	FW 84.93
		(IUPAC)		
		Methylene Chloride		
		Methylene Dichloride		
		(HAZARDOUS)		

5.74.1 Specifications. See Specifications para 4.10.

5.74.2 Technical description. Dichloromethane is a colorless volatile liquid with a penetrating ether like odor. It has a specific gravity of 1.335 (15/4°C) and a refractive index of 1.3348 (15°C). It freezes at a temperature of -97°C and its boiling point is 40-41°C. Dichloromethane is slightly soluble in water and miscible with alcohol, ether, and dimethylformamide.

5.74.3 Use data. Dichloromethane, ACS is used in organic synthesis and as a laboratory solvent.

5.74.4 Packaging data and labeling. Dichloromethane, ACS is packaged for military use in 1 pt, 1 qt, and 1 gal unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. The following precautionary label must appear on individual containers:

DICHLOROMETHANE

CAUTION!

Use with adequate ventilation.
Avoid prolonged or repeated breathing of vapor.
Avoid prolonged or repeated contact with skin.
Do not take internally.

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5.74.5 Storage data. Dichloromethane, ACS should be stored in a cool, dry, well-ventilated area in tightly closed containers. Store away from acute fire hazards, heat, and direct sunlight. Under these storage conditions, the shelf life is indefinite. Periodic checks should be made for leakage or spillage.

5.75 Name. DICHLOROMETHANE, FOR SPECTROPHOTOMETRY, ACS CH_2Cl_2 FW 84.93
(HAZARDOUS)

5.75.1 Specifications. See Specifications para 4.10.

5.75.2 Technical description. Dichloromethane, for spectrophotometry, ACS is especially refined for use in spectrophotometry where a low absorbance in the ultraviolet range is necessary. For physical constants, see DICHLOROMETHANE, 5.74.2.

5.75.3 Use data. Dichloromethane, for spectrophotometry, ACS is intended for use in spectrophotometry.

5.75.4 Packaging data and labeling. For military use dichloromethane for spectrophotometry, ACS is packaged in 500 ml, 1 qt, and 1 gal unit quantity bottles. See DICHLOROMETHANE, 5.74.4, for labeling requirement.

5.75.5 Storage data. See DICHLOROMETHANE, 5.74.5.

5.76 Name. 2,6-DICHLOROPHENOL-INDOPHENOL SODIUM, ACS $\text{O}:\text{C}_6\text{H}_2\text{Cl}_2:\text{NC}_6\text{H}_4\text{ONa}$
FW 290.08
2,6-Dichlorobenzenone Indophenol Sodium
2,6-Dichloroindophenol Sodium
Sodium 2,6-dichlorophenol-indophenol

5.76.1 Specifications. See Specifications para 4.10.

5.76.2 Technical description. 2,6-Dichlorophenol-indophenol Sodium is in the form of a dark green powder. It is soluble in water and alcohol, insoluble in ether and chloroform. Its solutions are a deep blue, changing to red upon the addition of acid.

5.76.3 Use data. 2,6-Dichlorophenol-indophenol sodium, ACS is used in estimating ascorbic acid (vitamin C), which reduces the dye to a colorless hydroxy compound.

5.76.4 Packaging data and labeling. For military use 2,6-dichlorophenol-indophenol sodium is packaged in 1 gram and 5 gram unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.76.5 Storage data. 2,6-Dichlorophenol-indophenol sodium should be stored in a cool, dry place in tightly closed containers. Under these

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storage conditions, the shelf life is indefinite.

5.77 Name. DIMETHYLFORMAMIDE, ACS $\text{HCON}(\text{CH}_3)_2$ FW 73.10
N,N-Dimethylformamide
(HAZARDOUS)

5.77.1 Specifications. See Specifications para 4.10.

5.77.2 Technical description. Dimethylformamide is a water-white non-corrosive liquid with a faint amine odor. It has a slow rate of evaporation.

TABLE XIV. - Physical constants of dimethylformamide

Boiling point (758 mm)	153°C
Flash point (tag open cup)	153°F
Melting point	-61°C
Refractive index (25°C)	1.4269
Solubility data	Miscible with water, alcohol, ether, benzene, and chloroform.
Specific gravity (25/4°C)	0.9445

5.77.3 Use data. Dimethylformamide, ACS is used in the formulation of organic compounds and is also used where a solvent with a slow rate of evaporation is required.

5.77.4 Packaging data and labeling. For military use dimethylformamide, ACS is packaged in 1 pt, 1 qt, and 1 gal unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

DIMETHYLFORMAMIDE
WARNING! LIQUID AND VAPOR HARMFUL
ABSORBED THROUGH SKIN
CAUSES SKIN IRRITATION

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Do not breathe vapor.
 Use with adequate ventilation.
 Avoid contact with skin, eyes, and clothing.
 In case of contact, immediately remove contaminated clothing and flush skin or eyes with plenty of water for at least 15 minutes; for eyes, get medical attention.

5.77.5 Storage data. Dimethylformamide should be stored in tightly closed containers in a cool, dry well-ventilated area. Store away from acute fire hazards, direct sunlight and oxidizing materials. Under these storage conditions, the shelf life is indefinite. It should be checked periodically for leakage or spillage.

5.78 Name. DIMETHYLFORMAMIDE, FOR SPECTROPHOTOMETRY, ACS $\text{HCON}(\text{CH}_3)_2$
 (HAZARDOUS) FW 73.10

5.78.1 Specifications. See Specifications para 4.10.

5.78.2 Technical description. Dimethylformamide, for spectrophotometry, ACS is especially refined for use in spectrophotometry where a low absorbance in the ultraviolet range is necessary. For physical constants, see DIMETHYLFORMAMIDE, 5.77.2.

5.78.3 Use data. Dimethylformamide, for spectrophotometry, ACS is intended for use in spectrophotometry.

5.78.4 Packaging data and labeling. For military use dimethylformamide, for spectrophotometry, ACS is packaged in 500 ml, 1 qt, and 1 gal unit quantity bottles. See DIMETHYLFORMAMIDE, 5.77.4, for labeling requirement.

5.78.5 Storage data. See DIMETHYLFORMAMIDE, 5.77.5.

5.79 Name. DIMETHYLGLYOXIME, ACS $\text{CH}_3\text{C:NOHC:NOHCH}_3$ FW 116.12
 Butane Dioxime
 2,3-Butanedione Dioxime (IUPAC)
 Diacetyldioxime

5.79.1 Specifications. See Specifications para 4.10.

5.79.2 Technical description. Dimethylglyoxime is in the form of white crystals or powder. It has a melting range of 240-246°C. It is very soluble in alcohol or ether; it is insoluble in water.

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5.79.3 Use data. Dimethylglyoxime, ACS is intended for military use as a general laboratory reagent. Typical commercial applications include use as an analytical reagent in the detection and determination of nickel. It is used to separate lead from tin, gold, rhodium and iridium and to detect bismuth. It is also used in biochemical research.

5.79.4 Packaging data and labeling. For military use dimethylglyoxime, ACS is packaged in 1/4 lb unit quantity bottles. There are no applicable DOT packaging or shipping regulations for this chemical.

5.79.5 Storage data. Dimethylglyoxime should be stored in a cool, dry place in tightly closed containers. Under these conditions, the shelf life is indefinite.

5.80 Name. DIOXANE, ACS $\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{O}$ FW 88.11
 1,4-Diethylene Dioxide
 p-Dioxane
 1,4-Dioxane
 (HAZARDOUS)

5.80.1 Specifications. See Specifications para 4.10.

5.80.2 Technical description. Dioxane is a flammable, colorless liquid with a faint pleasant ethereal odor. It tends to form explosive peroxides, especially when anhydrous. It should not be allowed to evaporate to dryness unless the absence of peroxides has been shown.

TABLE XV. - Physical constants of dioxane

Boiling point	101°C
Flash point (closed cup)	54°F
Melting point	11.8°C
Refractive index (20°C)	1.4224
Solubility data	Miscible with water, alcohol, ether, acetone, acetic acid, and the usual organic solvents.
Specific gravity	1.0336

5.80.3 Use data. Dioxane, ACS is used as a solvent for organic compounds.

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5.80.4 Packaging data and labeling. For military use dioxane, ACS is packaged in 1 pt, 1 qt, and 1 gal unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Individual containers must bear the following precautionary label:

DIOXANE WARNING!
FLAMMABLE VAPOR HARMFUL
TENDS TO FORM EXPLOSIVE PEROXIDES
ESPECIALLY WHEN ANHYDROUS

Keep away from heat, sparks and open flame.
Keep containers closed.
Use only with adequate ventilation.
Avoid prolonged breathing of vapor.
Avoid prolonged or repeated contact with skin.
Do not allow to evaporate to near dryness.
Addition of water or appropriate reducing agent will
lessen peroxide formation.

5.80.5 Storage data. Dioxane should be stored in tightly sealed containers in a cool, dry, well-ventilated area away from acute fire hazards, open flame, sparks, oxidizing materials, and direct sunlight. Dioxane tends to form explosive peroxides; this is accelerated by exposure to air and sunlight. The shelf life is proportional to the amount of exposure to air and bright light. In unopened containers, the shelf life is theoretically indefinite, but it is recommended that dioxane be used within a year of procurement. It should be inspected in storage periodically.

5.81 Name. DIPHENYLAMINE, ACS $(C_6H_5)_2NH$ FW 169.23
Anilinobenzene
Phenylaniline
(HAZARDOUS)

5.81.1 Specifications. See Specifications para 4.10.

5.81.2 Technical description. Diphenylamine is in the form of colorless, monoclinic leaflets and has a floral odor. It becomes discolored when exposed to light.

TABLE XVI. - Physical constants of diphenylamine

Boiling point	302°C
Flash point	307°F
Melting point	52.9°C
Solubility data	Solubility in: Water (25°C) 0.03 grams per 100 cc Alcohol (cold) 44 grams per 100 cc Methanol 57.5 grams per 100 cc Ether very soluble Benzene soluble
Specific gravity (20/20°C)	1.160

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5.81.3 Use data. Diphenylamine, ACS is used in analytical chemistry for the detection of nitrate, chlorates, and other oxidizing substances.

5.81.4 Packaging data and labeling. For military use diphenylamine, ACS is packaged in 100 gram unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

DIPHENYLAMINE
WARNING! HAZARDOUS SOLID
ABSORBED THROUGH SKIN

Do not breathe dust.
Do not get in eyes, on skin, on clothing.
In case of contact, immediately remove
contaminated clothing and flush skin or
eyes with plenty of water for at least
15 minutes. Get medical attention.

5.81.5 Storage data. Diphenylamine should be stored in tightly closed, nonactinic glass bottles in a cool, dry place away from light and away from heat, flames and acute fire hazards. Under these storage conditions, the shelf life is at least one year.

5.82 Name. DISODIUM (ETHYLENEDINITRIL) TETRAACETATE, ACS
 $\text{HOCOCH}_2(\text{NaOCOCH}_2)\text{NCH}_2\text{CH}_2\text{N}(\text{CH}_2\text{COONa})\text{CH}_2\text{COOH} \cdot 2\text{H}_2\text{O}$
 FW 372.24
 (Ethylenedinitrilo) Tetraacetic Acid Disodium Salt
 Disodium Ethylenediaminetetraacetate
 Ethylenediaminetetraacetic Acid Disodium Salt

5.82.1 Specifications. See Specifications para 4.10.

5.82.2 Technical description. Disodium (ethylenedinitrilo) tetraacetate is a white powder with an apparent density of 5 pounds per gallon of volume. It is very soluble in water, its solubility being approximately 103 grams per 100 ml of water. It is a basic substance; a 1% solution has a pH of 11.8. It reacts with most metallic ions to form soluble nonionic metal chelate compounds.

5.82.3 Use data. See Use data para 4.9.

5.82.4 Packaging data and labeling. For military use disodium (ethylenedinitrilo) tetraacetate, ACS is packaged in 1/4 and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.82.5 Storage data. Disodium (ethylenedinitrilo) tetraacetate should be stored in a cool, dry place in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

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5.83 Name. DITHIZONE, ACS $C_6H_5NHNHCSN:NC_6H_5$ FW 256.33
Diphenylthiocarbazone

5.83.1 Specifications. See Specifications para 4.10.

5.83.2 Technical description. Dithizone is in the form of a bluish-black crystalline powder. It is soluble in carbon tetrachloride or chloroform, slightly soluble in alcohol, and insoluble in water. It decomposes at 165-169°C.

5.83.3 Use data. Dithizone, ACS is used as a sensitive reagent for the detection of several heavy metals: cobalt, copper, lead, and mercury. It is much used in the estimation of minute amounts of lead.

5.83.4 Packaging data and labeling. For military use dithizone, ACS is packaged in 10 gram unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.83.5 Storage data. Dithizone should be stored in a cool, dry place in tightly closed containers. Under these conditions the shelf life is indefinite.

5.84 Name. ETHER, ACS $(CH_3CH_2)_2O$ FW 74.12
Diethyl Ether
(HAZARDOUS)

5.84.1 Specifications. See Specifications para 4.10.

5.84.2 Technical description. Ether is a mobile, very volatile, and highly flammable liquid with a sweetish, pungent odor. Ether, ACS contains about 2% alcohol and 0.5% water as stabilizers.

TABLE XVII. - Physical constants of ether

Boiling point	34.6°C (94.3°F)
Flash point (closed cup)	-40°F
Freezing point	-116.3°C
Solubility data	Solubility in water: 7.5 grams per 100 cc (20°C) Miscible with alcohol, chloroform, benzene, concentrated sulfuric acid, and most organic solvents.
Specific gravity (20/4°C)	0.7135

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5.84.3 Use data. Ether, ACS is an important reagent in organic synthesis, especially in Grignard and Wurtz reactions. It is also an easily removable extractant of active principles (hormones, etc) from plant and animal tissues.

5.84.4 Packaging data and labeling. For military use ether, ACS is packaged in 1/4 lb and 1 lb unit quantity cans. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Individual containers must have the following precautionary label:

ETHER
DANGER! EXTREMELY FLAMMABLE
HIGHLY VOLATILE
TENDS TO FORM EXPLOSIVE PEROXIDES
ESPECIALLY WHEN ANHYDROUS

Keep away from heat, sparks, and open-flame.
Keep container tightly closed.
Do not allow to evaporate to near dryness. Addition
of water or appropriate reducing agent will lessen
peroxide formation.

5.84.5 Storage data. Ether should be stored in a cool, dry, dark place in tightly closed containers. Vapors form explosive mixtures with air at temperatures above -40°F. If containers are closed and unused, periodic checks should be made every three months.

5.85 Name. ETHER, ABSOLUTE, ACS $(\text{CH}_3\text{CH}_2)_2\text{O}$ FW 74.12
Ether, anhydrous
(HAZARDOUS)

5.85.1 Specifications. See Specifications para 4.10.

5.85.2 Technical description. Absolute ether is anhydrous ether, whereas ether, (5.84) contains some alcohol and water as stabilizers. For physical constants, see ETHER, 5.84.2.

5.85.3 Use data. See ETHER 5.84.3.

5.85.4 Packaging data and labeling. For military use absolute ether, ACS is packaged in 1 lb unit quantity cans and 5 lb unit quantity cans or bottles. For shipping and labeling, see ETHER, 5.84.4.

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5.85.5 Storage data. See ETHER, 5.84.5.

5.86 Name. ETHYL ACETATE, ACS $\text{CH}_3\text{COOCH}_2\text{CH}_3$ FW 88.11
Acetic Ester
Acetic Ether
Ethyl Ethanoate (IUPAC)
(HAZARDOUS)

5.86.1 Specifications. See Specifications para 4.10.

5.86.2 Technical description. Ethyl acetate is a clear, colorless, volatile liquid with a fragrant, fruity odor and a pleasant taste when diluted. It is the ester of ethyl alcohol and acetic acid.

TABLE XVIII. - Physical constants of ethyl acetate

Boiling point	77.2°C
Flash point (open cup)	30°F
Freezing point	-83.6°C
Refractive index	1.37216 (at 18.9°C)
Solubility data	Solubility in water: 8.6 grams per 100 ml at 20°C. Miscible with alcohol, chloroform, ether, and oils.
Specific gravity (20/4°C)	0.901

5.86.3 Use data. Ethyl acetate, ACS is used in organic synthesis and as a general laboratory solvent.

5.86.4 Packaging data and labeling. For military use ethyl acetate, ACS is packaged in 1 pt unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Individual containers must have the following precautionary label:

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ETHYL ACETATE
WARNING! FLAMMABLE

Keep away from heat, sparks, and open flame.
Keep container closed.
Use with adequate ventilation.
Avoid prolonged breathing of vapor.
Avoid prolonged or repeated contact with skin.

5.86.5 Storage data. Ethyl acetate should be stored in tightly closed containers in a well-ventilated place away from acute fire hazards and open flame. Ethyl acetate is flammable and can react vigorously with oxidizing materials. Unless contaminated, shelf life of a year or more can be expected. The material should be checked every four months in storage for leakage or spillage.

5.87 Name. ETHYL ACETATE, FOR SPECTROPHOTOMETRY, ACS $\text{CH}_3\text{COOCH}_2\text{CH}_3$ FW 88.1
(HAZARDOUS)

5.87.1 Specifications. See Specifications para 4.10.

5.87.2 Technical description. Ethyl acetate, for spectrophotometry, ACS is especially refined for use in spectrophotometry where low absorbance in the ultraviolet range is necessary. For physical constants, see ETHYL ACETATE, 5.86.2.

5.87.3 Use data. Ethyl acetate, for spectrophotometry, ACS is intended for use in spectrophotometry.

5.87.4 Packaging data and labeling. For military use ethyl acetate for spectrophotometry, ACS is packaged in 500 ml and 1 liter unit quantity bottles. See ETHYL ACETATE, 5.86.4, for labeling requirement.

5.87.5 Storage data. See ETHYL ACETATE, 5.86.5.

5.88 Name. ETHYL ALCOHOL, ACS $\text{CH}_3\text{CH}_2\text{OH}$ FW 46.07
Ethanol
(HAZARDOUS)

5.88.1 Specifications. See Specifications para 4.10.

5.88.2 Technical description. Ethyl alcohol is a clear, colorless, very mobile, volatile liquid with a pleasant, wine-like odor and a burning taste.

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TABLE XIX. - Physical constants of ethyl alcohol, ACS

Boiling point	78.4°C
Flash point (open cup)	65°F
Freezing point	-114.5°C
Refractive index	1.3651 (at 15°C)
Solubility data	Miscible with water, and most organic solvents.
Specific gravity (20/4°C)	0.7893

5.88.3 Use data. Ethyl alcohol, ACS is used in organic synthesis and as a general laboratory solvent.

5.88.4 Packaging data and labeling. Ethyl alcohol, ACS is packaged for military use in 1 gal unit quantity cans and 5 gal and 55 gal unit quantity drums. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations.

5.88.5 Storage data. Ethyl alcohol should be stored in tightly closed containers in a cool, dry, well-ventilated place away from flame and sparks. Ethyl alcohol has a shelf life of one year or more if stored under the above conditions.

5.89 Name. ETHYL ALCOHOL, ABSOLUTE, ACS $\text{CH}_3\text{CH}_2\text{OH}$ FW 46.07
(HAZARDOUS)

5.89.1 Specifications. See Specifications para 4.10.

5.89.2 Technical description. Ethyl alcohol, absolute, ACS is identical in properties and physical constants with ethyl alcohol, ACS. It differs in that its assay should be not less than 99.5% ethyl alcohol by volume.

5.89.3 Use data. See ETHYL ALCOHOL, 5.88.3.

5.89.4 Packaging data and labeling. Ethyl alcohol, absolute, ACS is packaged for military use in 1 pt unit quantity bottles and 1 gal and 5 gal unit quantity cans. For shipping and labeling see ETHYL ALCOHOL, 5.88.4.

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5.89.5 Storage data. See ETHYL ALCOHOL, 5.88.5.

5.90 Name. ETHYL ALCOHOL, FOR SPECTROPHOTOMETRY, ACS $\text{CH}_3\text{CH}_2\text{OH}$ FW 46.07
(HAZARDOUS)

5.90.1 Specifications. See Specifications para 4.10.

5.90.2 Technical description. Ethyl alcohol, for spectrophotometry, ACS is especially refined for use in spectrophotometry where low absorbance in the ultraviolet range is necessary. For physical constants, see ETHYL ALCOHOL, 5.88.2.

5.90.3 Use data. Ethyl alcohol, for spectrophotometry, ACS is intended for use in spectrophotometry.

5.90.4 Packaging data and labeling. For military use ethyl alcohol, for spectrophotometry, ACS is packaged in 1 pt and 1 gal unit quantity bottles. See ETHYL ALCOHOL, 5.88.4, for shipping and labeling requirement.

5.90.5 Storage data. See ETHYL ALCOHOL, 5.88.5.

5.91 Name. (ETHYLENEDINITRIL) TETRAACETIC ACID, ACS FW 292.25
 $(\text{HOCOCH}_2)_2\text{NCH}_2\text{CH}_2\text{N}(\text{CH}_2\text{COOH})_2$
Ethylenediaminetetraacetic Acid

5.91.1 Specifications. See Specifications para 4.10.

5.91.2 Technical description. (Ethylenedinitrilo) tetraacetic acid is in the form of colorless crystals which decompose at a temperature of 240°C . It is slightly soluble in water and insoluble in common organic solvents.

5.91.3 Use data. See Use data para 4.9.

5.91.4 Packaging data and labeling. For military use (ethylenedinitrilo) tetraacetic acid, ACS is packaged in 1 lb and 5 lb unit quantity bottles and in 25 lb unit quantity waterproof fiber drums. There are no applicable DoT packaging or shipping regulations for this chemical.

5.91.5 Storage data. (Ethylenedinitrilo) tetraacetic acid should be stored in a cool, dry place in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.92 Name. FERRIC AMMONIUM SULFATE, DODECAHYDRATE, ACS FW 482.19
 $\text{FeNH}_4(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$

5.92.1 Specifications. See Specifications para 4.10.

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5.92.2 Technical description. Ferric ammonium sulfate, dodecahydrate, is in the form of pale violet, transparent, efflorescent crystals with specific gravity 1.71 and refractive index 1.4854. It melts at 39-41°C, and at 230°C it loses its water of crystallization. Its solubility in water at 25°C is 124 grams per 100 ml; it is insoluble in alcohol.

5.92.3 Use data. Ferric ammonium sulfate, dodecahydrate, ACS, is used as an indicator in titrating halogens.

5.92.4 Packaging data and labeling. For military use ferric ammonium sulfate, dodecahydrate, ACS is packaged in 1 lb and 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.92.5 Storage data. Ferric ammonium sulfate should be stored in tightly closed containers in a cool place. Under these storage conditions, the shelf life is indefinite.

5.93 Name. FERRIC CHLORIDE, HEXAHYDRATE, ACS $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ FW 270.30

5.93.1 Specifications. See Specifications para 4.10.

5.93.2 Technical description. Ferric chloride, hexahydrate, is in the form of brownish-yellow or orange, very deliquescent, crystalline lumps, which have a slight odor of hydrochloric acid. Its melting point is 37°C and its boiling point is 280°C. Exposure to light causes the compound to decompose to yield hydrochloric acid. Its solubility in water at 20°C is 91.9 grams per 100 ml; it is soluble in alcohol, acetone, ether, or glycerol.

5.93.3 Use data. See Use data para 4.9.

5.93.4 Packaging data and labeling. Ferric chloride, hexahydrate, ACS is packaged for military use in 1 lb and 1/4 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.93.5 Storage data. Ferric chloride, hexahydrate should be stored in tightly closed, nonactinic bottles in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.94 Name. FERRIC NITRATE, NONAHYDRATE, ACS $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ FW 404.00
(HAZARDOUS)

5.94.1 Specifications. See Specifications para 4.10.

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5.94.2 Technical description. Ferric nitrate, nonahydrate, is in the form of grayish-white to pale violet, somewhat deliquescent crystals with specific gravity 1.684. Its melting point is 47°C; at 100°C, it decomposes by losing acid. It is soluble in water, alcohol, and acetone.

5.94.3 Use data. See Use data para 4.9.

5.94.4 Packaging data and labeling. For military use ferric nitrate, nonahydrate, ACS is packaged in 1/4 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations.

5.94.5 Storage data. See BARIUM NITRATE, 5.30.5.

5.95 Name. FERROUS AMMONIUM SULFATE, HEXAHYDRATE, ACS FW 392.14
 $\text{Fe}(\text{NH}_4)_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$

5.95.1 Specifications. See Specifications para 4.10.

5.95.2 Technical description. Ferrous ammonium sulfate, hexahydrate, is in the form of pale bluish-green crystals or powder with specific gravity 1.864 and refractive index 1.4915. It decomposes upon heating. Its solubility in water at 20°C is 26.9 grams per 100 ml; it is soluble in alcohol. It slowly oxidizes and effloresces in air.

5.95.3 Use data. Ferrous ammonium sulfate, hexahydrate, ACS is used in analytical chemistry for standardizing solutions of potassium permanganate and potassium dichromate.

5.95.4 Packaging data and labeling. For military use ferrous ammonium sulfate, hexahydrate, ACS is packaged in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.95.5 Storage data. Ferrous ammonium sulfate, hexahydrate should be stored in tightly closed, nonactinic glass bottles in a cool, dry place. Under these conditions, the shelf life is indefinite.

5.96 Name. FERROUS SULFATE, HEPTAHYDRATE, ACS $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ FW 278.02

5.96.1 Specifications. See Specifications para 4.10.

5.96.2 Technical description. Ferrous sulfate, heptahydrate, is in the form of pale bluish-green crystals or granules; its specific gravity is 1.899 (14.8/4°C). Its melting point is 64°C. At 70-80°C, it loses 5 molecules of water; at 100°C, 6 molecules of water; and at 300°C, it loses 7 molecules of water. It effloresces in dry air; in moist air, it oxidizes and acquires a brownish-yellow coating of basic ferric sulfate. It is soluble in water and insoluble in alcohol.

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5.96.3 Use data. See Use data para 4.9.

5.96.4 Packaging data and labeling. Ferrous sulfate, heptahydrate, ACS is packaged for military use in 25 lb unit quantity drums and 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.96.5 Storage data. Ferrous sulfate, heptahydrate should be stored in a cool, dry place in tightly closed containers. Under these conditions, the shelf life is at least one year.

5.97 Name. FORMALDEHYDE SOLUTION, ACS HCHO FW 30.03
(With Preservative)
Formalin
(HAZARDOUS)

5.97.1 Specifications. See Specifications para 4.10.

5.97.2 Technical description. Pure formaldehyde is not available commercially due to its tendency to polymerize. It is prepared as aqueous solutions containing from 37% to 50% formaldehyde by weight and varying amounts of methanol. Formaldehyde solution is a clear, colorless liquid with a suffocating, pungent odor. Upon standing, especially in the cold, the solution may become cloudy and, on exposure to very low temperatures, a precipitate of trioxymethylene is formed.

TABLE XX. - Physical constants of formaldehyde solution

Boiling point	96°C
Flash point (open cup)	200°F
Refractive index	1.3746
Solubility data	Miscible with water, alcohol, and acetone.
Specific gravity (25/25°C)	1.081-1.085

5.97.3 Use data. See Use data para 4.9.

5.97.4 Packaging data and labeling. For military use formaldehyde solution, ACS is packaged in 1 pt unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Individual containers must have the following warning label:

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FORMALDEHYDE
WARNING! CAUSES IRRITATION OF
SKIN, EYES, NOSE, AND THROAT

Avoid prolonged or repeated contact.
Avoid prolonged breathing of vapor.
Use with adequate ventilation.
In case of contact, immediately flush skin or eyes
with plenty of water for at least 15 minutes; for
eyes, get medical attention.

POISON
CALL A PHYSICIAN
FIRST AID

If swallowed: Give a tablespoonful of salt in a
glass of warm water and repeat until
vomit is clear. Give milk or white
of egg beaten with water.

5.97.5 Storage data. Formaldehyde solution should be stored in tightly closed containers in a moderately warm, well-ventilated place away from fire hazards and oxidizing materials. Formaldehyde is a powerful reducing agent, especially in the presence of alkalis. The containers should be periodically inspected for leakage. Under these storage conditions, the shelf life is at least one year.

5.98 Name. FORMIC ACID, 88%, ACS HCOOH FW 46.03
Methanoic Acid (IUPAC)
(HAZARDOUS)

5.98.1 Specifications. See Specifications para 4.10.

5.98.2 Technical description. Formic acid is a colorless, fuming liquid with a pungent, penetrating odor; it is a strong reducing agent. It contains not less than 88% formic acid in weight.

TABLE XXI. - Physical constants of formic acid

Boiling point	100.5°C
Flash point (open cup)	156°F
Freezing point	8.40°C
Refractive index	1.3714
Solubility data	Miscible with water, alcohol, ether, and glycerol
Specific gravity (20/4°C)	1.220

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5.98.3 Use data. See Use data para 4.9.

5.98.4 Packaging data and labeling. For military use formic acid, ACS is packaged in 4 fl oz unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT white label for corrosive liquids unless exempted under section 173.244 of Title 49, Code of Federal Regulations. Individual containers must have the following precautionary label:

FORMIC ACID
WARNING! CAUSES BURNS

Avoid contact with skin and eyes.
Avoid breathing vapor.
In case of contact, immediately flush skin
or eyes with plenty of water for at least
15 minutes; for eyes, get medical attention.

5.98.5 Storage data. Formic acid, 88% should be stored in tightly closed containers in a cool, dry place away from open flame and oxidizing materials. Vapors may form explosive mixtures in air. When stored under these conditions, the shelf life is indefinite.

5.99 Name. FORMIC ACID, 98% ACS HCOOH FW 46.03
(HAZARDOUS)

5.99.1 Specifications. See Specifications para 4.10.

5.99.2 Technical description. This reagent contains not less than 98% formic acid by weight. For general physical constants, see FORMIC ACID, 88%, 5.98.2.

5.99.3 Use data. See Use data para 4.9.

5.99.4 Packaging data and labeling. Formic acid, 98%, ACS is packaged for military use in 1 pt unit quantity bottles. See FORMIC ACID, 88%, 5.98.4, for labeling requirement.

5.99.5 Storage data. See FORMIC ACID, 88%, 5.98.5.

5.100 Name. GLYCEROL, ACS $\text{CH}_2\text{OHCHOHCH}_2\text{OH}$ FW 92.10
Glycerin
1,2,3-propanetriol (IUPAC)
Trihydroxypropane

5.100.1 Specifications. See Specifications para 4.10.

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5.100.2 Technical description. Glycerol is a clear, colorless or pale yellow, syrupy liquid with no odor and a sweet, warm taste. In contact with strong oxidizing agents such as chromium trioxide, potassium chlorate, or potassium permanganate it may produce an explosion. It is hygroscopic.

TABLE XXII. - Physical constants of glycerol

Boiling point	290.0°C with decomposition
Flash point (open cup)	349°F
Refractive index	1.4729
Solubility data	Miscible with water and alcohol. Insoluble in ether and chloroform.
Specific gravity (20/4°C)	1.260

5.100.3 Use data. See Use data para 4.9.

5.100.4 Packaging data and labeling. For military use glycerol, ACS is packaged in 1 pt and 1 gal unit quantity bottles. There are no applicable DOT packaging or shipping regulations for this chemical.

5.100.5 Storage data. Glycerol should be stored in tightly closed containers in a dry place at temperatures between 40°F and 110°F, away from acute fire hazards, oxidizing agents, and acids. Under these storage conditions, the shelf life is approximately two years. Periodic checks should be made during the second year of storage. If caking occurs, the glycerol should be discarded.

5.101 Name. GOLD CHLORIDE, TRIHYDRATE, ACS $\text{HAuCl}_4 \cdot 3\text{H}_2\text{O}$ FW 393.83
Chloroauric (III) Acid, Trihydrate
(HAZARDOUS)

5.101.1 Specifications. See Specifications para 4.10.

5.101.2 Technical description. Gold chloride, trihydrate, is in the form of yellow to red crystals. It is decomposed upon heating. It is soluble in water, alcohol, and ether.

5.101.3 Use data. Gold chloride, trihydrate is used as a reagent for alkaloids.

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5.101.4 Packaging data and labeling. Gold chloride, trihydrate, ACS is packaged for military use in 15 gram unit quantity ampules and 1 gram unit quantity tubes. There are no applicable DoT packaging or shipping regulations for this chemical. Each container must bear the following precautionary label:

GOLD CHLORIDE
CAUTION! MAY BE IRRITATING

Avoid breathing dust.
Wash thoroughly after handling.

5.101.5 Storage data. Gold chloride, trihydrate should be stored in a cool, dry place in tightly closed nonactinic containers. Under these storage conditions, the shelf life is indefinite.

5.102 Name.. HEXANES, ACS
(HAZARDOUS)

5.102.1 Specifications. See Specifications para 4.10.

5.102.2 Technical description. This reagent is generally a mixture of several isomers of hexane (C_6H_{14}) predominantly n-hexane, and methyl cyclopentane (C_6H_{12}). It is a colorless, very volatile liquid with a faint, particular odor.

5.102.3 Use data. See Use data para 4.9.

5.102.4 Packaging data and labeling. For military use, hexanes, ACS is packaged in 1 qt, and 1 gal unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Each bottle must bear the following precautionary label:

HEXANES
DANGER! EXTREMELY FLAMMABLE

Keep away from heat, sparks, and open flame.
Use with adequate ventilation.
Avoid prolonged breathing of vapor.
Avoid prolonged contact with skin.

5.102.5 Storage data. Hexanes should be stored in tightly closed containers in a cool, dry, well-ventilated area away from acute fire hazards, oxidizing materials, and open flame. Under these storage conditions, the shelf life is indefinite.

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5.103 Name. HEXANES, FOR SPECTROPHOTOMETRY, ACS
(HAZARDOUS)

5.103.1 Specifications. See Specifications para 4.10.

5.103.2 Technical description. See HEXANES, ACS 5.102.2.

5.103.3 Use data. Hexanes, for spectrophotometry, ACS is intended for use in spectrophotometry.

5.103.4 Packaging data and labeling. Hexanes, for spectrophotometry, ACS is packaged for military use in 1 qt and 1 gal unit quantity bottles. For shipping and labeling, see Hexanes, 5.102.4.

5.103.5 Storage data. See HEXANES, ACS 5.102.5.

5.104 Name. HYDRAZINE SULFATE, ACS $(\text{NH}_2)_2\text{H}_2\text{SO}_4$ FW 130.12
(HAZARDOUS)

5.104.1 Specifications. See Specifications para 4.10.

5.104.2 Technical description. Hydrazine sulfate is in the form of white, glass-like plates or prismatic crystals of specific gravity 1.378. Its melting point is 254°C. It is very soluble in hot water and has a solubility of 3.05 grams per 100 ml of water at 32°C. It is insoluble in alcohol.

5.104.3 Use data. Hydrazine sulfate, ACS is used in the gravimetric estimation of nickel, cobalt, and cadmium. It is also used as a reducing agent in the analysis of minerals and in separating polonium from tellurium.

5.104.4 Packaging data and labeling. For military use hydrazine sulfate, ACS is packaged in 100 gram unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

HYDRAZINE SULFATE
DANGER! HAZARDOUS DUST
CAUSES IRRITATION TO SKIN,
EYES, NOSE, THROAT, LUNGS
HARMFUL IF SWALLOWED

Do not breathe dust.
Avoid contact with skin, eyes, or clothing.
Keep away from heat, flame, or oxidizing materials.
Wash thoroughly after handling.

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5.104.5 Storage data. Hydrazine sulfate should be stored in tightly closed containers in a cool, dry place away from acute fire hazards, alkalies, and oxidizing agents. If stored under these conditions it has an indefinite shelf life.

5.105 Name. HYDRIODIC ACID, ACS HI FW 127.91
Hydriodic Acid, 47%
(HAZARDOUS)

5.105.1 Specifications. See Specifications para 4.10.

5.105.2 Technical description. Hydriodic acid, ACS is an aqueous solution of hydrogen iodide containing not less than 47.0% hydrogen iodide by weight. Hydriodic acid is in the form of a clear, colorless or pale yellow, fuming liquid. It is colorless when freshly made, but rapidly turns yellowish or brown on exposure to light and air due to the presence of free iodine. It is a strong, highly corrosive acid and an active reducing agent. Pure hydrogen iodide can exist as a colorless gas or a pale yellow liquid with a melting point of -50.8°C and a boiling point of -35.38°C (at 4 atmospheres).

5.105.3 Use data. Hydriodic acid, ACS is used as a reducing agent in the preparation of iodine salts, and in organic preparations.

5.105.4 Packaging data and labeling. Hydriodic acid, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity nonactinic glass or polyethylene bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT white label for corrosive liquids unless exempted under section 173.244 of Title 49, Code of Federal Regulations. The following precautionary label must appear on individual containers:

HYDRIODIC ACID
WARNING! CAUSES BURNS

Do not take internally.
Avoid contact with skin and eyes.
Avoid breathing vapor.
In case of contact, immediately flush
skin or eyes with plenty of water for
at least 15 minutes; for eyes, get
medical attention.
Do not induce vomiting if swallowed.

5.105.5 Storage data. Hydriodic acid should be stored in a cool, dry, well-ventilated area in tightly sealed containers away from acute fire hazards and oxidizing agents such as nitric acid, nitrates, and chlorates. Under these storage conditions, the shelf life is indefinite.

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5.106 Name. HYDROBROMIC ACID, 48%, ACS HBr FW 80.91
Hydrogen Bromide (in solution)
(HAZARDOUS)

5.106.1 Specifications. See Specifications para 4.10.

5.106.2 Technical description. Hydrobromic acid is a colorless or faintly yellow, fuming liquid that slowly darkens on exposure to air and light. It is produced from a solution of hydrogen bromide gas in water and marked in various concentrations. The boiling point of hydrobromic acid (48%) is 126°C and the melting point is -11°C. It is soluble in alcohol and water. The specific gravity of hydrobromic acid (48%) is 1.49 at 20°C.

5.106.3 Use data. Hydrobromic acid, ACS is used in the preparation of organic and inorganic bromides and as a reducing agent and catalyst in chemical reactions.

5.106.4 Packaging data and labeling. Hydrobromic acid (48%) is packaged for military use in 1 pt unit quantity nonactinic glass bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT white label for corrosive liquids unless exempted under section 173.244 of Title 49, Code of Federal Regulations. Individual containers must bear the following precautionary label:

HYDROBROMIC ACID
WARNING! CAUSES BURNS

Avoid contact with skin and eyes.
Avoid breathing vapor.
In case of contact, immediately flush
skin or eyes with plenty of water for
at least 15 minutes; for eyes, get
medical attention.

5.106.5 Storage data. See HYDRIODIC ACID, 5.105.5.

5.107 Name. HYDROCHLORIC ACID, ACS, HCl FW 36.46
Hydrogen Chloride
(HAZARDOUS)

5.107.1 Specifications. See Specifications para 4.10.

5.107.2 Technical description. Hydrochloric acid, ACS is in the form of an aqueous solution of the colorless hydrogen chloride gas; the solution fumes unless it is very dilute. It is one of the strongest acids known, nitric acid being about equal to it and sulfuric acid being somewhat less strong. This acid has a sharp characteristic odor and emits very dangerous fumes. The melting point is about -24°C. It is miscible in water, alcohol and ether; it is soluble in benzene. The specific gravity of hydrochloric acid is 1.19 (15/4°C).

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5.107.3 Use data. Hydrochloric acid, ACS is used in many applications where a nonoxidizing acid is desired. It is also used in organic reactions involving isomerization, polymerization, and alkylation.

5.107.4 Packaging data and labeling. Hydrochloric acid, ACS is packaged for military use in 1 pt and 5 pt unit quantity containers with leakproof polyethylene screw caps and liners to vent pressure in excess of 10 lb. The caps and labels are color-coded light blue. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT white label for corrosive liquids unless exempted under section 173.244 of Title 49, Code of Federal Regulations. Individual containers must bear a precautionary label similar to hydriodic acid, 5.105.4.

5.107.5 Storage data. Hydrochloric acid need not be stored in nonactinic containers. Otherwise, see HYDRIODIC ACID, 5.105.5.

5.108 Name. HYDROFLUORIC ACID (48.0-51.0%) ACS HF FW 20.01
Hydrogen Fluoride
(HAZARDOUS)

5.108.1 Specifications. See Specifications para 4.10.

5.108.2 Technical description. Hydrofluoric acid, is a clear, colorless, fuming, corrosive liquid. It is an aqueous solution of hydrogen fluoride gas. It is a corrosive acid on contact and the solution fumes unless it is diluted. It reacts strongly with silica, sand, or glass, and is miscible with water. The specific gravity of the 48.0-51.0% solution is 1.19-1.10 (0/4°C). Its freezing point is from -38°C to -25°C (approximate), depending on the concentration. Its boiling point is from 103°C to 108°C (approximate), depending on the concentration.

5.108.3 Use data. Hydrofluoric acid, ACS is used in analytical chemistry to determine silicon dioxide, for separating uranium isotopes, and as a fluorinating agent in organic and inorganic reactions.

5.108.4 Packaging data and labeling. Hydrofluoric acid (48.0 - 51.0%), ACS is packaged for military use in 1 lb unit quantity nonactinic plastic bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT white label for corrosive liquids unless exempted under section 173.244 of Title 49, Code of Federal Regulations. Individual containers must bear the following precautionary label:

HYDROFLUORIC ACID
DANGER! HAZARDOUS LIQUID AND VAPOR
CAUSES BURNS WHICH MAY NOT BE
IMMEDIATELY PAINFUL OR VISIBLE

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Do not get in eyes, on skin, on clothing.
Do not breathe vapor.
Store out of sun and away from direct heat.
FIRST AID, in case of contact or suspicion of contact:
Always have on hand a supply of magnesia paste
(magnesium oxide and glycerin).
SKIN: Immediately flush with large quantities of cold
water until all acid is removed (up to 3-4 hours or
until medical attention is obtained), paying particular
attention to skin under nails. In case medical attention
is delayed, apply a mixture of glycerin with either
magnesium oxide or milk of magnesia. GET MEDICAL
ATTENTION. Remove and wash clothing before re-use.
EYES: Immediately flush with cool water for 15-30
minutes. PROMPT MEDICAL ATTENTION IS ABSOLUTELY
NECESSARY.

5.108.5 Storage data. Hydrofluoric acid should be stored in tightly
sealed, nonactinic, plastic containers in a cool, dry, well-ventilated
area. Under these storage conditions, the shelf life is indefinite.

5.109 Name. HYDROGEN PEROXIDE, ACS H_2O_2 FW 34.01
(HAZARDOUS)

5.109.1 Specifications. See Specifications para 4.10.

5.109.2 Technical description. Hydrogen peroxide is a clear, colorless,
liquid that decomposes with the evolution of oxygen. This decomposition is
gradual, but can be hastened by heat or by suitable catalysts. The
specific gravity of the 29-32% solution is about 1.1 (0/4°C). It is
miscible with water, soluble in alcohol and ether, and insoluble in
petroleum ether.

5.109.3 Use data. Hydrogen peroxide, ACS is used in analytical chemistry
as a source of organic and inorganic peroxides and for hydroxylation,
oxidation, and reduction reactions.

5.109.4 Packaging data and labeling. For military use, hydrogen
peroxide (29-32%), ACS is packaged in 1/4 lb and 1 lb unit quantity
nonactinic glass or polyethylene bottles with vented stoppers. Packaging
and shipping of this chemical must conform to DoT regulations. Shipping
containers must have a DoT white label for corrosive liquids unless
exempted under section 173.244 of Title 49, Code of Federal Regulations.
Individual containers must bear the following precautionary label:

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HYDROGEN PEROXIDE
CAUTION! STRONG OXIDANT

Avoid contact with skin and eyes.
 Avoid contact with combustible materials. Drying of this concentrated product on clothing or combustible materials may cause fire.
 In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes; for eyes, get medical attention.
 Avoid contamination from any source, including metals, dust, and organic materials. Such contamination may cause rapid decomposition, generation of large quantities of oxygen gas, and high pressures.
 Store in original closed container.
 Do not add any other product to this container.
 When empty, rinse thoroughly with clean water.

5.109.5 Storage data. Hydrogen peroxide, ACS should be stored in a clean, cool, ventilated place in the original containers with well-working vents in the stoppers. It should be stored away from fire hazards, flammable materials, reducing agents, metals, and organic materials. Hydrogen peroxide will deteriorate at a rate of 10% per year. It is recommended that this material be used within a year.

5.110 Name. HYDROXYLAMINE HYDROCHLORIDE, ACS $\text{NH}_2\text{OH}\cdot\text{HCl}$ FW 69.49
 (HAZARDOUS)

5.110.1 Specifications. See Specifications para 4.10.

5.110.2 Technical description. Hydroxylamine hydrochloride, is in the form of colorless, monoclinic, columnar crystals of specific gravity 1.67 (17°C). It slowly decomposes when moist. The melting point is 151°C, above which it decomposes. The solubility in water is 83 grams per 100 ml at 17°C; in hot water it is very soluble. It has a solubility of 4.43 grams per 100 ml of alcohol at 20°C and 16.4 grams per 100 ml of methanol at 20°C. It is soluble in glycerol and insoluble in ether.

5.110.3 Use data. Hydroxylamine hydrochloride, ACS is used in organic synthesis and in controlled reduction reactions.

5.110.4 Packaging data and labeling. Hydroxylamine hydrochloride, ACS is packaged for military use in 100 gram unit quantity nonactinic bottles. There are no applicable DOT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

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HYDROXYLAMINE HYDROCHLORIDE
 WARNING! IRRITATING TO SKIN AND EYES
 HARMFUL IF SWALLOWED

Keep away from heat and open flame.
 Avoid contact with skin and eyes.
 Avoid breathing dust.
 Do not take internally.

5.110.5 Storage data. Hydroxylamine hydrochloride should be stored in tightly closed, nonactinic containers in a cool, dry place away from heat, open flame, acute fire hazards, and oxidizing materials. Under these storage conditions, the shelf life is one year.

5.111 Name. HYDROXYNAPHTHOL BLUE, ACS $C_{20}H_{12}N_2S_3O_9Na_2$ FW 566.50
 1-(2-Naphtholazo-3,6-disulfonic acid)-2-naphthol-4-sulfonic
 acid, disodium salt

5.111.1 Specifications. See Specifications para 4.10.

5.111.2 Technical description. Hydroxynaphthol blue is the disodium salt of 1-(2-naphtholazo-3,6-disulfonic acid)-2-naphthol-4-sulfonic acid deposited on crystals of sodium chloride. This indicator is in the form of small blue crystals which are freely soluble in water. In the pH range between 12 and 13, its solution is reddish pink in the presence of calcium ion and deep blue in the presence of excess disodium ethylenediaminetetraacetate.

5.111.3 Use data. Hydroxynaphthol blue, ACS is intended for use in the determination of calcium.

5.111.4 Packaging data and labeling. Hydroxynaphthol blue, ACS is packaged for military use in 10 gram unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.111.5 Storage data. Hydroxynaphthol blue should be stored in a cool, dry place in tightly closed containers out of direct sunlight. Under these storage conditions, the shelf life is indefinite.

5.112 Name. 8-HYDROXYQUINOLINE, ACS $HOC_6H_3N:CHCH:CH$ FW 145.
 8-Quinolinol
 Oxine

5.112.1 Specifications. See Specifications para 4.10.

5.112.2 Technical description. 8-Hydroxyquinoline ACS, is in the form

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of white, crystalline powder or crystals. It has a melting point of 76°C and a boiling point of 267°C. It is almost insoluble in water and ether and freely soluble in alcohol, acetone, chloroform, benzene, and aqueous mineral acids.

5.112.3 Use data. 8-Hydroxyquinoline, ACS is used to precipitate metals and as a reagent for bismuth.

5.112.4 Packaging data and labeling. 8-Hydroxyquinoline, ACS is packaged for military use in 1 oz, 1/4 lb, and 1 lb unit quantity nonactinic bottles. There are no applicable Dot packaging or shipping regulations for this chemical.

5.112.5 Storage data. 8-Hydroxyquinoline should be stored out of the direct rays of the sun in a cool, dry, well-ventilated area, in tightly sealed containers away from oxidizable materials. Under these storage conditions, the shelf life is one year.

5.113 Name. IODINE, ACS I AW 126.90
(HAZARDOUS)

5.113.1 Specifications. See Specifications para 4.10.

5.113.2 Technical description. Iodine, ACS is in the form of rhombic violet-black crystals with a metallic luster. It has a characteristic odor, sharp acid taste, and violet vapor which is corrosive and volatile at ordinary temperatures and pressures. It attacks metals in the presence of moisture and acts on organic tissue. The boiling point of iodine is 183°C, and the melting point is 113.5°C. It is soluble in chloroform, ether, glycerol, acetic acid, oils and alcohol, and practically insoluble in water. The refractive index is 3.34 and specific gravity is 4.93.

5.113.3 Use data. Iodine, ACS is an important reagent in analytical chemistry. It is used as a catalyst in chemical reactions, in medical research; and an artificial isotope of iodine is used in biological, biochemical, and chemical structure research.

5.113.4 Packaging data and labeling. Iodine, ACS is packaged for military use in sublimed form in 1 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

IODINE
WARNING! MAY BE FATAL IF SWALLOWED
VAPOR HARMFUL
IRRITATING TO SKIN

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Do not take internally.
Do not breathe vapor.
Avoid contact with skin and eyes.
Keep away from heat and open flame.

5.113.5 Storage data. Iodine should be stored in a cool, dry place in tightly sealed containers at temperatures not to exceed 75°F at a relative humidity of 50%. It should be kept away from acute fire hazards and out of the direct rays of the sun. Under these storage conditions the shelf life is indefinite.

5.114 Name.	IRON, ACS	Fe	FW 55.85
	Iron Reduced		

5.114.1 Specifications. See Specifications para 4.10.

5.114.2 Technical description. Iron is a silvery white, lustrous metal. The wire has a diameter of 0.009 mm. It is somewhat magnetic and readily oxidizes in moist air. Due to its ductile and malleable properties, it can be polished, hammered, bent, and rolled. The common form of iron oxide is "rust". Iron, ACS has a boiling point of 3000°C, and melting point of 1525°C. It is soluble in acids and insoluble in water, alcohol, ether, and alkalis. The specific gravity is 7.86.

5.114.3 Use data. Iron, ACS is used as a reducing agent similar to zinc dust.

5.114.4 Packaging data and labeling. Iron, ACS (in wire form) is packaged for military use in a 1/4 lb unit quantity mailing tube or spool. There are no applicable DoT packaging or shipping regulations for this chemical.

5.114.5 Storage data. Iron should be stored in a cool, dry area in tightly closed containers. It is quite stable and should present no unusual storage problems. Under these storage conditions, the shelf life is indefinite.

5.115 Name.	IRON, LOW IN MANGANESE, ACS	Fe	FW 55.85
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5.115.1 Specifications. See Specifications para 4.10.

5.115.2 Technical description. Iron, low in manganese, ACS differs from IRON, 5.114.2 in that it has a lower assay of manganese. For physical constants, see IRON, 5.114.2.

5.115.3 Use data. See Use data para 4.9.

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5.115.4 Packaging data and labeling. For military use iron, low in manganese, ACS is packaged in 1/4 lb unit quantity mailing tubes or spools. There are no applicable DoT packaging or shipping regulations for this chemical..

5.115.5 Storage data. See IRON, 5.114.5.

5.116 Name. ISOBUTYL ALCOHOL, ACS $(CH_3)_2CHCH_2OH$ FW 74.12
Isobutanol
2-Methyl-1-Propanol
(HAZARDOUS)

5.116.1 Specifications. See Specifications para 4.10.

5.116.2 Technical description. Isobutyl alcohol is a clear, colorless, refractive liquid with an odor similar to, but weaker than, amyl alcohol.

TABLE XXIII. - Physical constants of isobutyl alcohol

Boiling point	107.90°C
Flash point (open cup)	100°F
Freezing point	-108°C
Refractive index (15°C)	1.3976
Solubility data	Soluble in water. Miscible with alcohol or ether.
Specific gravity (20/4°C)	0.805

5.116.3 Use data. Isobutyl alcohol, ACS is used in organic synthesis, in fluorometric determinations, in liquid chromatography and as a general laboratory solvent.

5.116.4 Packaging data and labeling. Isobutyl alcohol, ACS is packaged for military use in 1 lb unit quantity nonactinic glass bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

ISOBUTYL ALCOHOL
WARNING! COMBUSTIBLE LIQUID
MAY BE IRRITATING TO
SKIN AND EYES

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Keep away from heat and open flame.
 Use with adequate ventilation.
 Avoid prolonged breathing of vapor.
 Avoid contact with skin and eyes.

5.116.5 Storage data. See AMYL ALCOHOL, 5.22.5.

5.117 Name. ISOBUTYL ALCOHOL, FOR SPECTROPHOTOMETRY, ACS FW 74.12
 (HAZARDOUS) $(\text{CH}_3)_2\text{CHCH}_2\text{OH}$

5.117.1 Specifications. See Specifications para 4.10.

5.117.2 Technical description. Isobutyl alcohol, for spectrophotometry, ACS is especially refined for use in spectrophotometry where low absorbance in the ultraviolet range is necessary. For physical constants, see ISOBUTYL ALCOHOL, 5.116.2.

5.117.3 Use data. Isobutyl alcohol, for spectrophotometry, ACS is intended for use in spectrophotometry.

5.117.4 Packaging data and labeling. For military use isobutyl alcohol, for spectrophotometry, ACS is packaged in 1 pt, 1 qt, and 1 gal unit quantity bottles. See ISOBUTYL ALCOHOL, 5.116.4, for labeling requirement.

5.117.5 Storage data. See AMYL ALCOHOL, 5.22.5.

5.118 Name. ISOCTANE, ACS $(\text{CH}_3)_3\text{CCH}_2\text{CH}(\text{CH}_3)_2$ FW 114.23
 2,2,4 Trimethylpentane
 (HAZARDOUS)

5.118.1 Specifications. See Specifications para 4.10.

5.118.2 Technical description. Isooctane, ACS is a colorless, flammable, mobile liquid. It has the odor of gasoline.

TABLE XXIV. - Physical constants of isooctane, ACS

Boiling point	992°C
Flash point	40°F
Freezing point	-116.5°C
Solubility data	Insoluble in water. Miscible with absolute alcohols, benzene, toluene, xylene, chloroform, ether, and oils.
Specific gravity (20/40)	0.7025

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5.118.3 Use data. Isooctane, ACS is used for determining octane numbers of fuels and as a general laboratory reagent.

5.118.4 Packaging data and labeling. Isooctane, ACS is packaged for military use in 500 ml unit quantity nonactinic bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Individual containers must bear the following warning label:

ISOCTANE
WARNING! FLAMMABLE LIQUID
HARMFUL IF SWALLOWED

Keep away from heat, sparks, and open flame.
Use with adequate ventilation.
Avoid prolonged breathing of vapor.
Do not take internally.
If swallowed, do not induce vomiting; get
medical attention.

5.118.5 Storage data. Isooctane should be stored in a cool, well-ventilated place away from acute fire hazard, heat, open flame, and reducing agents. Keep containers tightly closed and plainly labeled. If stored in the recommended conditions and temperatures, the shelf life of isooctane is indefinite.

5.119 Name. ISOCTANE, FOR SPECTROPHOTOMETRY, ACS $(\text{CH}_3)_3\text{CCH}_2\text{CH}(\text{CH}_3)_2$
FW 114.23
2,2,4-Trimethylpentane
(HAZARDOUS)

5.119.1 Specifications. See Specifications para 4.10.

5.119.2 Technical description. Isooctane, for spectrophotometry is three times refined Isooctane. It is extremely clear and pure so as to serve as an optical fluid without any extraneous impurities. See ISOCTANE, 5.118.2.

5.119.3 Use data. Isooctane, for spectrophotometry, ACS is intended for use in spectrophotometry.

5.119.4 Packaging data and labeling. Isooctane for spectrophotometry, ACS is packaged for military use in 1 qt and 1 gal unit quantity nonactinic glass bottles. See ISOCTANE 5.118.4, for labeling requirements.

5.119.5 Storage data. See ISOCTANE 5.118.5.

5.120 Name. LEAD, ACS Pb AW 207.19
(HAZARDOUS)

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5.120.1 Specifications. See Specifications para 4.10.

5.120.2 Technical description. Lead, ACS is a blue-white or silvery gray metal, highly lustrous when freshly cut. It tarnishes upon exposure to air forming a coating of lead oxide. Since it is very malleable it is easily melted, cast, and rolled. It maintains its crystalline structure in all forms of alloys including solder, type metal, and various antifriction metals. The boiling point of lead is 1620°C, and the melting point is 327.43°C. It is soluble in ammonia and concentrated sulfuric acid, and insoluble in water. The specific gravity of lead is 11.3437 at 16°C, and the refractive index is 2.01.

5.120.3 Use data. See Use data para 4.9.

5.120.4 Packaging data and labeling. Lead, ACS is packaged for military use in granular form 1/4 lb, 1 lb, and 5 lb unit quantity glass bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

LEAD
CAUTION! HARMFUL DUST

Avoid breathing dust.
Wash thoroughly after handling.
Keep away from feed and food products.

5.120.5 Storage data. Lead should be stored in a cool, dry area in tightly sealed containers. Under these storage conditions, the shelf life is indefinite.

5.121 Name. LEAD ACETATE, TRIHYDRATE, ACS $(\text{CH}_3\text{COO})_2\text{Pb} \cdot 3\text{H}_2\text{O}$
(HAZARDOUS) FW 379.33

5.121.1 Specifications. See Specifications para 4.10.

5.121.2 Technical description. Lead acetate, trihydrate is in the form of colorless or white crystals. It has a slight acetic odor and slowly effloresces. It absorbs carbon dioxide from the air and becomes incompletely soluble. The melting point of lead acetate trihydrate is 75°C, and it becomes anhydrous at 280°C. The solubility of lead acetate trihydrate is 45.6 grams per 100 ml of water at 15°C and 200 grams per 100 ml of water at 100°C. It is soluble in glycerol and insoluble in alcohol. The specific gravity of lead acetate is 2.55 and the refractive index is 1.567.

5.121.3 Use data. Lead acetate, trihydrate, ACS is used in the detection of sulfides and the determination of chromates and molybdates.

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5.121.4 Packaging data and labeling. Lead acetate, trihydrate, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity nonactinic glass bottles. Unless exempted under section 173.364 of Title 49, Code of Federal Regulations, shipping containers must bear the DoT poison label for Class B poisons. In addition, each bottle must bear the following precautionary label:

LEAD ACETATE
WARNING! HARMFUL DUST

Avoid breathing dust.
Wash thoroughly after handling.
Keep away from feed or food products.

5.121.5 Storage data. Lead acetate, trihydrate should be stored in a cool dry place in tightly closed containers. Under these conditions, the shelf life is indefinite.

5.122 Name. LEAD CARBONATE, ACS PbCO_3 FW 267.20
(HAZARDOUS)

5.122.1 Specifications. See Specifications para 4.10.

5.122.2 Technical description. Lead carbonate is a white, heavy powder. Lead carbonate decomposes at 315°C. It is very slightly soluble in cold water, soluble in acid and alkalies, and insoluble in ammonia and alcohol. It decomposes in hot water. The specific gravity is 6.6. The refractive indices are 1.804, 2.076, and 2.078.

5.122.3 Use data. See Use data para 4.9.

5.122.4 Packaging data and labeling. Lead carbonate, ACS is packaged for military use in powdered form in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

LEAD CARBONATE
WARNING! HARMFUL DUST

Avoid breathing dust.
Wash thoroughly after handling.
Keep away from feed or food products.

5.122.5 Storage data. See LEAD ACETATE, 5.121.5.

5.123 Name. LEAD CHROMATE, ACS PbCrO_4 FW 323.18
(HAZARDOUS)

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5.123.1 Specifications. See Specifications para 4.10.

5.123.2 Technical description. Lead chromate is a yellowish-orange, crystalline powder. It has a melting point of 844°C and decomposes above this point. It is slightly soluble in alcohol, alkalies, and dilute acetic acid. It is insoluble in ammonia, water, and acetic acid. It has a specific gravity of 6.12 at 15°C, and refractive indices are 2.31, 2.37, and 2.66.

5.123.3 Use data. See Use data para 4.9.

5.123.4 Packaging data and labeling. Lead chromate, ACS is packaged for military use in 1 lb and 100 gram unit quantity nonactinic glass bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

LEAD CHROMATE
WARNING! HARMFUL DUST

Avoid breathing dust.
Wash thoroughly after handling.
Keep away from feed or food products.

5.123.5 Storage data. See LEAD ACETATE, 5.121.5.

5.124 Name.	LEAD DIOXIDE, ACS	PbO ₂	FW 239.19
	(HAZARDOUS)		

5.124.1 Specifications. See Specifications para 4.10.

5.124.2 Technical description. Lead dioxide is in the form of brown crystals or powder. At 290°C it decomposes to form Pb₃O₄ and oxygen. It is soluble in dilute hydrochloric acid, slightly soluble in acetic acid, and insoluble in alcohol or water. The specific gravity of lead dioxide is 9.375 and its refractive index is 2.30.

5.124.3 Use data. See Use data para 4.9.

5.124.4 Packaging data and labeling. Lead dioxide, ACS is packaged for military use in powdered form in 1/4 lb and 1 lb unit quantity bottles. Unless exempted under section 173.153 of Title 49, Code of Federal Regulations, shipping containers must bear the DoT yellow label for oxidizing materials. Each bottle must bear the following precautionary label:

LEAD DIOXIDE
WARNING! STRONG OXIDANT
HARMFUL DUST

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Store separately from and avoid contact
with combustible materials.
Avoid breathing dust.
Wash thoroughly after handling.
Keep away from feed or food products.

5.124.5 Storage data. Lead dioxide should be stored in tightly closed containers in a cool, dry place away from organic materials. Under these storage conditions, the shelf life is indefinite.

5.125 Name. LEAD NITRATE, ACS $\text{Pb}(\text{NO}_3)_2$ FW 331.20
(HAZARDOUS)

5.125.1 Specifications. See Specifications para 4.10.

5.125.2 Technical description. Lead nitrate, ACS is in the form of white or colorless, translucent crystals of specific gravity 5.43 and refractive index 1.782. At 470°C it decomposes. In water, lead nitrate has a solubility of 37.65 grams per 100 ml at 0°C and 127 grams per 100 ml at 100°C. It is also soluble in alcohol, alkalies, and ammonia. One of the most common soluble lead salts, it is obtained by the action of dilute nitric acid on lead or lead oxide.

5.125.3 Use data. See Use data para 4.9.

5.125.4 Packaging data and labeling. Lead nitrate, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. In addition, each bottle must bear the following precautionary label:

LEAD NITRATE
WARNING! HARMFUL DUST
STRONG OXIDANT

Avoid breathing dust.
Avoid contact with skin or eyes.
Wash thoroughly after handling.
Store separately from and avoid contact
with combustible materials.

5.125.5 Storage data. Lead nitrate should be stored in the same manner as BARIUM NITRATE, 5.30.5. Lead nitrate has an indefinite shelf life.

5.126 Name. LEAD SUBACETATE, ACS $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 2\text{Pb}(\text{OH})_2$ FW 807.68
Lead Acetate, Monobasic
(HAZARDOUS)

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5.126.1 Specifications. See Specifications para 4.10.

5.126.2 Technical description. Lead subacetate is a heavy white powder. Its solubility is 6.2 grams per 100 ml of cold water and 25 grams per 100 ml of boiling water with alkaline reaction. On exposure to air, lead subacetate absorbs carbon dioxide and becomes incompletely soluble.

5.126.3 Use data. Lead subacetate, ACS is used for removing coloring matter in sugar analysis and for clarifying and decolorizing other solutions of organic substances.

5.126.4 Packaging data and labeling. Lead subacetate, ACS is packaged for military use in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

LEAD SUBACETATE
WARNING! HARMFUL DUST

Avoid breathing dust.
Wash thoroughly after handling.
Keep away from feed or food products.

5.126.5 Storage data. Lead subacetate should be stored in a cool, dry area in tightly sealed containers. Under these storage conditions the shelf life is indefinite.

5.127 Name. LITHIUM CARBONATE, ACS Li_2CO_3 FW 73.89

5.127.1 Specifications. See Specifications para 4.10.

5.127.2 Technical description. Lithium carbonate, ACS is in the form of white, slightly alkaline powder or crystals. The melting point of lithium carbonate, ACS is 723°C, and it decomposes at 1310°C. The solubility of the material is 1.54 grams per 100 ml of water at 0°C, and 0.72 grams per 100 ml of water at 100°C. It is insoluble in alcohol and acetone. The specific gravity is 2.11, and refractive indices are 1.428, 1.507, and 1.572.

5.127.3 Use data. See Use data para 4.9.

5.127.4 Packaging data and labeling. Lithium carbonate, ACS is packaged for military use in powdered form in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

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5.127.5 Storage data. Lithium carbonate should be stored in a cool, dry area in tightly closed containers. Under these storage conditions the shelf life is indefinite.

5.128 Name. MAGNESIUM ACETATE, ACS $(\text{CH}_3\text{COO})_2\text{Mg} \cdot 4\text{H}_2\text{O}$ FW 214.46

5.128.1 Specifications. See Specifications para 4.10.

5.128.2 Technical description. Magnesium acetate, ACS is in the form of colorless or white, deliquescent crystals. The aqueous solutions are neutral or slightly acidic. The melting point of magnesium acetate is 80°C . The solubility of this material in water is 120 grams per 100 ml at 15°C ; in hot water, it is extremely soluble. It is very soluble in alcohol. The specific gravity is 1.454, and the refractive index is 1.491.

5.128.3 Use data. See Use data para 4.9.

5.128.4 Packaging data and labeling. Magnesium acetate, ACS is packaged for military use in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.128.5 Storage data. Magnesium acetate, ACS should be stored in a cool, dry area in tightly sealed containers. Under these storage conditions the shelf life is indefinite.

5.129 Name. MAGNESIUM CHLORIDE, HEXAHYDRATE, ACS $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ FW 203.30

5.129.1 Specifications. See Specifications para 4.10.

5.129.2 Technical description. Magnesium chloride, hexahydrate, which is very similar in its physical properties to calcium chloride (5.47) is a hydrated salt that occurs in mineral deposits. Magnesium chloride, hexahydrate, decomposes at $116\text{--}118^\circ\text{C}$. The solubility of this material is 167 grams per 100 ml of cold water, and 367 grams per 100 ml of hot water. It is soluble in alcohol. The specific gravity is 1.569, and the refractive indices are 1.495, 1.507, and 1.528.

5.129.3 Use data. See Use data para 4.9.

5.129.4 Packaging data and labeling. Magnesium chloride, hexahydrate, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.129.5 Storage data. Magnesium chloride, hexahydrate, ACS is very deliquescent and should be stored in tightly closed containers. It

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also possesses some inherent tendency to cake, and must be stored under moderate to cool temperatures. In tightly closed containers magnesium chloride will remain chemically stable indefinitely; however, it should be checked periodically.

5.130 Name. MAGNESIUM NITRATE, HEXAHYDRATE, ACS $\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ FW 256.41
(HAZARDOUS)

5.130.1 Specifications. See Specifications para 4.10.

5.130.2 Technical description. Magnesium nitrate, hexahydrate, ACS is in the form of white, monoclinic, deliquescent crystals. The melting point of magnesium nitrate, hexahydrate, is 95°C and it decomposes at 330°C . Its solubility in water is 125 grams per 100 ml at 20°C ; it is soluble in alcohol, ether, and liquid ammonia. The specific gravity of magnesium nitrate, hexahydrate is 1.464.

5.130.3 Use data. See Use data para 4.9.

5.130.4 Packaging data and labeling. Magnesium nitrate, hexahydrate, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Each bottle must bear the following precautionary label:

MAGNESIUM NITRATE
WARNING! STRONG OXIDANT

Avoid contact with skin or eyes.
Store separately from and avoid contact
with combustible materials.

5.130.5 Storage data. See BARIUM NITRATE, 5.30.5. Magnesium nitrate is deliquescent. In unopened containers, its shelf life is indefinite.

5.131 Name. MAGNESIUM OXIDE, ACS MgO FW 40.30

5.131.1 Specifications. See Specifications para 4.10.

5.131.2 Technical description. Magnesium oxide, ACS is in the form of a white or colorless, odorless, slightly hygroscopic, fine powder. It absorbs moisture and carbon dioxide from the air. It has a very low heat conductivity. The boiling point of magnesium oxide is 3600°C , and the melting point is 2800°C . The solubility of magnesium oxide is 0.00062 grams of 100 ml of cold water and 0.0086 grams per 100 ml of water at 30°C . It is soluble in acids and solutions of ammonia salts,

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and insoluble in alcohol. It has a specific gravity of 3.58 (25°C) and the refractive index is 1.736.

5.131.3 Use data. See Use data para 4.9.

5.131.4 Packaging data and labeling. Magnesium oxide, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.131.5 Storage data. Magnesium oxide, ACS should be stored in a cool, dry, well-ventilated place. Containers should be kept tightly closed. Under these storage conditions the shelf life is 12 months or longer.

5.132 Name. MAGNESIUM SULFATE, HEPTAHYDRATE ACS $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ FW 246.47

5.132.1 Specifications. See Specifications para 4.10.

5.132.2 Technical description. Magnesium sulfate, heptahydrate, is in the form of white, somewhat efflorescent crystals or powder with a bitter, saline, cooling taste. It loses water to dry, warm air: it rapidly reabsorbs water when exposed to moist air. At a temperature of 150°C, it loses 6 molecules of water and, at 200°C, it becomes anhydrous; the anhydrous magnesium sulfate decomposes at 1124°C. In water, the solubility is 71 grams per 100 ml at 20°C. It is slightly soluble in alcohol and glycol. Its specific gravity is 1.68; the refractive indices are 1.433, 1.455, and 1.461.

5.132.3 Use data. See Use data para 4.9.

5.132.4 Packaging data and labeling. Magnesium sulfate, heptahydrate, ACS is packaged for military use in small crystal form in 1 oz and 1 lb unit quantity glass bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.132.5 Storage data. See MAGNESIUM CHLORIDE, 5.129.5. Magnesium sulfate, heptahydrate, has an indefinite shelf life.

5.133 Name. MANGANESE SULFATE, MONOHYDRATE, ACS $\text{MnSO}_4 \cdot \text{H}_2\text{O}$ FW 169.01
Manganous Sulfate

5.133.1 Specifications. See Specifications para 4.10.

5.133.2 Technical description. Manganese sulfate, monohydrate, is in the form of pale red, slightly efflorescent crystals and maintains its chemical state at temperatures ranging from 57°C to 117°C. Its specific gravity is 2.95 and its refractive indices are 1.562, 1.595, and 1.632. Its solubility in water is 98.47 grams per 100 ml at 48°C and 79.8 grams per 100 ml at 100°C. It is not a very common hydrate of manganese sulfate.

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5.133.3 Use data. See Use data para 4.9.

5.133.4 Packaging data and labeling. Manganese sulfate, monohydrate, ACS is packaged for military use in powdered form in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.133.5 Storage data. Manganese sulfate should be stored in tightly closed containers in a cool, dry place. Under these storage conditions the shelf life is indefinite.

5.134 Name. MANNITOL, ACS $\text{HOCH}_2(\text{CHOH})_4\text{CH}_2\text{OH}$ FW 182.17
D-Mannitol

5.134.1 Specifications. See Specifications para 4.10.

5.134.2 Technical description. Mannitol is in the form of colorless, rhombic needles with a sweetish taste. Its specific gravity is 1.489 and its refractive index is 1.3330. Its melting point is 168°C and its boiling point, measured at 3.5 mm pressure, is 295°C. In water at 18°C, it has a solubility of 15.6 grams per 100 ml. Mannitol is soluble in glycerol, sparingly soluble in alcohol, and insoluble in ether.

5.134.3 Use data. Mannitol, ACS is used in analytical chemistry for boron determination and as a starting point for many derivatives.

5.134.4 Packaging data and labeling. For military use mannitol, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.134.5 Storage data. Mannitol should be stored in tightly closed containers in a cool, dry place. The shelf life is indefinite under these storage conditions.

5.135 Name. MERCURIC ACETATE, ACS $(\text{CH}_3\text{COO})_2\text{Hg}$ FW 318.68
Mercury Acetate
(HAZARDOUS)

5.135.1 Specifications. See Specifications para 4.10.

5.135.2 Technical description. Mercuric acetate is in the form of white scales or powder having a slight odor and taste of acetic acid. Upon heating this compound decomposes. It is sensitive to light. The solubility of mercuric acetate is 25 grams per 100 ml of water at 10°C and 100 grams per 100 ml at 100°C. It is soluble in alcohol and acetic acid.

5.135.3 Use data. Mercuric acetate, ACS is used as a catalyst in organic synthesis and for mercuriation of organic compounds.

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5.135.4 Packaging data and labeling. Mercuric acetate, ACS is packaged for military use in powdered form in 1/4 lb and 1 lb unit quantity nonactinic bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT poison B label unless exempted under section 173.364 of Title 49, Code of Federal Regulations. In addition, each bottle must bear the following precautionary label:

MERCURIC ACETATE
DANGER! HARMFUL DUST
MAY BE FATAL IF SWALLOWED
ABSORBED THROUGH SKIN

Do not breathe dust or vapor.
Do not get in eyes, on skin or clothing.
Wash thoroughly after handling.
Keep away from feed or food products.

POISON
CALL A PHYSICIAN

5.135.5 Storage data. Mercuric acetate should be stored in cool, dry, ventilated areas, protected from light and away from acute fire hazards. Containers must be kept tightly closed. Under the recommended storage conditions, the shelf life of mercuric acetate and other mercury compounds covered in this standard is indefinite.

5.136 Name. MERCURIC BROMIDE, ACS HgBr_2 FW 360.40
(HAZARDOUS)

5.136.1 Specifications. See Specifications para 4.10.

5.136.2 Technical description. Mercuric bromide is in the form of white crystals or crystalline powder of specific gravity 6.109 (25°C). It darkens on exposure to light, especially in the presence of mercurous salts. The melting point is 236°C and the boiling point is 322°C. In water, mercuric bromide has a solubility of 0.61 gram per 100 ml at 25°C and 4.0 grams per 100 ml at 100°C. Its solubility in alcohol is 15 grams per 100 ml at 0°C. It is soluble in methanol and very soluble in ether.

5.136.3 Use data. See Use data para 4.9.

5.136.4 Packaging data and labeling. Mercuric bromide, ACS is packaged for military use in 1 oz and 1/4 lb unit quantity nonactinic bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT poison B label unless exempted under section 173.364 of Title 49, Code of Federal Regulations. In addition, each bottle must bear the following precautionary label:

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MERCURIC BROMIDE
DANGER! HARMFUL DUST
MAY BE FATAL IF SWALLOWED

Do not breathe dust or vapor.
Avoid contact with eyes or prolonged
contact with skin.
Wash thoroughly after handling.
Keep away from feed or food products.

POISON
CALL A PHYSICIAN

5.136.5 Storage data. See MERCURIC ACETATE, 5.135.5.

5.137	Name.	MERCURIC CHLORIDE, ACS	HgCl_2	FW 271.50
		Mercury Bichloride		
		(HAZARDOUS)		

5.137.1 Specifications. See Specifications para 4.10.

5.137.2 Technical description. Mercuric chloride is in the form of white granules or crystalline powder. The melting point is 276°C and the boiling point is 302°C. In water, mercuric chloride has a solubility of 6.9 grams per 100 ml at 20°C and 48 grams per 100 ml at 100°C. Its solubility in alcohol is 33 grams per 100 ml at 25°C; it is soluble in ether, acetic acid, and pyridine.

5.137.3 Use data. Mercuric chloride, ACS is an important laboratory reagent used in organic synthesis, as a catalyst and many other uses.

5.137.4 Packaging data and labeling. Mercuric chloride, ACS is packaged for military use in crystalline form in 1/4 lb and 1 lb unit quantity nonactinic glass bottles. Packaging and shipping of this chemical must conform to DoT regulations. See MERCURIC BROMIDE, 5.136.4 for labeling requirements.

5.137.5 Storage data. See MERCURIC ACETATE, 5.135.5.

5.138	Name.	MERCURIC IODIDE, RED, ACS	HgI_2	FW 454.40
		Mercury Biniiodide		
		(HAZARDOUS)		

5.138.1 Specifications. See Specifications para 4.10.

5.138.2 Technical description. Mercuric iodide is a scarlet-red, heavy, tasteless, odorless powder. At 130°C it becomes yellow in color; on cooling it regains its original red color. It is sensitive to light. Mercuric iodide has a melting point of 259°C and a boiling point of 354°C. It is very slightly soluble in water and soluble in ether, acetone, chloroform, or potassium iodide solution. The specific gravity is 6.271.

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5.138.3 Use data. Mercuric iodide, ACS is used in analytical chemistry for the preparation of Nessler's Reagent and Mayer's Reagent.

5.138.4 Packaging data and labeling. Mercuric iodide, red, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity nonactinic bottles. Packaging and shipping of this chemical must conform to DoT regulations. See MERCURIC BROMIDE, 5.136.4 for labeling requirements.

5.138.5 Storage data. See MERCURIC ACETATE, 5.135.5.

5.139 Name. MERCURIC OXIDE, RED, ACS HgO FW 216.59
(HAZARDOUS)

5.139.1 Specifications. See Specifications para 4.10.

5.139.2 Technical description. Mercuric oxide is in the form of orange-red, heavy crystals or crystalline powder. It appears yellow when finely powdered; it decomposes on exposure to light or when heated to 500°C. At 400°C mercuric oxide is almost black; it returns to its original red color upon cooling. It is soluble in dilute hydrochloric acid or in solutions of alkalis, cyanides, or iodides; it is insoluble in water or alcohol. The specific gravity is 11.1 at 4°C; the refractive indices are 2.37, 2.5, and 2.65.

5.139.3 Use data. Mercuric oxide, red, ACS is used in Kjeldahl nitrogen determinations and as a reagent for citric acid, thiophene, glucose, aldehyde, urea, and acetone.

5.139.4 Packaging data and labeling. Mercuric oxide, red, ACS is packaged for military use in 1 oz, 1/4 lb, and 1 lb unit quantity nonactinic bottles. Packaging and shipping of this chemical must conform to DoT regulations. See MERCURIC BROMIDE, 5.136.4 for labeling requirements.

5.139.5 Storage data. See MERCURIC ACETATE, 5.135.5.

5.140 Name. MERCURIC OXIDE, YELLOW, ACS HgO FW 216.59
(HAZARDOUS)

5.140.1 Specifications. See Specifications para 4.10.

5.140.2 Technical description. Mercuric oxide, yellow is in the form of yellow to orange-yellow, heavy odorless powder. It becomes red on heating and yellow again on cooling. Other physical properties and solubilities are the same as MERCURIC OXIDE, RED, 5.139.2, but because of its fine state of subdivision, it is more reactive.

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5.140.3 Use data. Mercuric oxide, yellow, ACS is used in applications similar to mercuric oxide, red, 5.139.3 and for the determination of zinc or hydrocyanic acid. It is also used in detecting acetic acid in formic acid and carbon monoxide in gas mixtures.

5.140.4 Packaging data and labeling. Mercuric oxide, yellow, ACS is packaged for military use in 1 lb unit quantity nonactinic bottles. Packaging and shipping of this chemical must conform to DoT regulations. See MERCURIC BROMIDE, 5.136.4, for labeling requirements.

5.140.5 Storage data. See MERCURIC ACETATE, 5.135.5.

5.141 Name. MERCUROUS CHLORIDE, ACS HgCl FW 236.04
Mercury Chloride
(HAZARDOUS)

5.141.1 Specifications. See Specifications para 4.10.

5.141.2 Technical description. Mercurous chloride is in the form of a white, odorless, tasteless, heavy powder. It is slowly decomposed by sunlight into mercuric chloride and metallic mercury. It sublimes at 400-500°C without melting. It is practically insoluble in water and insoluble in alcohol or ether. Its specific gravity is 7.150.

5.141.3 Use data. See Use data para 4.9.

5.141.4 Packaging data and labeling. Mercurous chloride, ACS is packaged for military use in 1/4 lb, and 1 lb unit quantity nonactinic bottles. Unless exempted under section 173.364 of Title 49, Code of Federal Regulations, shipping containers must bear the DoT poison label for Class B poisons. Each bottle must bear the following precautionary label:

MERCUROUS CHLORIDE
DANGER! HARMFUL DUST
MAY BE FATAL IF SWALLOWED

Do not breathe dust or vapor.
Avoid contact with eyes or prolonged
contact with skin.
Wash thoroughly after handling.
Keep away from feed or food products.

5.141.5 Storage data. See MERCURIC ACETATE, 5.135.5.

5.142 Name. MERCURY, ACS Hg AW 200.59
(HAZARDOUS)

5.142.1 Specifications. See Specifications para 4.10.

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5.142.2 Technical description. Mercury is a bright, silver-white, lustrous metal which is in the form of a slightly volatile liquid at ordinary temperatures. This metal expands uniformly on heating; this property makes it valuable for use in thermometers. It forms amalgams with the better known metals except iron and platinum. Mercury's melting point is -38.87°C and its boiling point is 356.58°C . It is insoluble in water, dilute hydrochloric acid, hydrobromic acid, hydroiodic acid, and sulfuric acid. It is soluble in nitric acid. The specific gravity of mercury is 13.5939 ($20/4^{\circ}\text{C}$).

5.142.3 Use data. Mercury, ACS is used in barometers, thermometers, hydrometers, and pyrometers. It is also used in determining nitrogen by the Kjeldahl method for Millon's Reagent, as a cathode in electrolysis, electroanalysis, and many other uses.

5.142.4 Packaging data and labeling. Mercury, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity glass or polyethylene bottles. Unless exempted under section 173.345 of Title 49, Code of Federal Regulations, shipping containers must bear the DOT poison label for Class B poison. In addition, each bottle must bear the following precautionary label:

MERCURY
DANGER! VAPOR HARMFUL
ABSORBED THROUGH THE SKIN

Do not breathe vapor.
Use with adequate ventilation.
Do not get in eyes, on skin, on clothing.
Wash thoroughly after handling.

POISON
CALL A PHYSICIAN

5.142.5 Storage data. Mercury should be stored in tightly sealed containers in a cool, dry well-ventilated area. Under these storage conditions the shelf life is indefinite.

5.143	Name.	METHANOL, ACS Methyl Alcohol (HAZARDOUS)	CH_3OH	FW 32.04
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5.143.1 Specifications. See Specifications para 4.10.

5.143.2 Technical description. Methanol, ACS is in the form of a clear, colorless, mobile, flammable liquid. It has a slightly alcoholic odor.

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TABLE XXV. - Physical constants of methanol

Boiling point	64.8°C
Flash point (open cup)	65°F
Freezing point	-97.8°C
Refractive Index	1.3288 at 20°C
Solubility data	Miscible with water, alcohol, ethanol, ether and benzene
Specific gravity	0.7913

5.143.3 Use data. Methanol, ACS is used in organic synthesis, for preparation of methyl esters, methyl chloride, formaldehyde, etc, and as a general laboratory solvent.

5.143.4 Packaging data and labeling. Methanol, ACS is packaged for military use in 1 pt unit quantity bottles, and 1 gal unit quantity cans. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Individual containers must bear the following precautionary label:

METHANOL
DANGER! FLAMMABLE
VAPOR HARMFUL
MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED
CANNOT BE MADE NONPOISONOUS

Keep away from heat, sparks, and open flame.
Keep container closed.
Avoid prolonged or repeated breathing of vapor.
Use only with adequate ventilation.

POISON
CALL A PHYSICIAN

5.143.5 Storage data. See AMYL ALCOHOL, 5.22.5.

5.144 Name. METHANOL, FOR SPECTROPHOTOMETRY, ACS CH₃OH FW 32.04
(HAZARDOUS)

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5.144.1 Specifications. See Specifications para 4.10.

5.144.2 Technical description. Methanol, for spectrophotometry, ACS is especially refined to give it the low optical absorbance needed for spectrophotometry. For physical constants, see METHANOL, 5.143.2.

5.144.3 Use data. Methanol, for spectrophotometry, ACS is intended for use in spectrophotometry.

5.144.4 Packaging data and labeling. Methanol, for spectrophotometry, ACS is packaged for military use in 1 qt and 1 gal unit quantity bottles. See METHANOL, 5.143.4, for labeling requirements.

5.144.5 Storage data. See AMYL ALCOHOL, 5.22.5.

5.145 Name. METHYL ORANGE, ACS $C_{14}H_{14}N_3NaO_3S$ FW 327.35
Sodium p-dimethylaminoazobenzenesulfonate

5.145.1 Specifications. See Specifications para 4.10.

5.145.2 Technical description. Methyl orange is in the form of an orange-yellow powder or crystalline scales. It is slightly soluble in cold water; insoluble in alcohol; readily soluble in hot water. It decomposes upon heating.

5.145.3 Use data. Methyl orange, ACS, is used as a pH indicator in aqueous solution in the pH range 3.1 (red) to 4.4 (yellow). It is used for titrating most mineral acids, strong bases and for estimating alkalinity of water. It is useless for organic acids.

5.145.4 Packaging data and labeling. Methyl orange, ACS is packaged for military use in 1 oz, 1/4 lb and 1 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.145.5 Storage data. Methyl orange should be stored in a cool, dry place in tightly sealed containers protected from light. Under these storage conditions, the shelf life is indefinite.

5.146 Name. 4-METHYL-2-PENTANONE, ACS $(CH_3)_2CHCH_2COCH_3$ FW 100.16
Methyl Isobutyl Ketone
(HAZARDOUS)

5.146.1 Specifications. See Specifications para 4.10.

5.146.2 Technical description. 4-Methyl-2-pentanone, is a colorless, flammable, liquid with a faint, ketonic and camphor odor.

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TABLE XXVI. - Physical constants of 4-methyl-2-pentanone

Boiling point	116.85°C
Flash point	73°F
Melting point	-84.7°C
Refractive index (20°C)	1.396
Solubility data	Slightly soluble in water. Miscible with alcohol, ether, and benzene.
Specific gravity	0.801

5.146.3 Use data. See Use data para 4.9.

5.146.4 Packaging data and labeling. 4-Methyl-2-pentanone, ACS is packaged for military use in 1 pt, 1 qt, and 1 gal unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquid unless exempted under section 173.118 of Title 49, Code of Federal Regulations. In addition, each bottle must bear the following precautionary label:

4-METHYL-2-PENTANONE
 WARNING! FLAMMABLE
 VAPOR HARMFUL
 IRRITATING TO SKIN, EYES,
 NOSE, AND THROAT

Keep away from heat, sparks, and open flame.
 Avoid prolonged breathing of vapor.
 Use with adequate ventilation.
 Avoid prolonged or repeated contact with skin.
 Do not take internally.

5.146.5 Storage data. 4-Methyl-2-pentanone should be stored in tightly closed containers in a cool, dry, ventilated area away from acute fire hazards, open flame, reducing materials, and direct sunlight. Under these storage conditions the shelf life is indefinite.

5.147 Name. METHYL RED, ACS
 o-[[p-(Dimethylamino)phenyl]azo]benzoic Acid
 C.I. Acid Red 2

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5.147.1 Specifications. See Specifications para 4.10.

5.147.2 Technical description. Methyl red is in the form of a dark red powder or violet crystals. It is sparingly soluble in water and soluble in alcohol. Its melting point is 183°C. This compound also exists in salt forms as well as in the free acid form.

5.147.3 Use data. Methyl red, ACS is used as a pH indicator in the pH range 4.4 (red) to 6.2 (yellow). It is used for titrating ammonia, weak organic bases such as alkaloids. It is not suitable for organic acids except oxalic and picric acid.

5.147.4 Packaging data and labeling. Methyl red, ACS is packaged for military use in 1 oz and 1/4 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.147.5 Storage data. Methyl red should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.148 Name. METHYL SULFOXIDE, ACS $(CH_3)_2SO$ FW 78.13
Dimethyl Sulfoxide

5.148.1 Specifications. See Specifications para 4.10.

5.148.2 Technical description. Methyl sulfoxide is a clear, water-white, hygroscopic, practically odorless liquid with a slightly bitter taste. Methyl sulfoxide has a specific gravity of 1.1014, a melting point of 6°C, and a boiling point of 100°C, with decomposition. It is soluble in water, alcohol, ether, acetone, and ethyl acetate. Its flash point (open cup) is 203°F.

5.148.3 Use data. See Use data para 4.9.

5.148.4 Packaging data and labeling. Methyl sulfoxide, ACS is packaged for military use in 1 pt unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.148.5 Storage data. Methyl sulfoxide should be stored in a cool, dry area in tightly closed containers away from direct sunlight, acute fire hazards, open flame, or oxidizing materials. Under these storage conditions the shelf life is indefinite.

5.149 Name. MOLYBDENUM TRIOXIDE, ACS MoO_3 FW 143.94
Molybdic Acid Anhydride

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5.149.1 Specifications. See Specifications para 4.10.

5.149.2 Technical description. Molybdenum trioxide is in the form of a white, slightly yellow, or slightly bluish, hygroscopic powder. It can also be prepared in crystalline form. Molybdenum trioxide can undergo color changes at elevated temperatures. Its specific gravity is 4.692 at 21°C. The melting point is 795°C; it sublimates at 115°C (760 mm pressure). The solubility of molybdenum trioxide in water is 0.1066 grams per 100 ml at 18°C and 2.055 grams per 100 ml at 70°C. It is soluble in mixtures of mineral acids, in solutions of alkali hydroxides, ammonia, and potassium bitartrate.

5.149.3 Use data. See Use data para 4.9.

5.149.4 Packaging data and labeling. Molybdenum trioxide, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.149.5 Storage data. Molybdenum trioxide should be stored in a cool, dry place in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.150 Name. MOLYBDIC ACID, 85%, ACS H_2MoO_4 FW 161.95
This reagent consists largely of an Ammonium Molybdate.

5.150.1 Specifications. See Specifications para 4.10.

5.150.2 Technical description. Molybdic acid is in the form of white to yellow monoclinic crystals or powder. The specific gravity of molybdic acid is 3.124 (15/4°C). It melts at 90°C with decomposition at 115°C. The solubility of molybdic acid is 0.133 grams per 100 ml of water at 18°C, and 2.568 grams per 100 ml of water at 70°C. It is also soluble in strong mineral acids and alkalies.

5.150.3 Use data. Molybdic acid, 85%, ACS is used principally for the determination of phosphorus, or phosphate and lead.

5.150.4 Packaging data and labeling. Molybdic acid, 85%, ACS is packaged for military use in 2 oz, 1/4 lb, and 1 lb unit quantity nonactinic glass bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.150.5 Storage data. See MOLYBDENUM TRIOXIDE, 5.149.5.

5.151 Name. NICKEL SULFATE, ACS $NiSO_4 \cdot 6H_2O$ FW 262.86

5.151.1 Specifications. See Specifications para 4.10.

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5.151.2 Technical description. Nickel sulfate is in the form of emerald green, transparent, efflorescent crystals of specific gravity 2.07. It melts at 100°C with a loss of some water of hydration; it becomes anhydrous at 280°C. The solubility in water is 62.52 grams per 100 ml at 0°C and 340.7 grams per 100 ml at 100°C. In methanol, its solubility is 12.5 grams per 100 ml; it is very soluble in alcohol and in ammonium hydroxide. The aqueous solution is acidic.

5.151.3 Use data. See Use data para 4.9.

5.151.4 Packaging data and labeling. Nickel sulfate, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity nonactinic glass bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.151.5 Storage data. Nickel sulfate should be stored in a cool dry place in tightly closed containers. Under these storage conditions, nickel sulfate has an indefinite shelf life.

5.152 Name. NITRIC ACID, ACS HNO_3 FW 63.01
(HAZARDOUS)

5.152.1 Specifications. See Specifications para 4.10.

5.152.2 Technical description. Nitric acid is in the form of a colorless or yellowish, corrosive liquid, free from suspended matter or sediment. It fumes in moist air and has a characteristic choking odor. It is a strong oxidizing agent that will react readily with most chemicals. The specific gravity of nitric acid is about 1.4. The boiling point is about 120°C. It reacts violently with alcohol, turpentine, charcoal, and organic refuse.

5.152.3 Use data. See Use data para 4.9.

5.152.4 Packaging data and labeling. Nitric acid, ACS (69.0-71.0%) is packaged for military use in 1 pt and 5 pt unit quantity glass bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT white label for corrosive liquids. Individual containers must bear the following precautionary label:

NITRIC ACID
DANGER! CAUSES SEVERE BURNS
VAPOR EXTREMELY HAZARDOUS
MAY CAUSE NITROUS GAS POISONING
SPILLAGE MAY CAUSE FIRE OR
LIBERATE DANGEROUS GAS

Do not breathe vapor.

Do not get in eyes, on skin, on clothing.

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes; get medical attention.

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5.152.5 Storage data. Nitric acid should be carefully stored to avoid mechanical injury to containers. Keep it in a cool, well-ventilated place away from areas of acute fire hazards and the direct rays of the sun. Keep it away from organic and other readily oxidizable materials. Keep container tightly closed. Under these storage conditions, the shelf life is indefinite.

5.153 Name. NITRIC ACID, FUMING, ACS HNO_3 FW 63.01
Nitric Acid, 90%
(HAZARDOUS)

5.153.1 Specifications. See Specifications para 4.10.

5.153.2 Technical description. Nitric acid, fuming, ACS is a concentrated form (90%) of nitric acid containing dissolved nitrogen dioxide. It has the form of a yellow to brownish-red, strongly fuming, very corrosive liquid. It evolves suffocating, poisonous, yellowish-red fumes of nitrogen dioxide and nitrogen tetroxide. The specific gravity of nitric acid, fuming, is about 1.5.

5.153.3 Use data. See Use data para 4.9.

5.153.4 Packaging data and labeling. Nitric acid, fuming, ACS is packaged for military use in 1 pt unit quantity glass bottles. See NITRIC ACID, 5.152.4, for labeling requirements.

5.153.5 Storage data. This material is more likely to evolve fumes than ordinary nitric acid. It should be handled more carefully. See NITRIC ACID, 5.152.5.

5.154 Name. NITROBENZENE, ACS $\text{C}_6\text{H}_5\text{NO}_2$ FW 123.11
Nitrobenzol
(HAZARDOUS)

5.154.1 Specifications. See Specifications para 4.10.

5.154.2 Technical description. Nitrobenzene is a colorless to pale yellow, oily liquid with an odor of volatile oil almond. It is volatile with steam.

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TABLE XXVII. - Physical constants of nitrobenzene

Boiling point	210.8°C
Flash point (closed cup)	190°F
Melting point	5.7°C
Refractive index (20°C)	1.5562
Solubility data	Slightly soluble in water. Very soluble in alcohol, ether, and benzene
Specific gravity	1.2037

5.154.3 Use data. See Use data para 4.9.

5.154.4 Packaging data and labeling. For military use nitrobenzene, ACS is packaged in 1 pt and 1 qt unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT poison B label unless exempted under section 173.345 of Title 49, Code of Federal Regulations. Individual containers must bear a precautionary label identical to that of ANILINE, 5.23.4.

5.154.5 Storage data. Nitrobenzene should be stored in tightly closed containers in a cool, dry, well-ventilated area away from acute fire hazards, reducing materials, and direct sunlight. Under these storage conditions, the shelf life is indefinite. It should be inspected periodically for leakage or spillage.

5.155 Name. OXALIC ACID, DIHYDRATE, ACS $(\text{COOH})_2 \cdot 2\text{H}_2\text{O}$ FW 126.07
Ethanedioic Acid
(HAZARDOUS)

5.155.1 Specifications. See Specifications para 4.10.

5.155.2 Technical description. Oxalic acid, dihydrate, ACS is in the form of white, transparent crystals. It is among the strongest of the organic acids. It is moderately soluble in cold water; extremely soluble in hot water, and very soluble in alcohol or ether. It is insoluble in benzene, chloroform and petroleum ether. It is hygroscopic and sublimes at temperatures above 150°C. The melting point of oxalic acid is 101°C and it becomes anhydrous at 189°C. The specific gravity of oxalic acid is 1.653.

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5.155.3 Use data. See Use data para 4.9.

5.155.4 Packaging data and labeling. Oxalic acid, dihydrate, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

OXALIC ACID
WARNING! HARMFUL IF SWALLOWED
CAUSES SKIN IRRITATION

Avoid breathing dust.
Avoid contact with skin and eyes.
Do not take internally.
Keep away from feed or food products.
In case of contact, immediately flush skin or eyes
with plenty of water for at least 15 minutes; for
eyes, get medical attention.

5.155.5 Storage data. Oxalic acid should be stored in a cool, dry place away from oxidizing materials in tightly closed containers. Under recommended conditions and temperatures, the shelf life of oxalic acid is indefinite.

5.156 Name. PERCHLORIC ACID, 70% ACS HClO_4 FW 100.46
(HAZARDOUS)

5.156.1 Specifications. See Specifications para 4.10.

5.156.2 Technical description. Perchloric acid is a very strongly reactive acid. The anhydrous acid is a colorless, volatile, very hygroscopic liquid. Its specific gravity is 1.768 and its melting point is -112°C . It combines vigorously with water with evolution of heat. It undergoes spontaneous and explosive decomposition, thus it is marketed only in mixture with water containing 60-70% perchloric acid. The specific gravity of the 70% acid is 1.6736 and the specific gravity of the 60% acid is 1.5389.

5.156.3 Use data. Perchloric acid is used in analytical chemistry as an oxidizer and for separation of potassium from sodium.

5.156.4 Packaging data and labeling. Perchloric acid 70%, ACS is packaged for military use in 1 lb unit quantity nonactinic glass bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT white label for corrosive liquids unless exempted under section 173.244 of Title 49, Code of Federal Regulations. Individual containers must have the following precautionary label:

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PERCHLORIC ACID, 70%
 DANGER! STRONG OXIDANT
 CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE
 OR EXPLOSION, ESPECIALLY IF HEATED
 CAUSES SEVERE BURNS

Keep container closed and away from heat.
 Store separately from, and avoid contact with, dehydrating agents and other materials.
 Do not get in eyes, on skin, on clothing.
 In case of spillage, flush with plenty of water and remove contaminated articles.
 In case of contact, immediately remove all contaminated clothing and flush skin or eyes with plenty of water for at least 15 minutes; for eyes, get medical attention.

5.156.5 Storage data. Perchloric acid should be stored in a detached, fireproof building on shelves made of metal or other nonflammable materials. Store away from other chemicals, especially organic compounds, easily oxidizable materials, dehydrating agents, and all flammable materials. Store in a cool, ventilated area away from flame, friction, and impact. Keep containers tightly closed and plainly labeled. Under these conditions, the shelf life is indefinite.

5.157 Name. PERCHLORIC ACID, 60%, ACS HClO_4 FW 100.46
 ((HAZARDOUS))

5.157.1 Specifications. See Specifications para 4.10.

5.157.2 Technical description. See PERCHLORIC ACID, 70%, 5.156.2.

5.157.3 Use data. See PERCHLORIC ACID, 70%, 5.156.3.

5.157.4 Packaging data and labeling. For military use perchloric acid, 60%, ACS is packaged in 1 lb unit quantity bottles. See PERCHLORIC ACID, 70%, 5.156.4, for labeling requirements.

5.157.5 Storage data. See PERCHLORIC ACID, 70%, 5.156.5.

5.158 Name. PETROLEUM ETHER, ACS
 Benzine
 Ligroine
 Naphtha
 (HAZARDOUS)

5.158.1 Specifications. See Specifications para 4.10.

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5.158.2 Technical description. Petroleum ether is a clear, colorless, volatile, highly flammable liquid. It is composed of hydrocarbons, those from butane to octane predominating. The ACS grade petroleum ether has a boiling range of 30 to 60°C and a density of 0.635 to 0.660 grams per ml. Its flash point (closed cup) is -50°F.

5.158.3 Use data. See Use data para 4.9.

5.158.4 Packaging data and labeling. For military use petroleum ether, ACS is packaged in 1 pt bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Each bottle must bear the following precautionary label:

PETROLEUM ETHER
DANGER! EXTREMELY FLAMMABLE
VAPOR HARMFUL

Keep away from heat, sparks, or open flame.
Store in a cool place.
Use with adequate ventilation.
Avoid prolonged breathing of vapor.

5.158.5 Storage data. Petroleum ether should be stored in tightly closed containers in a cool, well-ventilated area away from acute fire hazards and open flames. Under these storage conditions, the shelf life is indefinite.

5.159 Name. o-PHENANTHROLINE, ACS $C_{12}H_8N_2 \cdot H_2O$ FW 198.23
1,10-Phenanthroline

5.159.1 Specifications. See Specifications para 4.10.

5.159.2 Technical description. o-Phenanthroline is a white, crystalline powder. It melts at 98°C and boils at a temperature above 300°C. It is soluble in water, benzene, alcohol, acetone, and ether.

5.159.3 Use data. o-Phenanthroline, ACS is used in the titration of ferrous salts; complexed with ferrous ions, it is used as an indicator in laboratory analysis of oxidation-reduction systems.

5.159.4 Packaging data and labeling. For military use o-phenanthroline, ACS is packaged in 1 gram and 5 gram unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.159.5 Storage data. o-Phenanthroline should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

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5.160 Name. PHENOL, ACS
Carbolic Acid
(HAZARDOUS)

 C_6H_5OH

FW 94.11

5.160.1 Specifications. See Specifications para 4.10.

5.160.2 Technical description. Phenol is in the form of colorless crystals or white, crystalline masses which become pink or red upon exposure to air and light; this is hastened by the presence of alkalinity. It has a distinctive odor and a burning taste.

TABLE XXVIII. - Physical constants of phenol

Boiling point	181.9°C
Flash point (closed cup)	175°C
Melting point	40.6°C
Solubility data	Soluble in water, alcohol, chloroform, ether, glycerol, and carbon disulfide.
Specific gravity (25/4°C)	1.072

5.160.3 Use data. See Use data para 4.9.

5.160.4 Packaging data and labeling. For military use phenol, ACS is packaged in 1/4 lb unit quantity bottles. Phenol that conforms to ACS specifications may contain a stabilizer. If a stabilizer is present, its presence should be stated on the label. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT poison B label. Individual containers must have the following precautionary label:

PHENOL
DANGER! HAZARDOUS LIQUID OR SOLID
RAPIDLY ABSORBED THROUGH SKIN
CAUSES SEVERE BURNS

Do not get in eyes, on skin, on clothing.

Avoid breathing vapor.

Do not take internally.

In case of contact, immediately remove all contaminated clothing, including shoes, and flush skin or eyes with plenty of water for at least 15 minutes; for eyes, get medical attention.

POISON
CALL A PHYSICIAN

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5.160.5 Storage data. Phenol should be stored in tightly closed, nonactinic glass bottles in a cool, dry, ventilated place away from acute fire hazards, organic compounds, and food products. When stored under these conditions in unopened containers, its shelf life is indefinite.

5.161 Name. PHENOLPHTHALEIN, ACS
3,3-Bis(p-hydroxyphenyl)phthalide

5.161.1 Specifications. See Specifications para 4.10.

5.161.2 Technical description. Phenolphthalein is in the form of white or yellow-white, small crystals of specific gravity 1.300 (25/4°C). The melting range is 258-262°C. Its solubility in alcohol is 20.9 grams per 100 ml; in ether, 5.92 grams per 100 ml. It is almost insoluble in water. It is soluble in aqueous sodium hydroxide or sodium carbonate to form the disodium salt and give the solution a pink to deep-red color.

5.161.3 Use data. Phenolphthalein, ACS is used as a pH indicator. It is colorless to pH 8.5 and pink to deep-red above pH 9. An alcoholic solution is extensively used as an indicator in titrations of mineral and organic acids and most alkalies. It is not suitable for ammonia.

5.161.4 Packaging data and labeling. Phenolphthalein, ACS is packaged for military use in 1 oz and 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.161.5 Storage data. Phenolphthalein should be stored in tightly closed containers in a cool, dry place preferably at temperatures not in excess of 75°F and at a relative humidity of about 50%. Under these storage conditions, the shelf life is indefinite.

5.162 Name. PHENOL RED, ACS
Phenolsulfonphthalein

5.162.1 Specifications. See Specifications para 4.10.

5.162.2 Technical description. Phenol red is in the form of bright to dark-red crystals, which are stable when exposed to air. Its solubility in water is 0.08 gram per 100 ml; in alcohol, 0.3 gram per ml. It is soluble in aqueous alkali hydroxides or carbonates.

5.162.3 Use data. Phenol red, ACS is used as a pH indicator in the range 6.8 (yellow) to 8.2 (red).

5.162.4 Packaging data and labeling. For military use phenol red, ACS is packaged in 1 gram and 5 gram unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

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5.162.5 Storage data. Phenol red should be stored in a cool, dry place in tightly closed containers. The shelf life is indefinite under these storage conditions.

5.163 Name. PHOSPHOMOLYBDIC ACID, ACS $20\text{MoO}_3 \cdot 2\text{H}_3\text{PO}_4 \cdot 48\text{H}_2\text{O}$ FW 3939.78
Molybdophosphoric Acid

5.163.1 Specifications. See Specifications para 4.10.

5.163.2 Technical description. Phosphomolybdic acid, is a complex salt of molybdenum trioxide and phosphoric acid. It is in the form of bright yellow crystals. Its melting point is 78°C and it loses 25 water molecules at 140°C . The solubility of phosphomolybdic acid is 250 grams per 100 ml of cold water; it is very soluble in alcohol or ether.

5.163.3 Use data. Phosphomolybdic acid, ACS is used as a reagent for alkaloids, uric acid, xanthine, creatinine and some metals. It is also used in microscopy.

5.163.4 Packaging data and labeling. Phosphomolybdic acid, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.163.5 Storage data. Phosphomolybdic acid should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite..

5.164 Name. PHOSPHORIC ACID, ACS H_3PO_4 FW 98.00
Orthophosphoric Acid
(HAZARDOUS)

5.164.1 Specifications. See Specifications para 4.10.

5.164.2 Technical description. Phosphoric acid is in the form of an unstable, clear, colorless liquid or a transparent crystalline solid depending on the concentration and the temperature. It has a pleasing acid taste when suitably diluted. Its specific gravity is 1.834 at 18°C , its melting point is 42.35°C , and at 213°C , it loses a half mole of water per mole of H_3PO_4 to form pyrophosphoric acid. Its solubility in water at 20°C is 548 grams per 100 ml; it is very soluble in hot water and soluble in alcohol.

5.164.3 Use data. See Use data para 4.9.

5.164.4 Packaging data and labeling. Phosphoric acid, ACS is packaged for military use in 1 pt unit quantity bottles containing an 85% phosphoric acid solution. There are no applicable DoT packaging or shipping regulations for this chemical. Individual containers should have the following precautionary label:

PHOSPHORIC ACID

CAUTION! CAUSES SKIN IRRITATION

Avoid contact with skin and eyes.
 In case of contact, flush skin or eyes
 with plenty of water for at least 15
 minutes; for eyes, get medical attention.

5.164.5 Storage data. Phosphoric acid should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.165 Name. PHOSPHORIC ACID, META-, ACS HPO_3 FW 79.98
 Glacial Phosphoric Acid
 (HAZARDOUS)

5.165.1 Specifications. See Specifications para 4.10.

5.165.2 Technical description. Metaphosphoric acid is in the form of a transparent, highly deliquescent, glassy mass or pellets with specific gravity 2.2 - 2.488. Upon heating, this compound sublimates. When placed in water, metaphosphoric acid slowly reacts with the water to form pyrophosphoric acid, then orthophosphoric acid.

5.165.3 Use data. See Use data para 4.9.

5.165.4 Packaging data and labeling. Metaphosphoric acid, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. See PHOSPHORIC ACID, 5.164.4, for labeling requirement.

5.165.5 Storage data. Metaphosphoric acid is very deliquescent. It should be stored in a cool, dry area in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.166 Name. PHOSPHORUS PENTOXIDE, ACS P_2O_5 FW 141.94
 Phosphoric Acid Anhydride
 Phosphoric Acid, Anhydrous
 (HAZARDOUS)

5.166.1 Specifications. See Specifications para 4.10.

5.166.2 Technical description. Phosphorus pentoxide is a soft, white, monoclinic or amorphous, deliquescent powder. It absorbs moisture from the air to form meta-, pyro-, or orthophosphoric (phosphoric) acid, depending upon the amount of water absorbed and the conditions under which absorption occurs. The specific gravity of this compound is 2.387, the melting point is 583°C, and it sublimates at 347°C. It reacts violently with water to form phosphoric acid; it is soluble in concentrated sulfuric acid and insoluble in acetone or ammonia.

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5.166.3 Use data. Phosphorus pentoxide, ACS is used as a drying and dehydrating agent and as a condensing agent in organic synthesis.

5.166.4 Packaging data and labeling. Phosphorus pentoxide, ACS is packaged for military use in 1/4 lb unit quantity bottles. Packaging and shipping must conform to DoT regulations. Shipping containers must have a DoT yellow label for flammable solids. It must have the following precautionary label:

PHOSPHORUS PENTOXIDE
WARNING! CAUSES BURNS

Avoid contact with skin and eyes.
Wear rubber gloves and goggles.
In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes; for eyes, get medical attention.
Open container carefully.
Do not add water to contents while in a container because of violent reaction.

5.166.5 Storage data. Phosphorous pentoxide should be stored in tightly closed containers in a cool, dry, well-ventilated area away from all sources of moisture and away from flammable materials. It should be stored in an area that is not protected from fire by an overhead sprinkler system. Under these storage conditions, the shelf life is indefinite.

5.167 Name. PICRIC ACID, ACS $(\text{NO}_2)_3\text{C}_6\text{H}_2\text{OH}$ FW 229.11
2,4,6-Trinitrophenol
(HAZARDOUS)

5.167.1 Specifications. See Specifications para 4.10.

5.167.2 Technical description. Picric acid is in the form of pale yellow, intensely bitter crystals and contains not less than 10 nor more than 15 percent water.

TABLE XXIX. - Physical constants of picric acid

Boiling point	Explodes above 300°C
Flash point	302°F
Melting point	121.8°C
Solubility data	Water: 1.23 g/100 ml at 20°C. Soluble in absolute alcohol or absolute ether.
Specific gravity	1.763

5.167.3 Use data. See Use data para 4.9.

5.167.4 Packaging data and labeling. For military use picric acid, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for flammable solids unless exempted under section 173.192 of Title 49, Code of Federal Regulations. Each bottle must bear the following precautionary label:

PICRIC ACID
DANGER! STRONG OXIDANT
SHOCK OR CONTACT WITH HEAT OR
OTHER MATERIAL MAY CAUSE
EXPLOSION OR FIRE
HARMFUL IF SWALLOWED

Avoid sudden shock.
Keep away from heat, metals, and oxidizable material.
Avoid contact with skin, eyes, or clothing.
Do not take internally.

5.167.5 Storage data. Picric acid should be stored in tightly closed containers in a cool, dry place away from heat sources, acute fire hazards, oxidizable substances, albumin, gelatin, alkaloids, and metals. Containers should be protected from shock and mechanical injury. Containers should be inspected periodically. Under these storage conditions, the shelf life is indefinite.

5.168 Name. PLATINIC CHLORIDE, HEXAHYDRATE, ACS $\text{H}_2\text{PtCl}_6 \cdot 6\text{H}_2\text{O}$ FW 517.92
Chloroplatinic Acid

5.168.1 Specifications. See Specifications para 4.10.

5.168.2 Technical description. Platinic chloride, hexahydrate, ACS is in the form of brownish-yellow, very deliquescent, crystalline masses. Its specific gravity is 2.431 and its melting point is 60°C. It is readily soluble in water or alcohol.

5.168.3 Use data. See Use data para 4.9.

5.168.4 Packaging data and labeling. Platinic chloride, hexahydrate, ACS is packaged for military use in 1 gram unit quantity tubes. There are no applicable DoT packaging or shipping regulations for this chemical.

5.168.5 Storage data. Platinic chloride, hexahydrate, should be stored in a cool, dry place in tightly closed, nonactinic glass bottles away from light. Under these storage conditions, the shelf life is indefinite.

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5.169 Name. POTASSIUM ACETATE, ACS CH_3COOK FW 98.15

5.169.1 Specifications. See Specifications para 4.10.

5.169.2 Technical description. Potassium acetate is in the form of lustrous, colorless, rapidly deliquescent crystals or white, crystalline flakes or powder. Its specific gravity is 1.8 and its melting point is 292°C . Its solubility in water at 20°C is 253 grams per 100 ml; it has a solubility of 33 grams per 100 ml of alcohol. It is insoluble in ether.

5.169.3 Use data. See Use data para 4.9.

5.169.4 Packaging data and labeling. For military use potassium acetate, ACS is packaged in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.169.5 Storage data. Potassium acetate should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.170 Name. POTASSIUM BICARBONATE, ACS KHCO_3 FW 100.12
Potassium Acid Carbonate
Potassium Hydrogen Carbonate

5.170.1 Specifications. See Specifications para 4.10.

5.170.2 Technical description. Potassium bicarbonate is in the form of colorless, transparent crystals or white granules or powder. It decomposes from 100 to 200°C to form potassium carbonate, carbon dioxide, and water. Its solubility in water at 20°C is 22.4 grams per 100 ml; it is insoluble in alcohol, and it is slightly hygroscopic.

5.170.3 Use data. See Use data para 4.9.

5.170.4 Packaging data and labeling. Potassium bicarbonate, ACS is packaged for military use in 1 lb and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.170.5 Storage data. Potassium bicarbonate should be stored in a cool, dry area in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.171 Name. POTASSIUM BIPHthalate, ACS $\text{HOCOC}_6\text{H}_4\text{COOK}$ FW 204.23
Potassium Acid Phthalate
Potassium Hydrogen Phthalate

5.171.1 Specifications. See Specifications para 4.10.

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5.171.2 Technical description. Potassium biphthalate is in the form of white or colorless crystals with specific gravity 1.636. Although it is stable in air, it decomposes upon heating. Its solubility in water at 25°C is 10 grams per 100 ml; in boiling water, its solubility is 33 grams per 100 ml. It is very slightly soluble in alcohol.

5.171.3 Use data. Potassium biphthalate, ACS is used as a primary standard for preparing volumetric alkali solutions and as a buffer in pH determinations.

5.171.4 Packaging data and labeling. For military use, potassium biphthalate, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.171.5 Storage data. Potassium biphthalate should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.172 Name. POTASSIUM BROMATE, ACS KBrO_3 FW 167.00
(HAZARDOUS)

5.172.1 Specifications. See Specifications para 4.10.

5.172.2 Technical description. Potassium bromate is in the form of white crystals or crystalline powder with specific gravity 3.27 (17.5°C). It decomposes at approximately 370°C into oxygen and potassium bromide. Its solubility in water at 0°C is 3.11 grams per 100 ml; 49.75 grams will dissolve in 100 ml of boiling water. It is slightly soluble in alcohol.

5.172.3 Use data. See Use data para 4.9.

5.172.4 Packaging data and labeling. Potassium bromate, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Each bottle must bear the following precautionary label:

POTASSIUM BROMATE
CAUTION! STRONG OXIDANT
HARMFUL IF SWALLOWED

Store separately from and avoid contact
with combustible materials.
Wash thoroughly after handling.

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5.172.5 Storage data. Potassium bromate should be stored in tightly closed containers in a cool, dry, isolated area away from open flame, acute fire hazards, oxidizable material, and organic materials. Under these storage conditions, potassium bromate has a shelf life of one year. Evidence of deterioration would be caking of the material. It should be checked periodically in storage.

5.173 Name. POTASSIUM BROMIDE, ACS KBr FW 119.01

5.173.1 Specifications. See Specifications para 4.10.

5.173.2 Technical description. Potassium bromide is in the form of colorless crystals or white granules or powder with specific gravity 2.75 (25°C). It is slightly hygroscopic; its refractive index is 1.559. Its melting point is 730°C and its boiling point is 1380°C. Its solubility in water at 0°C is 53.48 grams per 100 ml; in boiling water, 102 grams per 100 ml; and in alcohol, 0.5 gram per 100 ml. It is soluble in glycerol and slightly soluble in ether.

5.173.3 Use data. See Use data para 4.9.

5.173.4 Packaging data and labeling. Potassium bromide, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.173.5 Storage data. Potassium bromide should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.174 Name. POTASSIUM CARBONATE, ANHYDROUS, ACS K_2CO_3 FW 138.21

5.174.1 Specifications. See Specifications para 4.10.

5.174.2 Technical description. Potassium carbonate, anhydrous, is in the form of white, hygroscopic granules or granular powder of specific gravity 2.29. Its melting point is 891°C; heating to higher temperatures causes it to decompose. Its water solutions are strongly alkaline; since potassium carbonate is the salt of a strong base and a weak acid, the carbonate ion will hydrolyze, leaving an excess of hydroxide ions. Its solubility in water at 20°C is 112 grams per 100 ml. It is insoluble in alcohol or acetone.

5.174.3 Use data. See Use data para 4.9.

5.174.4 Packaging data and labeling. For military use potassium carbonate, anhydrous, ACS is packaged in 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

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5.174.5 Storage data. Potassium carbonate should be stored in tightly sealed containers. Any material found starting to cake should be used first or discarded if not satisfactory for use. It is recommended that the material be checked monthly in storage.

5.175 Name. POTASSIUM CARBONATE, CRYSTALS, ACS $K_2CO_3 \cdot 1-1/2H_2O$ FW 165.24

5.175.1 Specifications. See Specifications para 4.10.

5.175.2 Technical description. Potassium carbonate, crystals, is in the form of small, colorless or white, nonhygroscopic crystals of specific gravity 2.043. Its solubility in water at 0°C is 129.4 grams per 100 ml and at 100°C is 268.3 grams per 100 ml. It is insoluble in alcohol.

5.175.3 Use data. See Use data para 4.9.

5.175.4 Packaging data and labeling. For military use potassium carbonate, crystals, ACS is packaged in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.175.5 Storage data. Potassium carbonate crystals should be stored in tightly closed containers in a cool dry place. Under these storage conditions the shelf life is indefinite.

5.176 Name. POTASSIUM CHLORATE, ACS $KClO_3$ FW 122.55
(HAZARDOUS)

5.176.1 Specifications. See Specifications para 4.10.

5.176.2 Technical description. Potassium chlorate is in the form of colorless, lustrous crystals or white granules or powder of specific gravity 2.32 and refractive index 1.4004. Its melting point is 368.4°C; at 400°C, it decomposes into potassium chloride and oxygen. Its solubility in water is 7.1 grams per 100 ml at 20°C and 57 grams per 100 ml at 100°C. Its solubility in alcohol is 0.83 gram per 100 ml.

5.176.3 Use data. See Use data para 4.9.

5.176.4 Packaging data and labeling. Potassium chlorate, ACS is packaged for military use in 1/4 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Each bottle must bear the following precautionary label:

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POTASSIUM CHLORATE
WARNING! STRONG OXIDANT
HARMFUL IF SWALLOWED

Keep away from heat, sparks, and open flame.
Store separately from and avoid contact with
combustible materials.
Wash thoroughly after handling.

5.176.5 Storage data. Potassium chlorate should be stored in tightly closed containers in a cool, dry place away from organic matter, combustible materials, and oxidizable materials. It is not compatible in storage with iodides and tartaric acid. Under these storage conditions, the shelf life is indefinite.

5.177 Name. POTASSIUM CHLORIDE, ACS KCl FW 74.55

5.177.1 Specifications. See Specifications para 4.10.

5.177.2 Technical description. Potassium chloride is in the form of white crystals or powder with a strong saline taste. Its specific gravity is 1.984 and its refractive index is 1.490. Its melting point is 773°C and its boiling point is 1500°C. In water, its solubility is 34.7 grams per 100 ml at 20°C and 56.7 grams per 100 ml at 100°C. It is soluble in ether and glycerol and slightly soluble in alcohol.

5.177.3 Use data. See Use data para 4.9.

5.177.4 Packaging data and labeling. Potassium chloride, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.177.5 Storage data. Potassium chloride should be stored in tightly closed containers in a cool, dry area. Under these conditions, the shelf life is indefinite.

5.178 Name. POTASSIUM CHROMATE, ACS K_2CrO_4 FW 194.20
(HAZARDOUS)

5.178.1 Specifications. See Specifications para 4.10.

5.178.2 Technical description. Potassium chromate is in the form of lemon yellow crystals of specific gravity 2.73. Its melting point is 975°C. In water, its solubility is 62.9 grams per 100 ml at 20°C and 79.2 grams per 100 ml at 100°C. It is insoluble in alcohol.

5.178.3 Use data. See Use data para 4.9.

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5.178.4 Packaging data and labeling. Potassium chromate, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulation for this chemical. Each bottle must bear the following precautionary label:

POTASSIUM CHROMATE
WARNING! HARMFUL DUST
MAY CAUSE RASH OR EXTERNAL ULCERS

Avoid contact with skin, eyes, and clothing.
Avoid breathing dust or mist from solutions.
In case of contact, immediately flush skin
or eyes with plenty of water for at least
15 minutes; for eyes, get medical attention.

5.178.5 Storage data. Potassium chromate should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.179 Name. POTASSIUM CYANIDE, ACS KCN FW 65.12
(HAZARDOUS)

5.179.1 Specifications. See Specifications para 4.10.

5.179.2 Technical description. Potassium cyanide is in the form of white, amorphous, deliquescent, granular powder or fused pieces. Its specific gravity is 1.52; its melting point is 634.5°C. It has an odor of bitter almonds; this is similar to the odor of hydrogen cyanide gas. Upon exposure to air it is gradually decomposed by the action of carbon dioxide and moisture. The aqueous solution is strongly alkaline and rapidly decomposes. It is very soluble in water, soluble in glycerol and methanol, and slightly soluble in alcohol..

5.179.3 Use data. See Use data para 4.9.

5.179.4 Packaging data and labeling. Potassium cyanide is packaged for military use in 1 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT poison B label unless exempted under section 173.370 of Title 49, Code of Federal Regulations. Individual containers must bear the following precautionary label:

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POTASSIUM CYANIDE
DANGER! POISONOUS SOLID
CONTACT WITH ACID LIBERATES POISONOUS GAS

Do not breathe gas or dust.
Do not take internally.
Avoid contact with eyes and skin.
Wash thoroughly after handling.
Keep containers closed and away from acids. Store
in a dry place.
Keep away from feed and foodstuffs.
In case of contact with eyes, flush with plenty of
water for at least 15 minutes and get medical
attention.

POISON
CALL A PHYSICIAN

5.179.5 Storage data. Potassium cyanide should be stored in tightly closed, nonactinic glass containers in a cool, dry area. Store away from light, acids, alkaloids, iodine, metallic salts, and oxidizing materials. Under these storage conditions, the shelf life is indefinite.

5.180	Name.	POTASSIUM DICHROMATE, ACS	$K_2Cr_2O_7$	FW 294.19
		Potassium Bichromate		
		(HAZARDOUS)		

5.180.1 Specifications. See Specifications para 4.10.

5.180.2 Technical description. Potassium dichromate is in the form of bright, orange-red crystals of specific gravity 2.676 (25/4°C). Its melting point is 398°C; at about 500°C it decomposes. In water, its solubility is 4.9 grams per 100 ml at 0°C and 102 grams per 100 ml at 100°C. It is not hygroscopic or deliquescent.

5.180.3 Use data. See Use data para 4.9.

5.180.4 Packaging data and labeling. For military use potassium dichromate, ACS is packaged in 1/4 lb, 1 lb, and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. See Potassium Chromate, 5.178.4, for labeling requirement.

5.180.5 Storage data. Potassium dichromate should be stored in tightly closed containers, in a cool, dry place away from readily oxidizable materials. It readily forms hydrates upon exposure to moisture and tends to cake upon long standing in humid environments. When tightly closed and away from moisture, potassium dichromate has an indefinite shelf life.

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5.181 Name. POTASSIUM FERRICYANIDE, ACS $K_3Fe(CN)_6$ FW 329.26

5.181.1 Specifications. See Specifications para 4.10.

5.181.2 Technical description. Potassium ferricyanide is in the form of lustrous, ruby-red crystals of specific gravity 1.894. It decomposes upon heating and its aqueous solution slowly decomposes upon standing. Its solubility in water is 33 grams per 100 ml at 4°C and 77.5 grams per 100 ml at 100°C. It is soluble in acetone and insoluble in alcohol.

5.181.3 Use data. See Use data para 4.9.

5.181.4 Packaging data and labeling. For military use potassium ferricyanide, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.181.5 Storage data. Potassium ferricyanide should be stored in tightly closed, nonactinic glass bottles in a cool, dry place away from acids. Under these storage conditions, the shelf life is indefinite.

5.182 Name. POTASSIUM FERROCYANIDE, TRIHYDRATE, ACS $K_4Fe(CN)_6 \cdot 3H_2O$
FW 422.41²

5.182.1 Specifications. See Specifications para 4.10.

5.182.2 Technical description. Potassium ferrocyanide, trihydrate, ACS is in the form of efflorescent, lemon-yellow crystals or powder, with mild saline taste. Its specific gravity is 1.85 and the refractive index is 1.577. It begins to lose its water of hydration at 60°C and becomes anhydrous at 100°C; upon further heating, it decomposes. It can also be decomposed by acids; the aqueous solution slowly decomposes on standing. In water at 12°C its solubility is 27.8 grams per 100 ml; it is soluble in acetone and insoluble in alcohol.

5.182.3 Use data. See Use data para 4.9.

5.182.4 Packaging data and labeling. Potassium ferrocyanide, trihydrate, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.182.5 Storage data. See POTASSIUM FERRICYANIDE, 5.181.5.

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5.183 Name. POTASSIUM HYDROXIDE, ACS KOH FW 56.11
(HAZARDOUS)

5.183.1 Specifications. See Specifications para 4.10.

5.183.2 Technical description. Potassium hydroxide is in the form of white or slightly yellow, deliquescent pellets with a specific gravity of 2.044. Its melting point is $360.4 \pm 0.7^{\circ}\text{C}$ and its boiling point is 1320 to 1324°C . Its solubility in water at 15°C is 107 grams per 100 ml and at 100°C is 173 grams per 100 ml; it is very soluble in alcohol and insoluble in ether. Potassium hydroxide is a strong base and will react readily with acids, evolving much heat. Potassium hydroxide absorbs water and carbon dioxide from the air.

5.183.3 Use data. Potassium hydroxide, ACS is used as an absorbent for carbon dioxide, in organic synthesis and in many other applications.

5.183.4 Packaging data and labeling. Potassium hydroxide, ACS is packaged for military use in 1/4 lb and 1 lb, and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Individual containers must have the following precautionary label:

POTASSIUM HYDROXIDE
DANGER! CAUSES SEVERE BURNS TO SKIN AND EYES

Do not get in eyes, on skin, on clothing.

Do not take internally.

While making solutions, add slowly to surface of solution to avoid violent spattering.

In case of contact, immediately flush skin with plenty of water; for eyes, flush with plenty of water for at least 15 minutes and get medical attention.

5.183.5 Storage data. Potassium hydroxide, ACS should be stored in a cool, dry place. Containers should be kept closed and plainly labeled. It should be stored carefully to avoid mechanical injury to containers. When containers are opened or otherwise exposed to the air, this material rapidly picks up moisture and turns into a sticky, corrosive mass. Properly stored, the shelf life is indefinite.

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5.184 Name. POTASSIUM IODATE, ACS KIO_3 FW 214.00
(HAZARDOUS)

5.184.1 Specifications. See Specifications para 4.10.

5.184.2 Technical description. Potassium iodate is in the form of white, odorless crystals or crystalline powder of specific gravity 3.89. It melts with partial decomposition at 560°C . Its solubility in water is 4.74 grams per 100 ml at 0°C and 32.3 grams per 100 ml at 100°C . It is soluble in a potassium iodide solution and insoluble in alcohol. Potassium iodate is a powerful oxidizing agent.

5.184.3 Use data. Potassium iodate, ACS is used as an oxidizing agent in volumetric chemical analysis.

5.184.4 Packaging data and labeling. For military use potassium iodate, ACS is packaged in 1/4 lb unit quantity bottles. Unless exempted under section 173.153 of Title 49, Code of Federal Regulations, shipping containers must bear the DoT yellow label for oxidizing materials. Each bottle must bear the following precautionary label:

POTASSIUM IODATE
CAUTION! STRONG OXIDANT

Keep away from heat and open flame.
Store separately from and avoid contact
with combustible materials.

5.184.5 Storage data. Potassium iodate should be stored in tightly closed containers in a cool, dry area away from reducing materials and combustible materials. Under these storage conditions, the shelf life is indefinite.

5.185 Name. POTASSIUM IODIDE, ACS KI FW 166.00

5.185.1 Specifications. See Specifications para 4.10.

5.185.2 Technical description. Potassium iodide is in the form of colorless crystals or white crystals, granules, or powder. Its specific gravity is 3.12 and its refractive index is 1.677. Its melting point is 723°C and its boiling point is 1420°C . In water, its solubility is 127.5 grams per 100 ml at 0°C and 208 grams per 100 ml at 100°C ; in alcohol, its solubility is 14.3 grams per 100 ml. It is slightly soluble in ether and soluble in glycerol.

5.185.3 Use data. See Use data para 4.9.

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5.185.4 Packaging data and labeling. For military use potassium iodide, ACS is packaged in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.185.5 Storage data. Potassium iodide should be stored in tightly closed nonactinic glass bottles in a cool dry place. Under these storage conditions, the shelf life is indefinite.

5.186 Name. POTASSIUM NITRATE, ACS KNO_3 FW 101.11
(HAZARDOUS)

5.186.1 Specifications. See Specifications para 4.10.

5.186.2 Technical description. Potassium nitrate is in the form of transparent, colorless, crystals or white crystalline granules or powder. It has a pungent, cooling, saline taste. Its specific gravity is 2.109. Its melting point is 334°C ; it decomposes at 400°C with the evolution of oxygen. In water, its solubility is 31.6 grams per 100 ml at 20°C and 247 grams per 100 ml at 100°C . It is slightly soluble in alcohol and glycerol and insoluble in ether. It is a powerful oxidizing agent.

5.186.3 Use data. See Use data para 4.9.

5.186.4 Packaging data and labeling. Potassium nitrate, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Each bottle must bear the following precautionary label:

POTASSIUM NITRATE
CAUTION! STRONG OXIDANT

Store separately from and avoid contact
with combustible materials.
Wash thoroughly after handling.

5.186.5 Storage data. Potassium nitrate should be stored in tightly closed containers in a cool, dry, well-ventilated area away from combustible or readily oxidizable materials. Under these storage conditions, the shelf life is indefinite.

5.187 Name. POTASSIUM NITRITE, ACS KNO_2 FW 85.11
(HAZARDOUS)

5.187.1 Specifications. See Specifications para 4.10.

5.187.2 Technical description. Potassium nitrite is in the form of white

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or slightly yellow, deliquescent crystals of specific gravity 1.915. Its melting point is 387°C; it decomposes at higher temperatures. In water, its solubility is 313 grams per 100 ml at 25°C and 413 grams per 100 ml at 100°C. It is very soluble in ammonia and slightly soluble in alcohol. It is a powerful oxidizer.

5.187.3 Use data. Potassium nitrite, ACS is used in organic synthesis and in testing for amino acid, cobalt, iodine, and urea.

5.187.4 Packaging data and labeling. For military use potassium nitrite, ACS is packaged in 1/4 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Each bottle must bear the following precautionary label:

POTASSIUM NITRITE
WARNING! STRONG OXIDANT
HARMFUL IF SWALLOWED

Store separately from and avoid contact
with combustible material.
Wash thoroughly after handling.
Avoid breathing dust.

5.187.5 Storage data. Potassium nitrite should be stored in tightly closed containers in a cool, dry area away from acute fire hazards, organic materials, combustible materials, and easily oxidized materials. Under these storage conditions, the shelf life is indefinite.

5.188 Name. POTASSIUM OXALATE, MONOHYDRATE, ACS $(\text{COOK})_2 \cdot \text{H}_2\text{O}$ FW 184.24
(HAZARDOUS)

5.188.1 Specifications. See Specifications para 4.10.

5.188.2 Technical description. Potassium oxalate, monohydrate, is in the form of slightly efflorescent, white, monoclinic crystals of specific gravity 2.127 (39°C). Its refractive index has been reported as 1.440, 1.485, and 1.550. At about 160°C, it loses its water of hydration. When ignited, it is converted into potassium carbonate without appreciable charring. Its solubility in water is 33 grams per 100 ml at 16°C.

5.188.3 Use data. See Use data para 4.9.

5.188.4 Packaging data and labeling. Potassium oxalate, monohydrate, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity screw-capped bottles. There are no applicable DoT packaging or shipping regulations for this chemical. See AMMONIUM OXALATE, 5.16.4, for labeling requirement.

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5.188.5 Storage data. See AMMONIUM OXALATE, 5.16.5.

5.139 Name. POTASSIUM PERIODATE, ACS KIO_4 FW 230.00
Potassium Metaperiodate
(HAZARDOUS)

5.189.1 Specifications. See Specifications para 4.10..

5.189.2 Technical description. Potassium periodate is in the form of colorless, tetragonal crystals of specific gravity 3.618 (15°C) and refractive index 1.6205. It melts at 582°C with decomposition. Its solubility in water is 0.42 gram per 100 ml at 20°C; it is very slightly soluble in aqueous potassium hydroxide. It is a powerful oxidizing agent.

5.189.3 Use data. Potassium periodate, ACS is used in analytical chemistry for the colorimetric estimation of manganese and for the oxidation of some organic compounds.

5.189.4 Packaging data and labeling. Potassium periodate, ACS is packaged for military use in 1 oz and 1 lb unit quantity screw-capped, nonactinic glass bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Each bottle must bear the following precautionary label:

POTASSIUM PERIODATE
WARNING! STRONG OXIDANT
IRRITATING TO SKIN, EYES, NOSE
AND THROAT
HARMFUL IF SWALLOWED

Keep away from heat, sparks, and open flame.
Store separately from and avoid contact with
combustible materials.
Avoid contact with skin and eyes.
Do not breathe dust.

5.189.5 Storage data. Potassium periodate should be stored in a cool, dry area in tightly sealed containers away from light, heat and reducing agents. Under these storage conditions, the shelf life is indefinite.

5.190 Name. POTASSIUM PERMANGANATE, ACS KMnO_4 FW 158.04
(HAZARDOUS)

5.190.1 Specifications. See Specifications para 4.10.

5.190.2 Technical description. Potassium permanganate is in the form of

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dark purple, rhombic crystals of specific gravity 2.703 and refractive index 1.59. It is odorless with a sweet, astringent aftertaste. It is slightly hygroscopic and will cake upon exposure to air. At 240°C it decomposes with the evolution of oxygen. Its solubility in water at 20°C is 6.38 grams per 100 ml. It is very soluble in acetone and methanol, soluble in sulfuric acid, and it decomposes in alcohol. It is a strong oxidizing agent. In acid solutions, it is reduced to a manganous salt; in basic solutions, it is reduced to manganese dioxide. The acid solution is a more powerful oxidizing agent than the alkaline. Potassium permanganate may explode when heated to decomposition.

5.190.3 Use data. See Use data para 4.9.

5.190.4 Packaging data and labeling. Potassium permanganate, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity nonactinic glass bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Each bottle must bear the following precautionary label:

POTASSIUM PERMANGANATE
CAUTION! STRONG OXIDANT

Keep away from heat and open flame.
Store separately from and avoid contact
with combustible material.

5.190.5 Storage data. Potassium permanganate, ACS should be stored away from fire hazards, combustible materials, and reducing agents. It is a moderate explosion hazard when shocked or exposed to heat. Store in tightly closed containers in a cool, dry place. Under recommended conditions, shelf life is indefinite.

5.191 Name. POTASSIUM PHOSPHATE, DIBASIC, ANHYDROUS, ACS
Dipotassium Hydrogen Phosphate Fw 174.18

5.191.1 Specifications. See Specifications para 4.10.

5.191.2 Technical description. Potassium phosphate, dibasic, anhydrous, has the form of white, somewhat hygroscopic granules. It decomposes readily upon heating. The aqueous solution is slightly alkaline. It will be converted into pyrophosphate by ignition. The solubility of this material is 167 grams in 100 ml of water at 20°C, and it is very soluble in alcohol.

5.191.3 Use data. See Use data para 4.9.

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5.191.4 Packaging data and labeling. Potassium phosphate, dibasic, anhydrous, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity glass bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.191.5 Storage data. Potassium phosphate, dibasic, should be stored in tightly sealed containers in a cool dry area. Under these storage conditions the shelf life is indefinite.

5.192 Name. POTASSIUM PHOSPHATE, MONOBASIC, ACS KH_2PO_4 FW 136.09
Potassium Acid Phosphate
Potassium Dihydrogen Phosphate

5.192.1 Specifications. See Specifications para 4.10.

5.192.2 Technical description. Potassium phosphate, monobasic, is in the form of colorless crystals or a white, granular powder of specific gravity 2.338 and refractive indices 1.510 and 1.4864. Its melting point is 252.6°C; at 400°C it decomposes with a loss of H_2O to form the metaphosphate. In water, its solubility is 33 grams per 100 ml at 25°C and 83.5 grams per 100 ml at 90°C. It is insoluble in alcohol.

5.192.3 Use data. Potassium phosphate, monobasic, ACS, is used in buffers for determination of pH.

5.192.4 Packaging data and labeling. Potassium phosphate, monobasic, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.192.5 Storage data. Potassium phosphate, monobasic should be stored in a cool, dry place in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.193 Name. POTASSIUM PYROSULFATE, ACS $\text{K}_2\text{S}_2\text{O}_7$ FW 254.33

5.193.1 Specifications. See Specifications para 4.10.

5.193.2 Technical description. Potassium pyrosulfate, ACS is a mixture of potassium pyrosulfate and potassium bisulfate. It is in the form of colorless fused needles and pieces, of specific gravity 2.512 (25/4°C). At 300°C it decomposes. It is soluble in water and insoluble in alcohol. The aqueous solution is strongly acidic.

5.193.3 Use data. See Use data para 4.9.

5.193.4 Packaging data and labeling. Potassium pyrosulfate, ACS is packaged for military use in 0.2 g unit quantity vials, packed 5 vials to a carton, and 2.7 g and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

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5.193.5 Storage data. Potassium pyrosulfate should be stored in a cool, dry place in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.194 Name. POTASSIUM SODIUM TARTRATE; TETRAHYDRATE, ACS
 $\text{KOCOHCH(OH)COONa} \cdot 4\text{H}_2\text{O}$ FW 282.23
 Sodium Potassium Tartrate

5.194.1 Specifications. See Specifications para 4.10.

5.194.2 Technical description. Potassium sodium tartrate, tetrahydrate, ACS is in the form of colorless, translucent crystals or a white powder of specific gravity 1.790. Its refractive index has been reported as 1.492, 1.493, and 1.496. It has a cooling, saline taste and is slightly efflorescent in warm air. It melts at 70 to 80°C; at 100°C it loses 3 molecules of its water of hydration; at 130 to 140°C it becomes anhydrous; and at 220°C it begins to decompose. Its solubility in water is 26 grams per 100 ml at 0°C and 66 grams per 100 ml at 26°C; it is very slightly soluble in alcohol. The aqueous solution is slightly alkaline.

5.194.3 Use data. See Use data para 4.9.

5.194.4 Packaging data and labeling. Potassium sodium tartrate, tetrahydrate, ACS is packaged for military use in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.194.5 Storage data. Potassium sodium tartrate, tetrahydrate should be stored in a cool, dry area in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.195 Name. POTASSIUM SULFATE, ACS K_2SO_4 FW 174.27

5.195.1 Specifications. See Specifications para 4.10.

5.195.2 Technical description. Potassium sulfate is in the form of colorless to white, rhombic or hexagonal crystals or a white powder; it has a bitter, saline taste. Its specific gravity is 2.662; the refractive index has been reported as 1.494, 1.495, and 1.497. Its melting point is 1069°C and its boiling point is 1689°C. In water, its solubility is 12 grams per 100 ml at 25°C and 24.1 grams per 100 ml at 100°C; it is insoluble in acetone or alcohol.

5.195.3 Use data. Potassium sulfate is used as a reagent in the Kjeldahl determination of nitrogen.

5.195.4 Packaging data and labeling. Potassium sulfate, ACS is packaged for military use in the powdered, crystalline, and granular form. It is packaged in powdered form in 1/4 lb and 1 lb unit quantity nonactinic bottles; in granular form in 1 lb and 5 lb unit quantity nonactinic bottles; and in crystalline form in 1 lb and 5 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

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5.195.5 Storage data. Potassium sulfate should be stored in a cool, dry place in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.196 Name. POTASSIUM THIOCYANATE, ACS KSCN FW 97.18

5.196.1 Specifications. See Specifications para 4.10.

5.196.2 Technical description. Potassium thiocyanate is in the form of colorless, deliquescent crystals. It has a specific gravity of 1.886 (14°C). Its melting point is 173.3°C and at 500°C it decomposes. Its solubility in water at 20°C is 217 grams per 100 ml. It is soluble in alcohol and slightly soluble in amyl alcohol.

5.196.3 Use data. See Use data para 4.9.

5.196.4 Packaging data and labeling. Potassium thiocyanate, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity nonactinic glass bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.196.5 Storage data. See AMMONIUM THIOCYANATE, 5.21.5.

5.197 Name. 2-PROPANOL, ACS $\text{CH}_3\text{CHOHCH}_3$ FW 60.10
Isopropanol
Isopropyl Alcohol
(HAZARDOUS)

5.197.1 Specifications. See Specifications. Para 4.10.

5.197.2 Technical description. 2-Propanol, ACS is a volatile, flammable liquid with a bitter taste. It has an odor resembling that of a mixture of ethanol and acetone. 2-Propanol forms a constant boiling mixture when mixed with water.

TABLE XXX. - Physical constants of 2-propanol

Boiling point	82.4°C
Flash point (closed cup)	53°F
Melting point	-89.5°C
Refractive index (20°C)	1.3776
Solubility data	Miscible with alcohol, chloroform, ether, and water. Insoluble in salt solution.
Specific gravity (20/4°C)	0.7851

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5.197.3 Use data. See Use data para 4.9.

5.197.4 Packaging data and labeling. 2-Propanol, ACS is packaged for military use in 1 pt and 1 gal unit quantity nonactinic glass bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Each bottle must bear the following precautionary label:

2-PROPANOL
CAUTION! FLAMMABLE
VAPOR HARMFUL

Keep away from heat, sparks, or open flame
Avoid prolonged breathing of vapor.
Avoid contact with eyes.
In case of contact, flush eyes with
plenty of water for at least 15 minutes;
get medical attention.

5.197.5 Storage data. 2-Propanol should be stored in a cool, well-ventilated place away from areas of acute fire hazard, open flame, and oxidizing materials. Keep containers tightly closed and plainly labeled. The shelf life is indefinite under these storage conditions.

5.198 Name. 2-PROPANOL, FOR SPECTROPHOTOMETRY, ACS $\text{CH}_3\text{CHOHCH}_3$
(HAZARDOUS) FW 60.10

5.198.1 Specifications. See Specifications para 4.10.

5.198.2 Technical description. 2-Propanol, for spectrophotometry, ACS is three times refined for purity required in spectrophotometry. See 2-PROPANOL, 5.197.2.

5.198.3 Use data. 2-Propanol, for spectrophotometry, ACS is intended for use in spectrophotometry.

5.198.4 Packaging data and labeling. 2-Propanol for spectrophotometry, ACS is packaged for military use in 1 qt and 1 gal unit quantity bottles. See 2-PROPANOL, ACS 5.197.4, for labeling requirements.

5.198.5 Storage data. See 2-PROPANOL, 5.197.5.

5.199 Name. PYRIDINE, ACS N:CHCH:CHCH:CH FW 79.10
Azine (IUPAC)
(HAZARDOUS)

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5.199.1 Specifications. See Specifications para 4.10.

5.199.2 Technical description. Pyridine is a flammable, colorless liquid. It has a disagreeable odor and a burning taste. Pyridine is a weak base that reacts with strong acids to form salts.

TABLE XXXI. - Physical constants of pyridine

Boiling point	115.5°C
Flash point (closed cup)	68°F
Freezing point	-41.5°C
Refractive index (21°C)	1.50919
Solubility data	Miscible with water, alcohol, and ether. Soluble in benzene.
Specific gravity	0.982

5.199.3 Use data. See Use data para 4.9.

5.199.4 Packaging data and labeling. Pyridine, ACS is packaged for military use in 1 pt unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Individual containers must have the following precautionary label:

PYRIDINE
WARNING! FLAMMABLE
VAPOR HARMFUL

Keep away from heat, sparks, and open flame.
Keep containers closed.
Use only with adequate ventilation.
Avoid prolonged or repeated breathing of vapor.
Avoid repeated or prolonged contact with skin.

5.199.5 Storage data. Pyridine should be stored in a cool, dry, ventilated area away from acute fire hazards, open flame, and oxidizing agents. Containers should be tightly closed and plainly labeled. Under these storage conditions, the shelf life is indefinite. It may discolor on prolonged storage and may require distillation prior to use.

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5.200 Name. SILVER NITRATE, ACS AgNO_3 FW 169.87
(HAZARDOUS)

5.200.1 Specifications. See Specifications para 4.10.

5.200.2 Technical description. Silver nitrate is in the form of colorless, odorless, transparent, large crystals, or white, small crystals of specific gravity 4.352 at 19°C. The refractive indices have been reported as 1.729, 1.744, and 1.788. Its melting point is 212°C; at 444°C it decomposes. In water, the solubility is 122 grams per 100 ml at 0°C and 952 grams per 100 ml at 100°C; it is soluble in ammonia, ether, and glycerol, and very slightly soluble in absolute alcohol. Silver nitrate is a powerful oxidizing agent. It may cause discoloration of the skin since it readily decomposes in the presence of organic matter to form a black oxide.

5.200.3 Use data. See Use data para 4.9.

5.200.4 Packaging data and labeling. Silver nitrate is packaged for military use in 1 oz, 1 lb, and 5 lb unit quantity nonactinic bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Individual containers must have the following precautionary label:

SILVER NITRATE
WARNING! MAY CAUSE BURNS

Avoid contact with skin and eyes.
In case of contact, flush skin or eyes with water for at least 15 minutes; for eyes get medical attention.

POISON
CALL A PHYSICIAN

5.200.5 Storage data. Silver nitrate should be stored in tightly closed, nonactinic containers in a cool, dry, ventilated area out of direct sunlight. Store away from organic and easily oxidized materials. Under the recommended conditions, the shelf life is indefinite.

5.201 Name. SILVER SULFATE, ACS Ag_2SO_4 FW 311.80

5.201.1 Specifications. See Specifications para 4.10.

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5.201.2 Technical description. Silver sulfate is in the form of colorless to white, lustrous crystals or a white, crystalline powder that slowly darkens on exposure to light. The specific gravity is 5.45 and the refractive indices have been reported as 1.7583, 1.7748, and 1.7852. Its melting point is 652°C; at 1085°C it decomposes. It is soluble in hot water, ammonium hydroxide, nitric acid, and sulfuric acid; it is insoluble in alcohol.

5.201.3 Use data. See Use data para 4.9.

5.201.4 Packaging data and labeling. Silver sulfate, ACS is packaged for military use in 1 oz and 1/4 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.201.5 Storage data. See SILVER NITRATE, 5.200.5.

5.202 Name. SODA LIME, ACS

5.202.1 Specifications. See Specifications para 4.10.

5.202.2 Technical description. Soda lime is a mixture of variable proportions of sodium hydroxide with calcium oxide or hydroxide. This reagent may or may not have an indicator.

5.202.3 Use data. Soda lime, ACS is used as a drying agent and a carbon dioxide absorbent.

5.202.4 Packaging data and labeling. Soda lime, ACS is packaged for military use in 1 lb unit quantity nonactinic bottles. The label will indicate the percentage of moisture and mesh size in the standard mesh system. There are no applicable DoT packaging or shipping regulations for this chemical.

5.202.5 Storage data. Soda lime, ACS should be stored in a cool, dry place since it will deteriorate on exposure. It must be kept air tight in its containers since it may tend to cake. After unsealing, containers must be kept tightly closed. The shelf life is indefinite if kept under sealed or tightly closed conditions.

5.203 Name.	SODIUM ACS	Na	AW 22.9898
	Metallic Sodium		
	Sodium Metal		
	(HAZARDOUS)		

5.203.1 Specifications. See Specifications para 4.10.

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5.203.2 Technical description. Sodium is a light, soft, ductile, silvery-white metal. It is quite reactive and is never found free in nature. It is an excellent reducing agent, being capable of reducing most oxides to their elemental states. When placed in water, it floats on the surface and reacts vigorously, decomposing the water to form hydrogen gas and hydroxide ions with the evolution of heat. In the presence of moisture, as in humid air, sodium reacts to form caustic sodium hydroxide. Even in dry air, it will react with the free oxygen to form a coating of sodium oxides on its surface. Because of its strong reactions, sodium metal must be stored in kerosene or other similar liquid which does not contain water or free oxygen.

TABLE XXXII. - Physical constants of sodium

Boiling point	883°C
Heat of vaporization	100 cal/g at 892°C
Melting point	97.5°C
Solubility data	Reacts with water and alcohol. Insoluble in benzene and ether.
Specific gravity	0.9712
Specific heat	0.2930 at 0°C 0.3266 at 97.6°C

5.203.3 Use data. Sodium, ACS is used as a reducing agent in organic synthesis, a dehydrating agent, and as a catalyst in chemical reactions.

5.203.4 Packaging data and labeling. Sodium, ACS is packaged in 1/4 lb and 1 lb unit quantity cans for military use. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for flammable solids. Individual containers must have the following precautionary label:

SODIUM
DANGER! REACTS VIOLENTLY WITH WATER LIBERATING AND
IGNITING HYDROGEN
MAY CAUSE BURNS

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Keep from any possible contact with water.
 Keep container tightly closed.
 Do not get in eyes or on skin.
 Wear goggles and DRY gloves when handling.
 In case of fire, smother with DRY SODA ASH - NEVER USE
 WATER OR CHEMICAL FIRE EXTINGUISHERS.
 Dispose of SODIUM by burning carefully in an open fire.
 In case of contact with skin, remove SODIUM and flush
 skin with water. For eyes, immediately flush with
 plenty of water for 15 minutes; get medical attention.

5.203.5 Storage data. Sodium must be stored under kerosene or naphtha in its container. Store in a cool, dry, open, isolated area away from acute fire hazards, oxidizing materials, and possible contact with water, steam, or moist air. It shall not be stored in areas protected by overhead sprinkler systems. The shelf life has been recorded as high as two years, but air contamination or corrosion of the container often occurs before this time.

5.204 Name. SODIUM ACETATE, TRIHYDRATE, ACS $\text{CH}_3\text{COONa} \cdot 3\text{H}_2\text{O}$ FW 136.08

5.204.1 Specifications. See Specifications para 4.10.

5.204.2 Technical description. Sodium acetate, trihydrate, ACS is in the form of colorless, efflorescent, monoclinic crystals or prisms of refractive index 1.464 and specific gravity 1.45 (58°C). Its melting point is 58°C; at 123°C, it loses its water of hydration. In water, its solubility is 76.2 grams per 100 cc at 50°C. It is soluble in ether and slightly soluble in alcohol.

5.204.3 Use data. See Use data para 4.9.

5.204.4 Packaging data and labeling. Sodium acetate, trihydrate, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.204.5 Storage data. Sodium acetate, trihydrate should be stored in tightly closed containers in a cool, dry place. Under these conditions, the shelf life is indefinite.

5.205 Name. SODIUM BICARBONATE, ACS NaHCO_3 FW 84.01
 Sodium Acid Carbonate
 Sodium Hydrogen Carbonate

5.205.1 Specifications. See Specifications para 4.10.

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5.205.2 Technical description. Sodium bicarbonate is in the form of white, monoclinic prisms or granules of specific gravity 2.159 and refractive index 1.500. It has a cooling, slightly alkaline taste. It is stable in dry air, but slowly decomposes in moist air. At 270°C, it decomposes with the loss of carbon dioxide. In water, its solubility is 6.9 grams per 100 ml at 0°C, and 16.4 grams per 100 ml at 60°C; it is slightly soluble in alcohol. The aqueous solution is mildly alkaline.

5.205.3 Use data. See Use data para 4.9.

5.205.4 Packaging data and labeling. For military use, sodium bicarbonate, ACS is packaged in 1 lb unit quantity moisture resistant nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.205.5 Storage data. Sodium bicarbonate, ACS decomposes readily and therefore should be stored in a cool, dry place. Storage should be airtight to prevent caking as much as possible and checked every 2 or 3 months.

5.206 Name. SODIUM BISMUTHATE, ACS NaBiO_3 FW 279.97

5.206.1 Specifications. See Specifications para 4.10.

5.206.2 Technical description. Sodium bismuthate, ACS is a yellow-brown, amorphous powder that is hygroscopic; in the presence of moisture or higher temperatures, it will decompose. It is insoluble in cold water, decomposes in hot water and in acids.

5.206.3 Use data. Sodium bismuthate, ACS is used in analytical chemistry for the determination of manganese in iron and steel.

5.206.4 Packaging data and labeling. Sodium bismuthate is packaged for military use in 1 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.206.5 Storage data. Sodium bismuthate should be stored in tightly closed containers in a cool, dry place out of the direct rays of the sun. Sodium bismuthate slowly decomposes on prolonged storage. Under the recommended storage conditions, a shelf life of at least one year can be expected.

5.207 Name. SODIUM BISULFATE, FUSED, ACS NaHSO_4 FW 120.06
Sodium Hydrogen Sulfate
Sodium Acid Sulfate

5.207.1 Specifications. See Specifications para 4.10.

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5.207.2 Technical description. Sodium bisulfate, fused, ACS is usually a mixture of sodium bisulfate, NaHSO_4 , and sodium pyrosulfate, $\text{Na}_2\text{S}_2\text{O}_7$. It is in the form of colorless to white, triclinic crystals, granules, or globules of specific gravity 2.742. Sodium bisulfate melts at a temperature greater than 315°C ; upon further heating, it loses a water molecule to form the pyrosulfate. In water, sodium bisulfate has a solubility of 28.6 grams per 100 cc at 25°C and 100 grams per 100 cc at 100°C . It is insoluble in ammonia and decomposes in alcohol.

5.207.3 Use data. See Use data para 4.9.

5.207.4 Packaging data and labeling. For military use sodium bisulfate, fused, ACS is packaged in 1 lb and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.207.5 Storage data. Sodium bisulfate, fused, should be stored in a cool, dry, area in tightly sealed containers. Under these storage conditions the shelf life is indefinite.

5.208	Name.	SODIUM BISULFITE, ACS	NaHSO_3	FW 104.06
		Sodium Acid Sulfite		
		Sodium Hydrogen Sulfite		

5.208.1 Specifications. See Specifications para 4.10.

5.208.2 Technical description. Sodium bisulfite has the form of a white, crystalline powder with a disagreeable taste and an odor of sulfur dioxide. Its specific gravity is 1.48 and its refractive index is 1.526. It decomposes upon heating. It is very soluble in water and slightly soluble in alcohol. On exposure to the air, sodium bisulfite loses some sulfur dioxide and is gradually oxidized to sulfate.

5.208.3 Use data. See Use data para 4.9.

5.208.4 Packaging data and labeling. For military use sodium bisulfite, ACS is packaged in 1 lb and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.208.5 Storage data. Sodium bisulfite should be stored in a cool, dry area in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.209	Name.	SODIUM BORATE, DECAHYDRATE, ACS	$\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$	FW 381.37
		Borax		
		Sodium Tetraborate		

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5.209.1 Specifications. See Specifications para 4.10.

5.209.2 Technical description. Sodium borate, decahydrate, ACS is in the form of colorless, efflorescent, monoclinic crystals, granules, or powder of specific gravity 1.73 and refractive indices 1.447, 1.469, and 1.472. It loses 8 H₂O at 60°C, melts at 75°C, and loses the remainder of its water of hydration at 320°C. In water, its solubility is 8 grams per 100 ml at 25°C and 170 grams per 100 ml at 100°C. It is soluble in glycerol and very slightly soluble in alcohol.

5.209.3 Use data. See Use data para 4.9.

5.209.4 Packaging data and labeling. Sodium borate, decahydrate, ACS is packaged for military use in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.209.5 Storage data. Sodium borate, decahydrate should be stored in tightly closed containers in a cool, dry, place. Under these storage conditions, an indefinite shelf life can be expected.

5.210 Name. SODIUM CARBONATE, ALKALIMETRIC STANDARD, ACS Na_2CO_3
FW 105.99

5.210.1 Specifications. See Specifications para 4.10.

5.210.2 Technical description. Sodium carbonate, alkalimetric standard, ACS is purified to an extent to render it suitable for use in preparing pH standards. Physical constants will be covered in SODIUM CARBONATE, ANHYDROUS, 5.211.2.

5.210.3 Use data. Sodium carbonate, alkalimetric standard, ACS is used as a pH standard.

5.210.4 Packaging data and labeling. Sodium carbonate, alkalimetric standard, ACS is packaged for military use in 1 lb unit quantity bottles. See SODIUM CARBONATE, ANHYDROUS, 5.211.4.

5.210.5 Storage data. See SODIUM CARBONATE, ANHYDROUS, 5.211.5.

5.211 Name. SODIUM CARBONATE, ANHYDROUS, ACS Na_2CO_3 FW 105.99

5.211.1 Specifications. See Specifications para 4.10.

5.211.2 Technical description. Sodium carbonate is in the form of white, hygroscopic lumps, briquet, or powder of specific gravity 2.532, and refractive index 1.535. From 400°C to 851°C, it decomposes with the loss of carbon dioxide. Its solubility in water is 7.1 grams

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per 100 cc at 0°C and 45.5 grams per 100 cc at 100°C; it is slightly soluble in absolute alcohol and insoluble in acetone. It is decomposed by acids and it combines with water with the evolution of heat. Aqueous solutions are strongly alkaline.

5.211.3 Use data. See Use data para 4.9.

5.211.4 Packaging data and labeling. For military use, sodium carbonate, anhydrous, ACS is packaged in 1/4 lb, 1 lb, and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.211.5 Storage data. Sodium carbonate, anhydrous, should be stored in a cool, dry place in tightly closed containers. Under recommended storage conditions, the shelf life is indefinite.

5.212 Name. SODIUM CARBONATE, MONOHYDRATE, ACS $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$ FW 124.00

5.212.1 Specifications. See Specifications para 4.10.

5.212.2 Technical description. Sodium carbonate, monohydrate, ACS is in the form of white crystals or powder of specific gravity 1.55 and refractive indices 1.506 and 1.509. From 50°C to 100°C, it loses its water of hydration; it melts at 109°C and decomposes at higher temperatures. It is soluble in glycerol, slightly soluble in water, and insoluble in alcohol. It is deliquescent and has a tendency to cake.

5.212.3 Use data. See Use data para 4.9.

5.212.4 Packaging data and labeling. Sodium carbonate, monohydrate, ACS is packaged for military use in crystalline form in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.212.5 Storage data. See SODIUM CARBONATE, ANHYDROUS, 5.211.5.

5.213 Name. SODIUM CHLORIDE, ACS NaCl FW 58.44

5.213.1 Specifications. See Specifications para 4.10.

5.213.2 Technical description. Sodium chloride is in the form of colorless, transparent, cubic crystals or a white, crystalline powder of specific gravity 2.165 (25/4°C) and a refractive index of 1.5422. Its melting point is 801°C, above which it becomes volatile; its boiling point is 1413°C. In water, its solubility is 35.78 grams per 100 cc at 0°C and 39.12 grams per 100 cc at 100°C; it is soluble in glycerol, slightly soluble in alcohol and liquid ammonia, and almost insoluble in concentrated hydrochloric acid.

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5.213.3 Use data. See Use data para 4.9.

5.213.4 Packaging data and labeling. For military use, sodium chloride, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulation for this chemical.

5.213.5 Storage data. Sodium chloride should be stored in a cool, dry place in tightly closed containers. Under these conditions, the shelf life is indefinite.

5.214 Name. SODIUM COBALTINITRITE, ACS $\text{Na}_3\text{Co}(\text{NO}_2)_6$ FW 403.94
(HAZARDOUS)

5.214.1 Specifications. See Specifications para 4.10.

5.214.2 Technical description. Sodium cobaltinitrite, ACS is in the form of yellowish-brown crystals. It is easily decomposed by mineral acids, but is unaffected by dilute acetic acid or similar organic acid. It is very soluble in water and slightly soluble in alcohol. The aqueous solution decomposes gradually, but if a few drops of acetic acid are added, it may be kept for about 3 months.

5.214.3 Use data. Sodium cobaltinitrite, ACS is used for the detection of potassium, with which it forms a slightly soluble compound.

5.214.4 Packaging data and labeling. Sodium cobaltinitrite, ACS is packaged for military use in 1/4 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. See POTASSIUM NITRITE, 5.187.4, for labeling requirements.

5.214.5 Storage data. Sodium cobaltinitrite should be stored in a cool, dry place in tightly closed containers. Under these conditions, the shelf life is indefinite.

5.215 Name. SODIUM CYANIDE, ACS NaCN FW 49.01
(HAZARDOUS)

5.215.1 Specifications. See Specifications para 4.10.

5.215.2 Technical description. Sodium cyanide is in the form of white, deliquescent crystals, granules, or powder; it is odorless when dry and emits a slight odor of hydrogen cyanide in moist air. The refractive index is 1.452. Its melting point is 563.7°C and its boiling point is 1496°C. Its solubility in water is 48 grams per 100 cc at 10°C and 82 grams per 100 cc at 35°C; it is soluble in ammonia and slightly soluble in alcohol. Aqueous solutions are very alkaline and decompose rapidly upon standing.

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5.215.3 Use data. See Use data para 4.9.

5.215.4 Packaging data and labeling. Sodium cyanide, ACS is packaged for military use in a fine granular or powder form in 1/4 lb, 1 lb, and 5 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. See POTASSIUM CYANIDE, 5.179.4, for labeling requirements.

5.215.5 Storage data. See POTASSIUM CYANIDE, 5.179.5.

5.216 Name. SODIUM DIETHYLDITHIOCARBAMATE, ACS $(\text{CH}_3\text{CH}_2)_2\text{NCSSNa} \cdot 3\text{H}_2\text{O}$
FW 255.31

5.216.1 Specifications. See Specifications para 4.10.

5.216.2 Technical description. Sodium diethyldithiocarbamate is in the form of white or colorless crystals. It has a specific gravity of 1.1 (20/20°C); its melting point is 16 to 19°C. It is freely soluble in water and soluble in alcohol. Its aqueous solution is alkaline to litmus and phenolphthalein and decomposes slowly. The addition of an acid to the aqueous solution produces a white turbidity due to the liberation of carbon disulfide.

5.216.3 Use data. See Use data para. 4.9.

5.216.4 Packaging data and labeling. Sodium diethyldithiocarbamate, ACS is packaged for military use in 1 oz and 1/4 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.216.5 Storage data. Sodium diethyldithiocarbamate should be stored in a cool, dry place in tightly closed containers. Under these conditions, the shelf life is indefinite.

5.217 Name. SODIUM FLUORIDE, ACS NaF FW 41.99
(HAZARDOUS)

5.217.1 Specifications. See Specifications para 4.10.

5.217.2 Technical description. Sodium fluoride is in the form of colorless, lustrous, cubic or tetragonal crystals, or a free-flowing white powder of specific gravity 2.79 and refractive index 1.336. Its melting point is 988°C and its boiling point is 1695°C. Its solubility in water at 18°C is 4.22 grams per 100 cc; it is soluble in hydrofluoric acid and

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very slightly soluble in methanol. It is nonflammable and does not react with air or moisture. At very high temperatures, sodium fluoride undergoes thermal hydrolysis in the presence of steam to liberate hydrogen fluoride.

5.217.3 Use data. See Use data para 4.9.

5.217.4 Packaging data and labeling. For military use, sodium fluoride, ACS is packaged in 1/4 lb, 1 lb, and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Individual containers must have the following precautionary label:

SODIUM FLUORIDE
WARNING! MAY BE FATAL IF SWALLOWED

Avoid breathing dust.
Wash thoroughly after handling.

5.217.5 Storage data. Sodium fluoride should be stored in a cool, dry place in tightly closed containers. Under these conditions, the shelf life is indefinite.

5.218 Name. SODIUM HYDROXIDE, ACS NaOH FW 40.00
(HAZARDOUS)

5.218.1 Specifications. See Specifications para 4.10.

5.218.2 Technical description. Sodium hydroxide is in the form of white, deliquescent pieces, lumps, sticks, or pellets of specific gravity 2.130. Liquid sodium hydroxide has a refractive index of 1.433 at 320°C. Sodium hydroxide melts at 318.4°C and boils at 1390°C. Its solubility in water is 42 grams per 100 cc at 0°C and 100 grams per 100 cc at 100°C; it is slightly soluble in alcohol and glycerol and insoluble in acetone and ether. Sodium hydroxide is a very strong base, very corrosive, and reacts vigorously with water and with acids, generating considerable heat. It rapidly absorbs carbon dioxide from the air to form sodium carbonate.

5.218.3 Use data. See Use data para 4.9.

5.218.4 Packaging data and labeling. Sodium hydroxide, ACS is packaged for military use in pellet form in 1/4 lb, 1 lb, and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Individual containers must bear the same precautionary label as POTASSIUM HYDROXIDE, 5.183.4.

5.218.5 Storage data. See POTASSIUM HYDROXIDE, 5.183.5.

5.219 Name. SODIUM METABISULFITE, ACS $\text{Na}_2\text{S}_2\text{O}_5$ FW 190.10
Sodium Pyrosulfite

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5.219.1 Specifications. See Specifications para 4.10.

5.219.2 Technical description. Sodium metabisulfite is in the form of white crystals or powder with an odor of sulfur dioxide. It is freely soluble in water or glycerol and slightly soluble in alcohol. Its aqueous solution is acidic.

5.219.3 Use data. See Use data para 4.9.

5.219.4 Packaging data and labeling. Sodium metabisulfite, ACS is packaged for military use in 1 lb and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.219.5 Storage data. See SODIUM BISULFITE, 5.208.5.

5.220 Name. SODIUM NITRATE, ACS NaNO_3 FW 84.99
(HAZARDOUS)

5.220.1 Specifications. See Specifications para 4.10.

5.220.2 Technical description. Sodium nitrate is in the form of colorless crystals or white powder of specific gravity 2.261 and refractive indices 1.587 and 1.336. It is saline and slightly bitter to the taste, deliquescent in moist air, and neutral in aqueous solution. Sodium nitrate has a melting point of 306.8°C; at 380°C it decomposes. In water, its solubility is 73 grams per 100 ml at 0°C and 180 grams per 100 ml at 100°C; it is very soluble in ammonia, soluble in methanol, and slightly soluble in alcohol and glycerol. It is a strong oxidizing agent and reacts readily with reducing agents.

5.220.3 Use data. See Use data para 4.9.

5.220.4 Packaging data and labeling. Sodium nitrate, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Each bottle must bear the same precautionary label as for POTASSIUM NITRATE, 5.186.4.

5.220.5 Storage data. See POTASSIUM NITRATE, 5.186.5.

5.221 Name. SODIUM NITRITE, ACS NaNO_2 FW 69.00
(HAZARDOUS)

5.221.1 Specifications. See Specifications para 4.10.

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5.221.2 Technical description. Sodium nitrite is in the form of white to pale yellow granules, rods, or powder of specific gravity 2.168 (0°C). It is hygroscopic and will cake easily. Its melting point is 271°C and it decomposes at 320°C. It has a solubility in water of 72.1 grams per 100 ml at 0°C and 163.2 grams per 100 ml at 100°C; it is slightly soluble in absolute alcohol, ether, and methanol. Sodium nitrite is more soluble and less stable than sodium nitrate and is a very active oxidizing agent. It decomposes in acid solution to form the unstable nitrous acid and is the chief source of this acid.

5.221.3 Use data. See Use data para 4.9.

5.221.4 Packaging data and labeling. Sodium nitrite, ACS is packaged for military use in crystalline, granular and stick form in 1 oz, 1 lb, and 5 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Each bottle must bear the same precautionary label as for POTASSIUM NITRITE, 5.187.4.

5.221.5 Storage data. See POTASSIUM NITRITE, 5.187.5.

5.222 Name. SODIUM NITROFERRICYANIDE, DIHYDRATE, ACS $\text{Na}_2\text{Fe}(\text{CN})_6 \cdot 2\text{H}_2\text{O}$
(HAZARDOUS) FW 297.95

5.222.1 Specifications. See Specifications para 4.10.

5.222.2 Technical description. Sodium nitroferricyanide, dihydrate is in the form of red, transparent crystals of specific gravity 1.72. Its solubility in water at 16°C is 40 grams per 100 ml; it is slightly soluble in alcohol.

5.222.3 Use data. Sodium nitroferricyanide, dihydrate, ACS is used as a reagent for the detection of many organic compounds, alkali sulfides, zinc, and sulfur dioxide.

5.222.4 Packaging data and labeling. For military use sodium nitroferricyanide, dihydrate, ACS is packaged in 1 oz and 1/4 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Unless exempted under section 173.370 of Title 49, Code of Federal Regulations, shipping containers must bear the DoT poison label for Class B poisons. Each bottle must bear the same precautionary label as for POTASSIUM CYANIDE, 5.179.4.

5.222.5 Storage data. Sodium nitroferricyanide should be stored in tightly closed containers in a cool, dry area away from acids. Under these storage conditions, the shelf life is indefinite.

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5.223 Name. SODIUM OXALATE, ACS (COONa)₂ FW 134.00
(HAZARDOUS)

5.223.1 Specifications. See Specifications para 4.10.

5.223.2 Technical description. Sodium oxalate is in the form of a white, crystalline powder of specific gravity 2.34. From 250 to 270°C it decomposes. In water, its solubility is 3.7 grams per 100 ml at 20°C and 6.33 grams per 100 ml at 100°C; it is insoluble in ether and alcohol. It is odorless and its aqueous solution is practically neutral.

5.223.3 Use data. Sodium oxalate, ACS is used for standardizing potassium permanganate solutions.

5.223.4 Packaging data and labeling. Sodium oxalate, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. See AMMONIUM OXALATE, 5.16.4, for labeling requirement.

5.223.5 Storage data. See AMMONIUM OXALATE, 5.16.5.

5.224 Name. SODIUM PERIODATE, ACS NaIO₄ FW 213.89
Sodium Metaperiodate
(HAZARDOUS)

5.224.1 Specifications. See Specifications para 4.10.

5.224.2 Technical description. Sodium periodate is in the form of white, tetragonal crystals of specific gravity 3.865 at 16°C. It decomposes at 300°C. Its solubility in water is 4 grams per 100 ml at 6°C and 37 grams per 100 ml at 50°C; it is soluble in sulfuric acid, nitric acid, and acetic acid.

5.224.3 Use data. Sodium periodate, ACS is used in the determination of manganese.

5.224.4 Packaging data and labeling. Sodium periodate is packaged for military use in 1/4 lb unit quantity bottles. See POTASSIUM PERIODATE, 5.189.4, for labeling requirements.

5.224.5 Storage data. See POTASSIUM PERIODATE, 5.189.5.

5.225 Name. SODIUM PEROXIDE, ANHYDROUS, ACS Na₂O₂ FW 77.98
(HAZARDOUS)

5.225.1 Specifications. See Specifications para 4.10.

5.225.2 Technical description. Sodium peroxide is a yellow-white, granular, free-flowing powder of specific gravity 2.805. It melts at 460°C with some decomposition and decomposes completely at 657°C. It

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is soluble in cold water and decomposes in hot water; it is soluble in dilute acids. In alcohol or ammonia it decomposes. Sodium peroxide acts as both a strong alkali and vigorous oxidizing agent. In water, it liberates active oxygen and sodium hydroxide. When dissolving in dilute acids, it forms hydrogen peroxide, which remains stable.

5.225.3 Use data. See Use data para 4.9.

5.225.4 Packaging data and labeling. Sodium peroxide, anhydrous, ACS is packaged for military use in 1/4 lb unit quantity bottles. It is recommended that the 1 lb and 5 lb unit quantity bottles also be used. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material. Each bottle must bear the following precautionary label:

SODIUM PEROXIDE
DANGER! CAUSES SEVERE BURNS TO SKIN AND EYES
-- STRONG OXIDANT
HARMFUL DUST

Do not get in eyes, on skin, on clothing.
Do not breathe dust.
Do not take internally.
Store separately from and avoid contact with
combustible material.
In case of contact, immediately flush skin or eyes
with plenty of water for at least 15 minutes;
for eyes get medical attention.

5.225.5 Storage data. Sodium peroxide should be stored in a cool, dry area in tightly sealed containers away from acids and combustible material. Under these storage conditions, the shelf life is indefinite.

5.226 Name. SODIUM PHOSPHATE, DIBASIC, ANHYDROUS, ACS Na_2HPO_4 FW 141.96
Dibasic Sodium Phosphate
Disodium Phosphate, Anhydrous

5.226.1 Specifications. See Specifications para 4.10.

5.226.2 Technical description. Anhydrous dibasic sodium phosphate is in the form of white, translucent, free-flowing crystals or powder. Upon heating, this material decomposes. In water, its solubility is 1.53 grams per 100 ml at 0°C and 12.14 grams per 100 ml at 25°C; it is insoluble in alcohol. On exposure to air, the anhydrous salt will absorb from 2 to 7 water molecules, depending upon the humidity and temperature.

5.226.3 Use data. Sodium phosphate dibasic, anhydrous, ACS is used in analytical chemistry as a buffer for colorimetric pH determinations.

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5.226.4 Packaging data and labeling. Sodium phosphate, dibasic, anhydrous, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity nonactinic glass bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.226.5 Storage data. Sodium phosphate, dibasic, anhydrous, should be stored in a cool, dry place in tightly closed containers. Under these conditions the shelf life is indefinite.

5.227 Name. SODIUM PHOSPHATE, DIBASIC, HEPTAHYDRATE, ACS $\text{Na}_2\text{HPO}_4 \cdot 7\text{H}_2\text{O}$
FW 268.07

5.227.1 Specifications. See Specifications para 4.10.

5.227.2 Technical description. Dibasic sodium phosphate, heptahydrate, ACS is in the form of colorless, monoclinic prisms, crystals, or granular powder; it is mildly alkaline and has a cooling, saline taste. The specific gravity is 1.679 and the refractive index is 1.442. At 48.1°C the salt loses 5 molecules of its water of hydration and, at 95°C it becomes anhydrous. Its solubility in water at 40°C is 104 grams per 100 ml; it is insoluble in alcohol.

5.227.3 Use data. See Use data para 4.9.

5.227.4 Packaging data and labeling. For military use, sodium phosphate, dibasic, heptahydrate, ACS is packaged in 1/4 lb, 1 lb, and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.227.5 Storage data. Sodium phosphate, dibasic, heptahydrate should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.228 Name. SODIUM PHOSPHATE, MONOBASIC, ACS $\text{NaH}_2\text{PO}_4 \cdot \text{H}_2\text{O}$ FW 137.99
Sodium Biphosphate

5.228.1 Specifications. See Specifications para 4.10.

5.228.2 Technical description. Sodium phosphate, monobasic, ACS is in the form of white, odorless, slightly deliquescent crystals or granules of specific gravity 2.040 and refractive indices 1.456, 1.458, and 1.487. At 100°C it loses its water of hydration and at 204°C it decomposes. In water, its solubility is 59.9 grams per 100 ml at 0°C, and 427 grams per 100 ml at 100°C. It is very slightly soluble in ether or chloroform and insoluble in alcohol. At 25°C a 0.1 molar aqueous solution of sodium phosphate, monobasic, has a pH of 4.5. When ignited, this salt converts into the metaphosphate.

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5.228.3 Use data. See Use data para 4.9.

5.228.4 Packaging data and labeling. Sodium phosphate, monobasic, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.228.5 Storage data. Sodium phosphate, monobasic, should be stored in a cool, dry area in tightly closed containers. The shelf life is indefinite under these storage conditions.

5.229 Name. SODIUM PHOSPHATE, TRIBASIC, ACS $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ FW 380.12
Trisodium Phosphate

5.229.1 Specifications. See Specifications para 4.10.

5.229.2 Technical description. Tribasic sodium phosphate is in the form of colorless, efflorescent, free-flowing crystals or white powder. The specific gravity is 1.62 and the refractive indices are 1.432, 1.436, and 1.437. At 35.1°C it loses 5 molecules of its water of hydration; at 100°C all water of hydration is lost. The solubility is 4.15 grams per 100 ml of water at 0°C and 87.4 grams per 100 ml at 34°C; it is insoluble in alcohol. Due to the efflorescent nature of this salt, loss of water of hydration will result in an assay of more than 100%. This, however, will not affect the determination of the relative amount of free alkali present.

5.229.3 Use data. See Use data para 4.9.

5.229.4 Packaging data and labeling. Sodium phosphate, tribasic, ACS is packaged for military use in 1 lb and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.229.5 Storage data. Sodium phosphate, tribasic, should be stored in tightly closed containers in a cool, dry place away from sources of heat. Under these storage conditions, the shelf life is indefinite.

5.230 Name. SODIUM SULFATE, ANHYDROUS, ACS Na_2SO_4 FW 142.04

5.230.1 Specifications. See Specifications para 4.10.

5.230.2 Technical description. Anhydrous sodium sulfate is in the form of white, rhombic crystals or powder of specific gravity 2.698 and refractive index 1.477. It is odorless and has a bitter, saline taste. At 100°C the salt is transformed to the monoclinic form and at 884°C it melts. Its solubility in water is 5 grams per 100 ml at 0°C and 42 grams per 100 ml at 100°C; it is soluble in glycerol, insoluble in alcohol.

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5.230.3 Use data. Sodium sulfate, anhydrous, ACS is used as a drying agent for organic liquids and for the determination of nitrogen by the Kjeldahl method.

5.230.4 Packaging data and labeling. Sodium sulfate, anhydrous, ACS in powdered form is packaged for military use in 1/2 lb, 1 lb, and 5 lb unit quantity bottles and in 1 lb unit quantity cans. There are no applicable DoT packaging or shipping regulations for this chemical.

5.230.5 Storage data. See POTASSIUM SULFATE, 5.195.5.

5.231 Name. SODIUM SULFIDE, NONAHYDRATE, ACS $\text{Na}_2\text{S} \cdot 9\text{H}_2\text{O}$ FW 240.18
(HAZARDOUS)

5.231.1 Specifications. See Specifications para 4.10.

5.231.2 Technical description. Sodium sulfide, nonahydrate, ACS is in the form of deliquescent, colorless, tetragonal crystals of specific gravity 1.427 (16/4°C). It decomposes at 920°C. Its solubility in water is 47.5 grams per 100 ml at 10°C and 96.7 grams per 100 ml at 100°C. It is slightly soluble in alcohol. Aqueous solutions are very alkaline. It discolors upon exposure to light and air.

5.231.3 Use data. See use data para 4.9.

5.231.4 Packaging data and labeling. Sodium sulfide, nonahydrate, ACS is packaged for military use in 1/4 lb, and 1 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must bear the DoT yellow label for flammable solids unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Individual containers must have the following precautionary label:

SODIUM SULFIDE
DANGER! CONTACT WITH ACID LIBERATES
POISONOUS GAS
BURNS SKIN AND EYES

Do not breathe dust or gas.

Do not get in eyes, on skin, on clothing.

Keep container closed and away from acid and heat.

Sweep up spillage. Do not flush to sewer which
may contain acid.

In case of contact, immediately flush skin or eyes with
plenty of water. For eyes, get medical attention.

5.231.5 Storage data. Sodium sulfide, nonahydrate should be stored in tightly closed, nonactinic glass bottles in a cool, dry place away from oxidizing materials and light. In unopened containers, the shelf life is indefinite.

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5.232 Name. SODIUM SULFITE, ANHYDROUS, ACS Na_2SO_3 FW 126.04

5.232.1 Specifications. See Specifications para 4.10.

5.232.2 Technical description. Anhydrous sodium sulfite is in the form of very hygroscopic, white crystals, hexagonal prisms, or powder of specific gravity 2.633 (15/4°C) and refractive indices of 1.565 and 1.515. It decomposes at red heat. In water, its solubility is 12.54 grams per 100 ml at 0°C and 28.3 grams per 100 ml at 80°C; it is slightly soluble in alcohol, insoluble in ammonia and liquid chlorine. Its aqueous solutions are alkaline. The anhydrous form is fairly stable and does not oxidize as readily as the hydrated form, $\text{Na}_2\text{SO}_3 \cdot 7\text{H}_2\text{O}$. It tends to cake or fuse.

5.232.3 Use data. See Use data para 4.9.

5.232.4 Packaging data and labeling. Sodium sulfite, anhydrous, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.232.5 Storage data. Store in a cool, dry place away from oxidizing agents. Keep containers tightly closed. If kept closed, the shelf life is indefinite, but this material can oxidize under humid conditions.

5.233 Name. SODIUM TARTRATE, ACS $(\text{CHOHCOONa})_2 \cdot 2\text{H}_2\text{O}$ FW 230.08

5.233.1 Specifications. See Specifications para 4.10.

5.233.2 Technical description. Sodium tartrate is in the form of colorless or white, rhombic crystals or granules of specific gravity 1.818 and refractive indices 1.545 and 1.49. At 150°C it loses its water of hydration. In water, its solubility is 29 grams per 100 ml at 6°C and 66 grams per 100 ml at 43°C; it is insoluble in alcohol. It is slightly alkaline to litmus.

5.233.3 Use data. Sodium tartrate, ACS is used in the standardization of Karl Fischer Reagent for the determination of water.

5.233.4 Packaging data and labeling. Sodium tartrate, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.233.5 Storage data. Sodium tartrate should be stored in a cool, dry place with container tightly closed. This material is quite stable and in normal storage conditions has an indefinite shelf life.

5.234 Name. SODIUM TETRAPHENYLBORATE, ACS $\text{NaB}(\text{C}_6\text{H}_5)_4$ FW 342.23
Sodium Tetraphenylboron

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5.234.1 Specifications. See Specifications para 4.10.

5.234.2 Technical description. Sodium tetraphenylborate is in the form of snow-white crystals. It is freely soluble in water or acetone, less soluble in ether or chloroform, and practically insoluble in petroleum ether. Aqueous solutions should be adjusted to a pH of about 5 and can be stored at room temperature or lower. The solubility in polar solvents increases as the temperature decreases.

5.234.3 Use data. Sodium tetraphenylborate, ACS is used in analytical chemistry for the determination of potassium, ammonium, rubidium, and cesium ions.

5.234.4 Packaging data and labeling. Sodium tetraphenylborate, ACS is packaged for military use in 10 gram unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.234.5 Storage data. Sodium tetraphenylborate should be stored in a cool, dry area in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.235	Name.	SODIUM THIOCYANATE, ACS	NaSCN	FW 81.07
		Sodium Sulfocyanate		

5.235.1 Specifications. See Specifications para 4.10.

5.235.2 Technical description. Sodium thiocyanate is in the form of white, deliquescent crystals with a melting point of 287°C. Its solubility in water is 139.31 grams per 100 ml at 21.3°C and 225 grams per 100 ml at 100°C. It is very soluble in alcohol and acetone. When sodium thiocyanate is dissolved in water, the temperature is considerably lowered. The solutions are neutral.

5.235.3 Use data. See Use data para 4.9.

5.235.4 Packaging data and labeling. For military use sodium thiocyanate, ACS is packaged in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.235.5 Storage data. Sodium thiocyanate should be stored in a cool, dry place in tightly closed containers. In unopened containers, the shelf life is indefinite.

5.236	Name.	SODIUM THIOSULFATE, PENTAHYDRATE, ACS	$\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$	FW 248.18
		Sodium Hyposulfite		

5.236.1 Specifications. See Specifications para 4.10.

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5.236.2 Technical description. Sodium thiosulfate, pentahydrate, ACS is in the form of colorless, monoclinic crystals with a cooling taste and bitter aftertaste. It is efflorescent in warm, dry air and deliquescent in moist air. The specific gravity is 1.729 (17°C) and the refractive indices are 1.489, 1.508, and 1.536. It melts at 48°C, loses its water at 100°C, and decomposes at higher temperatures. Its solubility in water is 79.4 grams per 100 ml at 0°C and 291.1 grams per 100 ml at 45°C; it is soluble in ammonia and insoluble in alcohol. It slowly decomposes in solution at normal temperatures, more rapidly when heated.

5.236.3 Use data. See Use data para 4.9.

5.236.4 Packaging data and labeling. Sodium thiosulfate, pentahydrate, ACS is packaged for military use in 1/4 lb unit quantity bottles and in 25 lb unit quantity polyethylene bag lined cartons. There are no applicable DoT packaging or shipping regulations for this chemical.

5.236.5 Storage data. Sodium thiosulfate, pentahydrate should be stored in a cool, dry place in tightly sealed containers. Under such conditions, the shelf life is up to six months.

5.237 Name. SODIUM TUNGSTATE, DIHYDRATE, ACS $\text{Na}_2\text{WO}_4 \cdot 2\text{H}_2\text{O}$ FW 329.86

5.237.1 Specifications. See Specifications para 4.10.

5.237.2 Technical description. Sodium tungstate, dihydrate, ACS is in the form of colorless, rhombic crystals, plates, or granules of specific gravity 3.23 to 3.25, and refractive index 1.5533. At 100°C, it loses its water of hydration; the anhydrous form melts at 698°C. In water, its solubility is 41 grams per 100 ml at 0°C and 123.5 grams per 100 ml at 100°C; it is insoluble in alcohol, slightly soluble in ammonia. It reacts with acid to form the insoluble tungstic acid with a solution of sodium hydroxide.

5.237.3 Use data. Sodium tungstate, dihydrate, ACS is used for preparing complex compounds such as phosphotungstates, as a biological reagent, and as a precipitant for alkaloids.

5.237.4 Packaging data and labeling. Sodium tungstate, dihydrate, ACS is packaged for military use in 1/4 lb and 5 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.237.5 Storage data. Sodium tungstate, dihydrate should be stored in a cool, dry place. Keep containers tightly closed. Under recommended conditions and temperatures the shelf life is indefinite.

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5.238 Name. STANNOUS CHLORIDE, DIHYDRATE, ACS $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$ FW 225.63

5.238.1 Specifications. See Specifications para 4.10.

5.238.2 Technical description. Stannous chloride, dihydrate, ACS is in the form of colorless to white, monoclinic, free-flowing crystals of specific gravity 2.710 (15.5°C). Its melting point is 37.7°C and it decomposes on strong heating. When dissolved in much water, it forms an insoluble basic salt. It is soluble in alcohol, acetone, ethyl acetate, glacial acetic acid, and sodium hydroxide solution; it is very soluble in hydrochloric acid. It easily absorbs oxygen from the air to form the insoluble oxychloride.

5.238.3 Use data. See Use data para 4.9.

5.238.4 Packaging data and labeling. Stannous chloride, dihydrate, ACS is packaged for military use in 1/4 lb, 1 lb, and 5 lb unit quantity bottles; and in 25 lb unit quantity polyethylene bag lined cartons. There are no applicable DoT packaging or shipping regulations for this chemical.

5.238.5 Storage data. Stannous chloride, dihydrate should be stored away from areas of acute fire hazard, open flame, or oxidizing agents. A shelf life of one year can be expected if kept in unopened containers in a dry atmosphere. Containers should be kept tightly closed at all times.

5.239 Name. STARCH, SOLUBLE, ACS $(\text{C}_6\text{H}_{12}\text{O}_5)_n$
Starch, Soluble (for Iodometry)

5.239.1 Specifications. See Specifications para 4.10.

5.239.2 Technical description. Soluble starch is in the form of white amorphous, tasteless powder or irregular lumps; it melts at 138 to 140°C. It is soluble in water and in alcohol. It decomposes in ether or acetone.

5.239.3 Use data. Starch, soluble, ACS is used as an indicator in iodometric analysis.

5.239.4 Packaging data and labeling. Starch, soluble, ACS is packaged for military use in 1 oz, 1/4 lb, and 1 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.239.5 Storage data. Starch, soluble should be stored in a cool, dry area in tightly sealed containers. Under these storage conditions, the shelf life is indefinite.

5.240 Name. STRONTIUM NITRATE, ANHYDROUS, ACS $\text{Sr}(\text{NO}_3)_2$ FW 211.63
(HAZARDOUS)

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5.240.1 Specifications. See Specifications para 4.10.

5.240.2 Technical description. Anhydrous strontium nitrate is in the form of colorless to white cubic crystals, granules, or powder of specific gravity 2.986 and refractive index 1.5878. Its melting point is 570°C. In water, its solubility is 40 grams per 100 ml at 0°C and 100 grams per 100 ml at 89°C; it is slightly soluble in alcohol and acetone, and very soluble in ammonium hydroxide. It is highly reactive oxidizing agent. It imparts a carmine-red color to a burner flame.

5.240.3 Use data. See Use data para 4.9.

5.240.4 Packaging data and labeling. Strontium nitrate, anhydrous, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity glass bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Each bottle must bear the following precautionary label:

STRONTIUM NITRATE
CAUTION! STRONG OXIDANT

Keep away from heat or open flame.
Store separately from and avoid contact
with combustible materials.

5.240.5 Storage data. See BARIUM NITRATE, 5.30.5.

5.241 Name. SUCROSE, ACS $C_{12}H_{22}O_{11}$ FW 342.30

5.241.1 Specifications. See Specifications para 4.10.

5.241.2 Technical description. Sucrose is in the form of colorless to white, monoclinic crystals, masses, or powder of specific gravity 1.588 (22/4°C). It decomposes from 170 to 186°C. Its solubility in water is 64.18 grams per 100 ml at 0°C and 82.97 grams per 100 ml at 100°C; it is soluble in alcohol or benzene and insoluble in ether. It has a sweet taste and is hygroscopic; its moisture can be driven off by heating to 90°C. When decomposed by heat, sucrose emits a characteristic odor of caramel. Sucrose can be fermented, but it resists bacterial decomposition when in high concentrations. Its solutions are neutral to litmus.

5.241.3 Use data. See Use data para 4.9.

5.241.4 Packaging data and labeling. Sucrose, ACS is packaged for military use in 1 lb and 5 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

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5.241.5 Storage data. Sucrose should be stored in a cool, dry place in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.242 Name. SULFANILIC ACID, MONOHYDRATE, ACS $4\text{-NH}_2\text{C}_6\text{H}_4\text{SO}_3\text{H}\cdot\text{H}_2\text{O}$
 p-Aminobenzenesulfonic Acid FW 191.21
 4-Aminobenzenesulfonic Acid

5.242.1 Specifications. See Specifications para 4.10.

5.242.2 Technical description. Sulfanilic acid is in the form of efflorescent, colorless crystals. At 100°C, it loses its water of hydration and, at 280° to 300°C it decomposes without melting. Its solubility in water is 1.08 grams per 100 ml at 20°C, and 6.67 grams per 100 ml at 100°C; it is very slightly soluble in alcohol, ether, and benzene.

5.242.3 Use data. See Use data para 4.9.

5.242.4 Packaging data and labeling. Sulfanilic acid, monohydrate, ACS is packaged for military use in 1 oz and 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.242.5 Storage data. Sulfanilic acid, monohydrate should be stored in a cool, dry area in tightly sealed containers. Under these storage conditions, the shelf life is indefinite.

5.243 Name. SULFOSALICYLIC ACID, ACS $\text{HOC}_6\text{H}_3(\text{COOH})\text{SO}_3\text{H}\cdot 2\text{H}_2\text{O}$ FW 254.22
 5-Sulfosalicylic Acid

5.243.1 Specifications. See Specifications para 4.10.

5.243.2 Technical description. Sulfosalicylic acid, ACS is in the form of white crystals or crystalline powder, which can be colored pink when traces of iron are present. The anhydrous form melts at about 120°C and decomposes into phenol and salicylic acid. It is very soluble in water and alcohol and soluble in ether.

5.243.3 Use data. Sulfosalicylic acid, ACS is used as a colorimetric agent for the ferric ion, with which it gives a violet color, and for the determination of albumin in urine.

5.243.4 Packaging data and labeling. Sulfosalicylic acid, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

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5.243.5 Storage data. Sulfosalicylic acid should be stored in tightly closed nonactinic bottles in a cool, dry area away from bright light. Under recommended conditions and temperatures the shelf life is indefinite.

5.244 Name. SULFURIC ACID, ACS H_2SO_4 FW 98.08
(HAZARDOUS)

5.244.1 Specifications. See Specifications para 4.10.

5.244.2 Technical description. Sulfuric acid is a colorless to cloudy, oily liquid of specific gravity 1.841 for the 96-98% sulfuric acid. Its melting point is 10.36°C and its boiling point is 315 to 338°C for the 96-98% form. It is miscible with water with evolution of heat; it decomposes in alcohol. It is a powerful oxidizing agent, particularly with organic materials, nitrates, carbides, and chlorates. Sulfuric acid is highly corrosive to most metals, with evolution of hydrogen, particularly in strengths below 60°Be (about 14 molar).

5.244.3 Use data. See Use data para 4.9.

5.244.4 Packaging data and labeling. Sulfuric acid, ACS is packaged for military use in 1 pt and 5 pt unit quantity bottles with acid-resistant screw-caps, color coded yellow. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT white label for corrosive liquids unless exempted under section 173.244 of Title 49, Code of Federal Regulations. Individual containers must have the following precautionary label:

SULFURIC ACID
DANGER! CAUSES SEVERE BURNS

Do not get in eyes, on skin, on clothing.

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes; for eyes, get medical attention.

Do not add water to contents while in a container because of violent reaction.

5.244.5 Storage data. Sulfuric acid should be stored along with other highly corrosive liquids and strong mineral acids, away from other chemicals. It should be kept in a cool, well-ventilated place in tightly closed containers. Do not store sulfuric acid in direct sunlight. Under recommended conditions and temperatures the shelf life of sulfuric acid is indefinite.

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5.245 Name. SULFURIC ACID, FUMING, ACS
(HAZARDOUS)

5.245.1 Specifications. See Specifications para 4.10.

5.245.2 Technical description. Fuming sulfuric acid is a solution of sulfur trioxide in sulfuric acid. It is an oily liquid, colorless to dark brown, depending on its purity, and has a specific gravity of about 1.9 at 20°C. Its melting point is 15°C or lower; it decomposes at higher temperatures. It decomposes in water or alcohol. It fumes strongly in moist air and is extremely corrosive. Fuming sulfuric acid, ACS has a nominal content of 15%, 20%, or 30% free sulfur trioxide.

5.245.3 Use data. See Use data para 4.9.

5.245.4 Packaging data and labeling. Sulfuric acid, fuming, ACS is packaged for military use in 1 lb unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must bear the DoT white label for corrosive liquids unless exempted under section 173.244 of Title 49, Code of Federal Regulations. Individual containers must bear the following precautionary label:

SULFURIC ACID, FUMING
DANGER! CAUSES SEVERE BURNS

Do not get in eyes, on skin, on clothing.
Avoid breathing vapor.
In case of contact, immediately
flush skin or eyes with plenty of
water for at least 15 minutes; for
eyes get medical attention.
Do not add water to contents while
in a container because of violent
reaction.

5.245.5 Storage data. See SULFURIC ACID, 5.244.5.

5.246 Name. SULFUROUS ACID, ACS
(A solution of SO_2 in water)
(HAZARDOUS)

5.246.1 Specifications. See Specifications para 4.10.

5.246.2 Technical description. Sulfurous acid is a solution of sulfur dioxide, in water. It is a colorless, unstable liquid having a suffocating odor of sulfur dioxide with a specific gravity of about 1.03. It is soluble in water, acetone, acids, alcohol, and ether. The ACS grade has no less than 6% sulfur dioxide.

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5.246.3 Use data. See Use data para 4.9.

5.246.4 Packaging data and labeling. Sulfurous acid, ACS is packaged for military use in 1 lb and 5 lb unit quantity nonactinic bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must bear the DoT white label for corrosive liquids unless exempted under section 173.244 of Title 49, Code of Federal Regulations. Individual containers must bear the following precautionary label:

SULFUROUS ACID
DANGER! CAUSES SEVERE BURNS
HEATING CAUSES EXTREMELY
TOXIC FUMES

Do not get in eyes, on skin, on clothing.

Avoid breathing vapor.

In case of contact, immediately flush
skin or eyes with plenty of water for
at least 15 minutes; for eyes, get
medical attention.

If swallowed, do not induce vomiting.

POISON
CALL A PHYSICIAN

5.246.5 Storage data. Sulfurous acid should be stored in a cool, dry area. Containers of this acid should be kept tightly closed. In tightly closed containers and stored under constant atmospheric conditions, the shelf life is six to nine months.

5.247 Name. TARTARIC ACID, ACS $\text{HOOC}(\text{CHOH})_2\text{COOH}$ FW 150.09

5.247.1 Specifications. See Specifications para 4.10.

5.247.2 Technical description. Tartaric acid is in the form of monoclinic spheroidal prisms. It is stable in air and light. It has a tart taste. It has an odor of burnt sugar when heated to melting. It is a relatively strong organic acid.

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TABLE XXXIII. - Physical constants of tartaric acid

Flash point (open cup)	410°F
Melting point	168°C ~ 170°C (decomposes on further heating)
Solubility data	Solubility in water: per 100 ml 115 g at 0°C, 195 g at 50°C, 343 g at 100°C. Soluble in alcohol, ether, glycerol, and propanol. Insoluble in chloroform.
Specific gravity (20/4°C)	1.7598

5.247.3 Use data. See Use data para 4.9.

5.247.4 Packaging data and labeling. Tartaric acid, ACS is packaged for military use in powdered form in 1/4 lb and 1 lb unit quantity bottles, in granular form in 1 lb unit quantity bottles, and in crystalline form in 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.247.5 Storage data. Tartaric acid should be stored in tightly closed containers in a cool, dry well-ventilated area. Under the recommended conditions and temperatures the shelf life of tartaric acid is indefinite.

5.248 Name. THIOACETAMIDE, ACS CH_3CSNH_2 FW 75.13
(HAZARDOUS)

5.248.1 Specifications. See Specifications para 4.10.

5.248.2 Technical description. Thioacetamide is in the form of colorless crystals with a melting point of 115-116°C. It has a slight odor of mercaptans. Its solubility in water at 25°C is 16.3 grams per 100 ml and in ethanol is 26.4 grams per 100 ml. It is sparingly soluble in ether.

5.248.3 Use data. Thioacetamide, ACS is used as a pleasant substitute for hydrogen sulfide in analytical chemistry.

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5.248.4 Packaging data and labeling. Thioacetamide, ACS is packaged for military use in 1 oz and 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

THIOACETAMIDE
CAUTION! HARMFUL IF SWALLOWED

Avoid breathing dust.
Wash thoroughly after handling.

5.248.5 Storage data. Thioacetamide should be stored in tightly closed containers in a cool, dry area away from acute fire hazards, heat sources, and acids. Under these storage conditions, the shelf life is indefinite.

5.249 Name. THORIUM NITRATE, ACS $\text{Th}(\text{NO}_3)_4 \cdot 4\text{H}_2\text{O}$ FW 552.12
(HAZARDOUS)

5.249.1 Specifications. See Specifications para 4.10.

5.249.2 Technical description. Thorium nitrate is in the form of colorless to white, slightly deliquescent plates or crystals. Upon heating, the material swells. It is very soluble in water and alcohol, soluble in ether, and slightly soluble in acetone. It is radioactive with low specific activity.

5.249.3 Use data. Thorium nitrate, ACS is used as a reagent for the determination of fluorine.

5.249.4 Packaging data and labeling. Thorium nitrate, ACS is packaged for military use in 1 oz, 1/4 lb, and 1 lb unit quantity nonactinic glass bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must bear a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Under certain conditions of packaging, labeling to indicate radioactive material may be required. See sections 173.391 and 173.392 of Title 49 and military specification MIL-M-19590 for requirements and exemptions. Each bottle must bear the following precautionary label:

THORIUM NITRATE
CAUTION! STRONG OXIDANT
HARMFUL DUST

Store separately from and avoid contact
with combustible materials.
Keep away from heat and open flame.
Avoid breathing dust.
Use with adequate ventilation.
Do not take internally.

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5.249.5 Storage data. Thorium nitrate should be stored in a cool, dry place, away from light, heat, and moisture. Do not store near organic or easily oxidizable materials. Stored under the above conditions, the shelf life is indefinite.

5.250 Name. THYMOL BLUE, ACS
Thymolsulfonphthalein

5.250.1 Specifications. See Specifications para 4.10.

5.250.2 Technical description. Thymol blue is in the form of brownish-green crystals or powder with a melting point of 220°C. It is insoluble in water and soluble in alcohol or dilute alkali solutions.

5.250.3 Use data. Thymol blue, ACS is used as a pH indicator in the ranges of 1.2 (red) to 2.8 (yellow) and 8.0 (yellow) to 9.6 (blue).

5.250.4 Packaging data and labeling. Thymol blue, ACS is packaged for military use in powdered form in 1 gram, 5 gram, and 10 gram unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.250.5 Storage data. Thymol blue, should be stored in a cool, dry, well-ventilated area in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.251 Name. THYMOLPHTHALEIN, ACS

5.251.1 Specifications. See Specifications para 4.10.

5.251.2 Technical description. Thymolphthalein is a white to slightly yellow, crystalline powder which melts at 246-250°C. It is soluble in hot alcohol, acetone, dilute alkali solutions, and ether.

5.251.3 Use data. Thymolphthalein, ACS is used as a general laboratory reagent and pH indicator. It serves as an acid-base indicator in the pH range 9.3 (colorless) to pH 10.5 (blue) and as a reagent for blood.

5.251.4 Packaging data and labeling. Thymolphthalein, ACS is packaged for military use in 10 gram and 100 gram unit quantity nonactinic bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.251.5 Storage data. Thymolphthalein should be stored in a cool, dry, well-ventilated area. Keep containers tightly closed. Under these storage conditions, the shelf life is indefinite.

5.252 Name. TIN, ACS

Sn

AW 118.69

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5.252.1. Specifications. See Specifications para 4.10.

5.252.2 Technical description. Tin is a bright, metallic element that is very malleable and does not react readily with organic acids. At normal temperatures, tin exists as a malleable, silvery-white metal of specific gravity 7.28. This "white" tin has a highly crystallized structure. Tin melts at 231.89°C and boils at 2260°C. It is insoluble in water; slightly soluble in ammonia, and soluble in hydrochloric acid, sulfuric acid, and alkali solutions.

5.252.3 Use data. See Use data para 4.9.

5.252.4 Packaging data and labeling. Tin, ACS is packaged for military use in granular form in the No. 30 mesh of the US sieve sizes in 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.252.5 Storage data. Tin should be stored in a cool, dry area in tightly closed containers. Under these storage conditions, the shelf life is indefinite.

5.253	Name.	TOLUENE, ACS Methylbenzene Phenylmethane Toluol (HAZARDOUS)	$C_6H_5CH_3$	FW 92.14
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5.253.1 Specifications. See Specifications para 4.10.

5.253.2 Technical description. Toluene, ACS is a colorless, flammable liquid with many properties analagous to benzene and aniline. It is a very good organic solvent with a benzene-like odor. It is a stable liquid that will not absorb oxygen from the air. The boiling point of toluene is 110.6°C and the melting point is -95°C. It is soluble in carbon disulfide; miscible with acetone, alcohol and chloroform. It is insoluble in water. The refractive index is 1.4961 at 20°C and the specific gravity (20/4°C) is 0.866. The flash point (closed cup) of toluene is 40°F.

5.253.3 Use data. Toluene, ACS is used in organic synthesis and as a general laboratory solvent.

5.253.4 Packaging data and labeling. Toluene, ACS is packaged for military use in 1 pt and 1 gal unit quantity nonactinic bottles or cans. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Individual containers must have the following precautionary label:

TOLUENE
WARNING! FLAMMABLE
VAPOR HARMFUL

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Keep away from heat, sparks, and open flame.
Keep container closed.
Use only with adequate ventilation.
Avoid prolonged breathing of vapor.
Avoid prolonged or repeated contact with skin.

5.253.5 Storage data. See ANILINE, 5.23.5.

5.254 Name. TOLUENE, FOR SPECTROPHOTOMETRY, ACS $C_6H_5CH_3$ FW 92.14
(HAZARDOUS)

5.254.1 Specifications. See Specifications para 4.10.

5.254.2 Technical description. Toluene, for spectrophotometry, ACS is especially refined for use in spectrophotometry where a low absorbance in the ultraviolet range is necessary. For physical constants, See TOLUENE, 5.253.2.

5.254.3 Use data. Toluene, for spectrophotometry, ACS is intended for use in spectrophotometry.

5.254.4 Packaging data and labeling. Toluene, for spectrophotometry, ACS is packaged for military use in 500 ml and 1 liter unit quantity bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT red label for flammable liquids unless exempted. A precautionary label, identical to that of TOLUENE, ACS (see 5.253.4) must be on each individual container.

5.254.5 Storage data. See TOLUENE, 5.253.5.

5.255 Name. TRICHLOROACETIC ACID, ACS CCl_3COOH FW 163.39
(HAZARDOUS)

5.255.1 Specifications. See Specifications para 4.10.

5.255.2 Technical description. Trichloroacetic acid is in the form of deliquescent, colorless, rhombic crystals of specific gravity 1.62 (25/4°C) and refractive index 1.4603 (61°C). Its melting point is 56.3°C and its boiling point is 195.5°C. Its solubility in water is 120 grams per 100 ml at 25°C; it is soluble in alcohol or ether. It is a moderately strong acid which attacks the skin readily. Decomposition by heating with caustic alkali carbonate yields chloroform, hydrogen chloride, carbon dioxide, and carbon monoxide.

5.255.3 Use data. Trichloroacetic acid, ACS is used as a decalcifier and fixative in microscopy, and as a precipitant of protein.

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5.255.4 Packaging data and labeling. Trichloroacetic acid, ACS is packaged for military use in 1/4 lb unit quantity bottles. There are no applicable DOT packaging or shipping regulations for this chemical. Each bottle must bear the following precautionary label:

TRICHLOROACETIC ACID

WARNING! CAUSES SEVERE BURNS TO SKIN AND EYES

Avoid contact with skin, eyes, or clothing.

Do not take internally.

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes; for eyes, get medical attention.

5.255.5 Storage data. Trichloroacetic acid, ACS should be stored in a cool, ventilated area away from materials which are affected by acid fumes. Containers should be kept closed and plainly labeled. Under the conditions described above, the shelf life of trichloroacetic acid is as long as 2 or 3 years. This material should be checked annually.

5.256 Name. URANYL ACETATE, ACS $\text{UO}_2(\text{CH}_3\text{COO})_2 \cdot 2\text{H}_2\text{O}$ FW 424.15
Uranium Acetate
(HAZARDOUS)

5.256.1 Specifications. See Specifications para 4.10.

5.256.2 Technical description. Uranyl acetate is in the form of yellow, rhombic crystals or crystalline powder with a slight odor of acetic acid. The specific gravity is 2.893 at 15°C. Its solubility in water is 7.694 grams per 100 ml at 15°C; it is freely soluble in an aqueous solution of acetic acid and very soluble in alcohol. At 110°C, it loses its water of hydration and, at 275°C, it decomposes. It is decomposed by light, and is radioactive with a low specific activity.

5.256.3 Use data. Uranyl acetate, ACS is used as a reagent for the precipitation of sodium, and as an activator in bacterial oxidation processes.

5.256.4 Packaging data and labeling. Uranyl acetate, ACS is packaged for military use in 1 oz and 1/4 lb unit quantity nonactinic glass bottles. The 1 oz container of uranyl acetate is specified sodium free. Packaging and shipping of this chemical must conform to DOT regulations. Under certain conditions of packaging, labeling to indicate radioactive material may be required. See section 173.391 and 173.392 of Title 49, Code of Federal Regulations, and military specification MIL-M-19590 for requirements and exemptions. Each bottle must bear the following precautionary label:

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URANYL ACETATE
WARNING! HARMFUL DUST

Do not take internally.
Do not breathe dust or mist of solutions.
Avoid contact with skin, eyes, or clothing.
Wash thoroughly after handling.

5.256.5 Storage data. Uranyl acetate, ACS should be stored in a cool, dry place protected from light. Keep containers tightly closed. Under these conditions, the shelf life is indefinite.

5.257 Name. URANYL NITRATE, HEXAHYDRATE, ACS $\text{UO}_2(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ FW 502.13
Uranium Nitrate
(HAZARDOUS)

5.257.1 Specifications. See Specifications para 4.10.

5.257.2 Technical description. Uranyl nitrate, hexahydrate, ACS is in the form of deliquescent, yellow, rhombic crystals which have a greenish luster in reflected light. When shaken, rubbed, or crushed, the crystals show triboluminescence (flashes of light) with occasional detonations. The specific gravity is 2.807 (13°C) and the refractive index is 1.4967. It is soluble in all proportions in water and is very soluble in acetic acid, acetone, alcohol, and ether.

5.257.3 Use data. See Use data para 4.9.

5.257.4 Packaging data and labeling. Uranyl nitrate, hexahydrate, ACS is packaged for military use in 1/4 lb unit quantity nonactinic glass bottles. Packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must have a DoT yellow label for oxidizing material unless exempted under section 173.153 of Title 49, Code of Federal Regulations. Under certain conditions of packaging, labeling to indicate radioactive material may be required. See sections 173.391 and 173.392 of Title 49, Code of Federal Regulations, and military specification MIL-M-19590 for requirements and exemptions. Each bottle must bear the following precautionary label:

URANYL NITRATE
WARNING! HARMFUL DUST
STRONG OXIDANT

Keep away from heat, sparks, and open flame.
Store separately from and avoid contact with
combustible materials.
Do not take internally.
Do not breathe dust or mist of solutions.
Avoid contact with skin, eyes, or clothing.
Wash thoroughly after handling.

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5.257.5 Storage data. Uranyl nitrate should be stored in a cool, dry area in tightly sealed containers away from organic or other readily oxidizable substances. Under these storage conditions the shelf life is indefinite.

5.258 Name. UREA, ACS NH_2CONH_2 FW 60.06

5.258.1 Specifications. See Specifications para 4.10.

5.258.2 Technical description. Urea is in the form of white, tetragonal prisms and has a cooling, saline taste and an odor of ammonia. Its specific gravity is 1.32 (18/4°C) and its refractive index is 1.484. The melting point is 132.7°C; upon further heating, it decomposes. Its solubility in water is 119.3 grams per 100 ml at 25°C and in alcohol is 15.8 grams per 100 ml at 20°C; it is soluble in concentrated hydrochloric acid, slightly soluble in ether, and insoluble in chloroform.

5.258.3 Use data. Urea, ACS is intended for use as a general laboratory reagent. The pure grades of urea are used commercially in organic synthesis and as solubilizing agents.

5.258.4 Packaging data and labeling. Urea, ACS is packaged for military use in 1 lb unit quantity nonactinic glass bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.258.5 Storage data. Urea, ACS should be stored in a cool, ventilated area. Containers should be kept tightly closed. Under these storage conditions, the shelf life is indefinite.

5.259 Name. XYLENE, ACS $\text{C}_6\text{H}_4(\text{CH}_3)_2$ FW 106.17
Xylol
Dimethylbenzene
(HAZARDOUS)

5.259.1 Specifications. See Specifications para 4.10.

5.259.2 Technical description. Xylene, ACS is a mobile, clear liquid. Its specific gravity is about 0.86 and it has a boiling range of 137-140°C. It is insoluble in water and miscible with absolute alcohol, and many other organic liquids.

5.259.3 Use data. See Use data para 4.9.

5.259.4 Packaging data and labeling. Xylene, ACS is packaged for military use in 1 pt and 5 pt unit quantity bottles and 350 ml unit quantity cans. When the flash point is determined to be 80°F or lower by the Tag open cup method, packaging and shipping of this chemical must conform to DoT regulations. Shipping containers must then have a DoT red label for flammable liquids unless exempted under section 173.118 of Title 49, Code of Federal Regulations. Individual containers must bear the following precautionary label:

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XYLENE
WARNING! FLAMMABLE

Keep away from heat, sparks, and open flame.
Keep container closed.
Use with adequate ventilation.
Avoid prolonged breathing of vapor.
Avoid prolonged or repeated contact with skin.

When the flash point is determined to be higher than 80°F, the word FLAMMABLE in the label should be changed to COMBUSTIBLE.

5.259.5 Storage data. See ANILINE, 5.23.5.

5.260 Name. ZINC, ACS Zn AW 65.37

5.260.1 Specifications. See Specifications para 4.10.

5.260.2 Technical description. Zinc is a soft, bluish-white, lustrous metal. It is brittle at normal temperatures, but is malleable at 100-150°C. At 210°C, zinc becomes brittle and can be pulverized. Stable in dry air, zinc becomes covered with a white coating of basic carbonate on exposure to moist air. Zinc burns in air with a bluish-green flame and with the evolution of white clouds of zinc oxide. The melting point is 419.47°C and the boiling point is 907°C. It is insoluble in water or alcohol, slowly soluble in acetic acid, and readily soluble in alkali hydroxides. It is soluble in nitric acid. Its specific gravity is 7.14.

5.260.3 Use data. Zinc, ACS is used as a reducing agent in organic chemistry, as a reagent in analytical chemistry in the Marsh and Gutzeit test for arsenic, and as a reducer in the determination of iron.

5.260.4 Packaging data and labeling. Zinc, ACS is packaged for military use in granular form in 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.260.5 Storage data. Zinc should be stored in a cool, dry place away from acute fire hazards, acid fumes, and powerful oxidizing agents. In tightly closed containers, zinc has an indefinite shelf life.

5.261 Name. ZINC CHLORIDE, ACS ZnCl₂ FW 136.28
(HAZARDOUS)

5.261.1 Specifications. See Specifications para 4.10.

5.261.2 Technical description. Zinc chloride is in the form of colorless to white, hygroscopic crystals. The specific gravity of zinc chloride is 2.91 (25/4°C) and its refractive indices are 1.681 and 1.713. Zinc chloride has a melting point of 283°C and a boiling point of 732°C. In water, its solubility is 432 grams per 100 ml at 25°C and 615 grams per 100 ml at 100°C. The solubility in alcohol is 100 grams per 100 ml at 12.5°C; it is very soluble in ether and insoluble in ammonia.

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5.261.3 Use data. Zinc chloride, ACS is used as a dehydrating agent in organic synthesis, as a catalyst for chemical reactions, and in microscopy.

5.261.4 Packaging data and labeling. Zinc chloride, ACS is packaged for military use in granular form in 1/4 lb and 1 lb unit quantity bottles and in stick form in 1/4 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical. Individual containers must have the following precautionary label:

ZINC CHLORIDE
WARNING! MAY CAUSE SEVERE SKIN IRRITATION

Avoid contact with skin or eyes.
In case of contact, flush skin or eyes with plenty
of water for at least 15 minutes; for eyes, get
medical attention.

5.261.5 Storage data. Zinc chloride should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.262 Name, ZINC OXIDE, ACS ZnO FW 81.37

5.262.1 Specifications. See Specifications para 4.10.

5.262.2 Technical description. Zinc oxide, ACS is in the form of white or yellowish-white, amorphous, odorless powder of specific gravity 5.606 and refractive indices 2.008 and 2.029. The melting point is above 1800°C. It is insoluble in water or alcohol and soluble in acids. It absorbs carbon dioxide from the air.

5.262.3 Use data. See Use data para 4.9.

5.262.4 Packaging data and labeling. Zinc oxide, ACS is packaged for military use in powder form in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.262.5 Storage data. Zinc oxide should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

5.263 Name. ZINC SULFATE, HEPTAHYDRATE, ACS $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ FW 287.54

5.263.1 Specifications. See Specifications para 4.10.

5.263.2 Technical description. Zinc sulfate, heptahydrate, ACS is in the form of colorless crystals, white granules, or white powder with a

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strong, astringent taste and no odor. It is efflorescent in dry air and rapidly loses its water of hydration when heated above 100°C. The melting point is 100°C; at 280°C it becomes anhydrous. In water, the solubility is 96.5 grams per 100 ml at 20°C and 663.6 grams per 100 ml at 100°C. It is slightly soluble in glycerol or alcohol. The specific gravity is 3.54 (25/4°C) and the refractive indices are 1.457, 1.480, and 1.484.

5.263.3 Use data. See Use data para 4.9.

5.263.4 Packaging data and labeling. Zinc sulfate, heptahydrate, ACS is packaged for military use in 1/4 lb and 1 lb unit quantity bottles. There are no applicable DoT packaging or shipping regulations for this chemical.

5.263.5 Storage data. Zinc sulfate, heptahydrate should be stored in tightly closed containers in a cool, dry place. Under these storage conditions, the shelf life is indefinite.

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Notice: Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.

Assignee activity: Defense General Supply Center

Custodians:	Army	- MU	Preparing activity: Army - MU
	Navy	- SH	
	Air Force	- 68	

Review activities: Army - ME, MI, MU

User activities: Navy - AS, OS, YD
Marine Corps - MC

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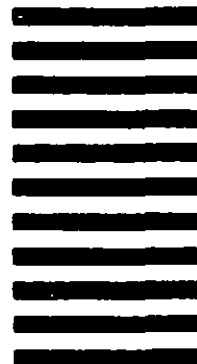
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