MIL STD - 1436

27 March 1970

MILITARY STANDARD

ORGANIC CHEMICAL COMPOUNDS, LIQUID, TECHNICAL GRADE

FSC 6810

DEPARTMENT OF DEFENSE
Washington, D.C. 20301

Organic Chemical Compounds, Liquid, Technical Grade

MIL-STD-1436

1. This Military Standard is mandatory for use by all departments and agencies of the Department of Defense, to assure that selection of new items is limited to essential items, for which no comparable standard item exists. This document is not intended to restrict any service in selecting new items required to support state-of-the-art changes.

2. Recommended corrections, additions, or deletions should be addressed to Commanding Officer, Edgewood Arsenal, ATTN: SMUEA-TSE-SM, Edgewood Arsenal, Maryland 21010.

FOREWORD

This is the first book format generated on Organic Chemical Compounds, Liquid, Technical Grade. This document is mandatory for use by all departments and agencies of the Department of Defense in the selection of items for application. It is intended to prevent the entry of unnecessary items (sizes, types, varieties) into the Department of Defense logistics system. This is not a procurement document. This document is not intended to restrict any service in slecting new items required to support state-of-the-art changes.

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1. SCOPE

1.1 Coverage. This standard is a presentation of nomenclature, symbols, physical and chemical properties and requirements, military use, directions for use, packaging data, labeling, general safety precautions, storage information, and shelf life of all military standard technical grade, liquid, organic chemical compounds. This standard does not necessarily include all classifications of the items represented by the title or those which are commercially available. Many liquid, organic chemical compounds which may seem applicable to this standard are not included because they are either reagent grade or are included under other military standards covering technical grade chemicals; aldehydes, ketones and peroxides; esters and metal organics; organic acids; miscellaneous alcohols and amines; or solid organic compounds. It does contain items preferred for use in the selection of technical grade, liquid organic chemical compounds for application by the Department of Defense. This standard covers the following forty-eight items.

NAME	NO. OF ITEMS
BENZENE, TECHNICAL	4
BROMOCHLOROMETHANE, TECHNICAL	1
CHLORINATED PARAFFIN, TECHNICAL	1
COAL TAR, TECHNICAL	1
CREOSOTE, TECHNICAL (Pressure Treatment)	1
CREOSOTE, TECHNICAL (Brush, Spray, or Open Tank Treatment)	2
ETHYLENDIAMINETETRAACETIC ACID, TETRASODIUM SALT SOLUTION, TECHNICAL	1
n-HEPTANE, TECHNICAL	1
ISOOCTANE REFERENCE FUEL	6
METHYL CYCLOPENTADIENYL MANGANESE TRICARBONYL, TECHNICAL	1
NAPHTHA, ALIPHATIC (Acrylic Plastic Cleaner)	3
NAPHTHA, ALIPHATIC (Rubber Solvent)	1
NAPHTHA, ALIPHATIC (ASTM Precipitation Naphtha)	2
NAPHTHA, AROMATIC	7
NAPHTHA, COMPASS	1
NITROMETHANE, TECHNICAL	1
PETROLEUM ETHER, TECHNICAL	1
PINE TAR, TECHNICAL	1
PYRIDINE, TECHNICAL	1
TOLUENE, TECHNICAL	4
XYLENE, TECHNICAL	7

1.2 Application. Items listed herein accommodate essential requirements of the military and defense agencies and will effect continued economies in all logistics functions where properly employed in new application. This standard supersedes MS35730(CE).

2. REFERENCED DOCUMENTS

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

Federal Specifications

LLL-P430	Pine Tar Technical
O-E-751	Ether, Petroleum; Technical Grade
PPP-C-300	Chemicals, Liquid; Packaging and Packing of
TT-C-645	Creosote, Coal Tar, Technical
TT-C-655	Creosote, Technical, Wood Preservative, (for) Brush, Spray, or Open-Tank Treatment
TT-N-95	Naphtha, Aliphatic
TT-N-97	Naphtha, Aromatic
TT-P-143	Paint, Varnish, Lacquer, and Related Materials; Packaging, Packing and Marking of
TT-T548	Toluene, Technical
TT-X-916	Xylene, (for use in Organic Coatings)
VV-B-231	Benzene, (Benzol), Technical
VV-L-791	Lubricants, Liquid Fuels, and Related Products; Methods of Inspection, Sampling, and Testing
ZZ-T-416	Tire Rebuilding and Tire and Tube Repair Materials

Military Specifications

MIL-B-4394	Bromochloromethane, Technical
MIL-C-429	Chlorinated Paraffin, Technical
MIL-L-5020	Liquid, Compass, Aircraft
MIL-T-15194	Tar, Coal

Military Standards

MIL-STD-12	Abbreviations for use on Drawings, Specifications, Standards and in Technical Documents
MIL-STD-290	Packaging, Packing, and Marking of Petroleum and Related Products

Professional Associations Standards

Part 7 & 20	American Society for Testing Materials Standards

Rules and Regulations

Title 49 - Code of Federal Regulations, Department of Transportation, Parts 171-190

3. GLOSSARY

3.1 Definitions

Aniline point - The minimum equilibrium solution temperature for equal volumes of aniline and solvent.

API Gravity - A measurement of gravity of petroleum and petroleum products defined by the following equation

$$\text{API Gravity, degrees} = \frac{141.5}{\text{specific gravity } 60/60^\circ\text{F}} - 131.5$$

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).

Bromine number - The number of grams of bromine consumed by 100 grams of sample when reacted under given conditions.

Chelate - The type of coordination compound in which a central atom (most frequently a metal) is joined to two or more atoms, ions, or molecules (called ligands) so that one or more heterocyclic rings are formed with the central (metal) atom as part of each ring. Usually both ordinary and coordinate bonds are involved in joining the central (metal) atom to the adjoining atoms in the ring, but these bonds may be entirely of one or the other type.

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

Doctor Test - A test with a doctor solution for detecting the presence of undesirable sulfur compounds in petroleum distillates.

Explosive limits - When combustible vapor is mixed with air in the proper proportions, ignition will produce an explosion. This proper proportion is called the explosive range. The expolosive range includes all concentrations of a mixture of flammable vapor or gas in air, in which a flash will occur or a flame will travel if the mixture is ignited. The lowest percentage at which this occurs is the lower explosive limit; and the highest percentage, the upper explosive limit. Explosive limits are expressed in percent by volume of vapor in air and, unless otherwise specified, under normal conditions of termperature and pressure.

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, it is computed according to international atomic weight values of 1961.

Hazardous substance - Any substance or mixture of substances which is (1) toxic; (2) corrosive; (3) an irritant; (4) a strong sensitizer; (5) flammable, or which (6) 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.

Kauri-butanol value - A measure of the solvent power of a petroleum thinner for paints and varnishes that is determined as the number of milliliters of the thinner just causing turbidity in a standard solution of hard kauri resin in normal butyl alcohol.

Melting point - The temperature at which solid and liquid forms of a substance are in equilibrium, and transition from the solid to the liquid occurs.

pH - A means of expressing the degree of acidity or basicity of an aqueous solution. It is defined as the logarithum 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 or basic); a pH below 7.0 indicates an acidic solution, while a pH above 7.0 indicates a basic solution.

Refractive index - A constant characteristic of a substance which represents the ratio of the velocity of light in a vacuum to that in the substance. It varies with the wave length of the incident light, temperature, and pressure. The usual light source is the D line of sodium at 20°C. Unless otherwise indicated in this standard the refractive index is understood to be (n 20/D).

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 solute in grams dissolved in 100 ml of the specified solvent.

Specific gravity - The ratio of the mass of a body to the mass of an equal volume of water at 4°C or other specified temperature. In this standard, the first temperature indicates the temperature of the substance and the second indicates the temperature of the water to which it is referred. If there is no mention the temperature, (20/4°C) is understood.

Technical grade - Denotes a quality of chemicals which are generally used for industrial, solvents, and manufacturing applications. Generally, specific processes are not employed by the manufacturer to limit all the impurities, aside from the normal precautions which are taken in the manufacturing process. A technical chemical may be specially processed to reduce specific impurities so as to suit the chemical to a given industrial application. In such cases, the identification of the items must be further expanded to indicate the specific impurities limitation.

Turbidity - Cloudy nature of a liquid, not clear or translucent.

Vapor density - The ratio of the density of a vapor to the density of air at the same temperature and pressure.

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 of the temperature.

Viscosity - The internal resistance offered by a fluid (liquid or gas) to flow. Viscosity is a characteristic property and is a measure of the combined effects of adhesion and cohesion.

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

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

ASTM - American Society for Resting and Materials

C - Celsius (Centigrade)

DoT - Department of Transportation

F - Fahrenheit

FW - Formula Weight

gal - gallon

g - gram

max - maximum

mg - milligram

MIL-STD - Military Standard

min - minimum

ml - milliliter

mm - millimeter

No. - number

pH - Hydrogen ion concentration

pt - pint

qt - quart

wt - weight

4. GENERAL REQUIREMENTS

4.1 Chemical and physical requirements. When military or federal specifications establish requirements for degrees of purity of the chemicals listed herein, those chemical and physical properties affected are tablulated as requirements. These requirements are subject to change as specifications are revised. When no specific limitations are imposed or no specification exists, the chemical and physcial properties are tabulated as constants or typical properties.

4.2 Nomenclature. All chemicals in this standard conform to the military definition of technical grade as set forth under section 3.1. 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 organic chemicals included in this standard shall be packaged in accordance with Federal Specification PPP-C-300 and with all applicable documents mentioned in this document. The precautionary labeling prescribed in this standard 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 prescribed by this standard is not required in addition thereto.

4.4 Safety. All hazardous chemicals in this standard are indicated as such immediately beneath item names. General safety and hygienic measures

should be exercised in the use of all chemicals. For more specific information on hazardous chemicals, the appropriate safety or medical authorities should be consulted in order to determine personal protective measures and environmental controls.

4.5 Shelf life. Factors such as moisture, temperature, type and condition of container, and exposure to sunligth and the atmosphere cause variations in shelf life. Ideal storage conditions are outlined for each item. The term "cool" denotes temperatures from freezing up to 110°F but not consistently over 100°F 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 example, storing on pallets away from walls in an enclosure or building). Periodic examinations of the material should be made more frequently when storage conditions vary from the ideal. For applications where quality may be critical, each compound should be analyzed prior to use. Shelf life is dated from the date of manufacture. Unless otherwise specified, it is preferable that not more than one year shall have elapsed from date of manufacture to date of purchase.

4.6 Solubility data. Solubility data is given for only the most common solvents.

4.7 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).

4.8 Substitutability and interchangeability. None of the chemicals in this standard are completely interchangeable with other chemicals in any given circumstance. One chemical may provide the same end result as another, but procedures, techniques, and other factors would have to be altered to do so. Time, economy, and the discretion of the user would govern such circumstances.

5. DETAIL REQUIREMENTS

5.1 Name. BENZENE, TECHNICAL C_6H_6 FW 78.11
Benzol
(HAZARDOUS)

5.1.1 Specifications. Federal Specification VV-B-231, Benzene (Benzol), Technical.

5.1.2 Technical description. Benzene is a clear, colorless, flammable liquid with a charactertistic odor. It burns with a very smoky flame. It has a boiling point of 80.1°C, a specific gravity of 0.8790, a refractive index of 1.50110, a melting point of 5.5°C, and a flash point (closed cup) of 12°F. It is slightly soluble in water, and miscible with alcohol, ether acetone, and carbon tetrachloride. It forms an explosive mixture with air within limits of 1.5 to 8% by volume. Benzene is derived from the catalytic reforming streams obtained in the refining of petroleum,

and from the fractional distillation of coal tar after dehydration. This standard covers two grades of benzene, industrial grade benzene and industrial 90 benzene. Benzene, technical shall have a color not darker than a solution of 0.0030 g of potassium dichromate ($K_2Cr_2O_7$) in a liter of distilled water, and it shall show no evidence of acidity or hydrogen sulfide. The copper test strip shall show no iridescence, gray or black deposit, or discoloration when in contact with the benzene.

TABLE I Requirements for benzene, technical

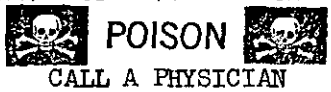
Property	Requirements	
	Industrial	Industrial 90
Color of acid wash (max)	3	6
Specific gravity (15.56°C/15.56°C)	0.875-0.886	0.870-0.886
Distillation data: (760 mm pressure)		
Dry point (max)	-	120°C
First drop (min)	-	78°C
Range, including 80.1°C	2°C	-
Recovery at 100°C (min)	-	90%

5.1.3 Use data. Benzene, technical is intended for military use as an organic solvent and a chemical raw material. Industrial grade benzene should be used where a high purity is a requirement. Benzene covered by this standard is not to be used in the manufacture of high explosives.

5.1.4 Packaging data and labeling. Benzene, technical (industrial grade) is packaged for military use in 1 qt, 1 gal and 5 gal unit quantity cans. Benzene technical (industrial 90) is packaged for military use in 55 gal unit quantity drums. Shipping containers must bear the DoT red label for flammable liquids. Benzene, technical packaged in 1 qt may be exempt for this requirement under the provisions of section 173.118, Title 49, Code of Federal Regulations. In addition to the above, each individual container must bear the following precautionary label:

BENZENE (BENZOL)
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.



CALL A PHYSICIAN
FIRST AID IF SWALLOWED: DO NOT MAKE PATIENT VOMIT - NOTE TO PHYSICIAN: DO NOT GIVE ADRENALIN

5.1.5 Storage data. Benzene, technical should be planinly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers. It should be stored away from sources of heat and combustible materials. Under these stroage conditions, the shelf life is indefinite, however, containers should be inspected periodically for deterioration.

5.2 Name. BROMOCHLOROMETHANE, TECHNICAL $BrCH_2Cl$ FW 129.39
Methylene Chlorobromide
(HAZARDOUS)

5.2.1 Specifications. MIL-B-4394, Bromochloromethane, Technical

5.2.2 Technical description. Bromochloromethane is a clear, colorless, volatile, nonflammable liquid with a chloroform-like odor. It has a boiling point of 67°C, a melting point of -86.5°C, and a refractive index of 1.48. It is insoluble in water but soluble in organic solvents. When tested in accordance with the precedures prescribed in referenced specification, bromochloromethane, technical shall be technically pure (98%) with a suitable added corrosion inhibiting agent of not more than 1% by weight. It shall contain no free halogens. In addition to the above, bromochloromethane, technical shall conform to the requirements shown in Table II.

TABLE II Requirements for bromochloromethane, technical

Property	Requirements
Specific gravity, 25°C	1.910-1.940
Suspended matter or sediment	none
Boiling range, including 67.8°C (760 mm pressure)	
(5-95% $BrCH_2Cl$ distilled)	3°C
Nonvolatile residue (max)	0.004g/100ml
Water content (max)	0.04
Corrosion, acidity	To pass test

5.2.3 Use data. Bromochloromethane, technical is intended for military use as a fire extinguisher fluid.

5.2.4 Packaging data and labeling. Bromochloromethane, technical is packaged for military use in 5 gal (80 lb) unit quantity cans. There are no applicable DoT packaging or shipping regulations for this compound, however, each individual container must bear the following precautionary label:

BROMOCHLOROMETHANE
WARNING! VAPOR HARMFUL

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

5.2.5 Storage data. Bromochloromethane, technical should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers. Under these storage conditions, the shelf life is indefinite, however, containers should be inspected periodically for deterioration.

5.3 Name. CHLORINATED PARAFFIN, TECHNICAL

5.3.1 Specifications. MIL-C-429, Chlorinated Paraffin, Technical

5.3.2 Technical description. Chlorinated paraffin is a light yellow to light amber liquid of indefinite composition. A typical average formula is $C_{24}H_{43.1}Cl_{6.9}$. It is produced by chlorinating a paraffin oil. Chlorinated paraffin, technical shall be type 1 of referenced specification and conform to the requirements shown in Table III when tested in accordance with the procedures prescribed in referenced specification.

TABLE III Requirements for chlorinated paraffin, technical

Property	Requirements
Iron (max)	0.01%
Color	Not darker than Union Colorimeter No. 5
Hydorchloric acid (max)	1.0mg/20ml
Total chlorine	41.0-43.0%
Water content (max)	0.1%
Free chlorine	To pass test

5.3.3 Use data. Chlorinated paraffin, technical is intended for military use, along with other materials, in the impregnation of clothing for protection against vesicant type chemical agents.

5.3.4 Packaging data and labeling. Chlorinated paraffin, technical is packaged for military use in 55 gal unit quantity metal drums. There are no applicable DoT packaging or shipping regulations for this compound.

5.3.5 Storage data. Chlorinated paraffin, technical should be plainly labeled and stored in a cool, dry area in tightly sealed containers. Under these storage conditions the shelf life is indefinite, however surveillance tests should be performed periodically to insure that the material meets the requirements for intended use.

5.4 Name. COAL TAR, TECHNICAL
(HAZARDOUS)

5.4.1 Specifications. MIL-T-15194, Coal Tar, Technical

5.4.2 Technical description. Coal tar in a black viscous liquid, denser than water, with a sharp naphthalene-like odor and a sharp burning taste. It is obtained in the destructive distillation of coal. It is soluble in ether, benzene, carbon disulfide, and chloroform and slightly soluble in water. Coal tar, technical shall be a liquid dehydrated coal tar and shall be miscible, in practically any proportion, with solvent naphtha, or benzol. In addition, it shall conform to the requirements shown in Table IV when tested in accordane with the procedures prescribed in referenced specification.

TABLE IV Requirements for coal tar, technical

Property	Requirements
Specific gravity (25/25°C)	1.14-1.24
Water content (max)	1%
Carbon content (free carbon) (max)	15%
Ash or inorganic matter content (max)	0.5%
Viscosity at 50°C (Engler)	15-35

5.4.3 Use data. Coal tar, technical is intended for military use as an ingedient for shipbottom paint.

5.4.4 Packaging data and labeling. Coal tar, technical is packaged for military use in 5 gal unit quantity drums. When it has been determined that the flash point of the coal tar is at 80°F or lower, determined by the tag open cup method, shipping containers must bear the DoT red label for flammable liquids. Each individual container should bear the following label: COAL TAR CAUTION! VAPOR HARMFUL Avoid prolonged breathing of vapor.

5.4.5 Storage data. Coal tar, technical should be plainly labeled and stored in a cool, dry area in tightly sealed containers. It should be stored away from sources of heat and oxidizing materials. Containers should be inspected periodically for deterioration.

5.5 Name. CREOSOTE, TECHNICAL (Pressure Treatment) (HAZARDOUS)

5.5.1 Specifications. Federal Specification TT-C-645, Creosote, Coal Tar, Technical.

5.5.2 Technical description. Creosote is a yellowish to dark, green-brown, oily liquid with a characteristic odor. It is normally clear at 38°C or higher. It is derived from the fractional distillation of coal tar produced by the carbonization of bituminous coal. It frequently contains substantial amounts of naphthalene and anthracene. It has a flash point of 120-180°F. It is soluble in alcohol, benzene, and toluene, and immiscible with water. Creosote, technical shall conform to the

requirements of Table V when tested in accordance with the procedures prescribed in referenced specification

TABLE V Requirements for creosote, technical

Property	Requirements	
	Maximum	Minimum
Water, % by volume	3.0	-
Specific gravity (38°/15.5°C)	-	1.050
Insoluble in benzol, % by weight	0.5	-
Coke residue, % by weight	2.0	-
Distillation: The distillate percent by weight on the water free basis shall be within the following limits:		
Up to 210°C	5	-
Up to 235°C	25	5
Up to 270°C	-	20
Up to 355°C	85	60
Specific gravity of fractions:		
Fraction 235° to 315°C (38°/15.5°C)	-	1.025
Fraction 315° to 355°C (38°/15.5°C)	-	1.085

5.5.3 Use data. Creosote, technical is intended for military use for the pressure treatment of ties, lumber, structural timers, land piles, and posts, or for bath treating poles.

5.5.4 Packaging data and labeling. Creosote, technical is packaged for military use in 5 gal unit quantity pails. There are no applicable DoT packaging or shipping regulations for this compound; however, individual containers must bear the following precautionary label:

CREOSOTE
CAUTION! MAY CAUSE SKIN IRRITATION

Avoid prolonged or repeated contact with skin.
Avoid porlonged breathing of vapor.
Use only with adequate ventilation.

5.5.5 Storage data. Creosote, technical should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers. Under these storage conditions, the shelf life is indefinite. Containers should be inspected periodically for deterioration.

5.6 Name. CREOSOTE, TECHNICAL (Brush, Spray, or Open-Tank Treatment) (HAZARDOUS)

5.6.1 Specifications. Federal Specification TT-C-655, Creosote, Technical, Wood Preservative (For) Brush, Spray, or Open-Tank Treatment.

5.6.2 Technical description. See Creosote, paragraph 5.5.2. Creosote, technical shall be a distillate derived entirely from tar produced by the carbonization of bituminous coal. It shall be fluid and crystal free at 5°C when tested as prescribed by referenced specification. In addition it shall conform to the requirements shown in Table VI.

TABLE VI Requirements for creosote, technical

Property	Requirements	
	Maximum	Minimum
Water, % by volume	1.0	-
Insoluble in benzol, % by weight	0.5	-
Coke residual, % by weight	2.0	-
Specific gravity (38°C/15.5°C)	-	1.06
Distillation: The distillate % by weight on a water free basis shall be within the following limits:		
Up to 210°C	1.0	-
Up to 235°C	10.0	-
Up to 355°C	-	65.0
Specific gravity of fractions:		
235°-315°C (38°/15.5°C)	-	1.025
315°-355°C (38°/15.5°C)	-	1.085

5.6.3 Use data. Creosote, technical is intended for military use as a preservative in brush, spray, or open-tant treatment of lumber where pressure treatments are not practical.

5.6.4 Packaging data and labeling. Creosote, technical is packaged for military use in 1 gal unit quantity cans and 55 gal unit quantity drums. There are no applicable DoT packaging or shipping regulations for this compound; however, individual containers must bear the following precautionary label:

CREOSOTE
CAUTION! MAY CAUSE SKIN IRRITATION

Avoid prolonged or repeated contact with skin.
Avoid prolonged breathing of vapor.
Use only with adequate ventilation.

5.6.5 Storage data. Creosote, technical should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers. Under these storage conditions, the shelf life is indefinite. Containers should be inspected periodically for deterioration.

5.7 Name. ETHYLENEDIAMINETETRAACETIC ACID
TETRASODIUM SALT SOLUTION, TECHNICAL
EDTA Tetrasodium Salt

5.7.1 Specifications. None.

5.7.2 Technical description. Ethylenediaminetetraacetic acid tetrasodium salt solution, is a light, straw colored liquid which reacts with most metallic ions to form soluble nonionic metal chelate compounds. It has a specific gravity of 1.29 to 1.32 at 25°/25°C, and one g chelates 100 mg calcium carbonate at pH 11.0.

5.7.3 Use data. Ethylenediaminetetraacetic acid tetrasodium salt solution, technical is intended for military use as a metal chelating agent, water softener, and scale remover and preventative.

5.7.4 Packaging data and labeling. Ethylenediaminetetraacetic acid tetrasodium salt solution, technical is packaged for military use in 1 gal unit quantity cans. There are no applicable DoT packaging or shipping regulations for this compound.

5.7.5 Storage data. Ethylenediaminetetraacetic acid tetrasodium salt solution, technical should be plainly labeled and stored in a cool, dry area in tightly sealed containers. Under these storage conditions, the shelf life is indefinite. Containers should be inspected periodically for deterioration.

5.8 Name. n-HEPTANE, TECHNICAL $CH_3(CH_2)_5CH_3$ FW 100.20
Dipropylmethane
Heptyl Hydride
(HAZARDOUS)

5.8.1 Specifications. None.

5.8.2 Technical description. n-Heptane is a volatile, colorless, highly flammable liquid. It is derived from the fractional distillation of petroleum and purified by rectification. It is soluble in alcohol, ether, and chloroform and insoluble in water. Typical properties of n-ehptane are shown in Table VII.

TABLE VII Typical porperties of n-heptane, technical

Freezing point	-90.6°C
Boiling point	98.4°C
Refractive index	1.38764
Flash point (closed cup)	30°F
Specific gravity	0.6837

5.8.3 Use data. n-Heptane, technical is intended for military use as a standard in testing knock characteristics of gasoline for internal combustion engines.

5.8.4 Packaging data and labeling. n-Heptane, technical is packaged for military use in 55 gal unit quantity drums. Each drum must bear the DoT red label for flammable liquids. In addition each container must bear the following precautionary label:

n-HEPTANE
WARNING! FLAMMABLE LIQUID
VAPOR HARMFUL

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

5.8.5 Storage data. n-Heptane, technical should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers. It should be stored away from sources of heat and combustible materials. Under these storage conditions the shelf life is indefinite, however, containers should be inspected periodically for deterioration.

5.9 Name. ISOOCTANE REFERENCE FUEL C_8H_{18} FW 114.23
2,2,4-Trimethylpentane
2-Methylheptane
Isobutyltrimethyl-methane
(HAZARDOUS)

5.9.1 Specifications. None.

5.9.2 Technical description. Isooctane reference fuel is a highly flammable, mobile and colorless liquid produced by the refining of petroleum. It has an odor of gasoline and it is insoluble in water. It is miscible with absolute alcohol, benzene, toluene, xylene, chloroform, ether, carbon disulfide, carbon tetrachloride, dimethyl formamide and oils, except castor oil. Isooctane reference fuels as covered by this standard include the standard reference fuel as defined by the American Society for Testing and Materials specifications for 100 octane number. In addition, this standard covers isooctane reference fuel with 1.25, 2, 3, 4, and 6 ml of tetraethyl lead added per gal of isooctane. Typical properties of isooctane reference fuel are shown in Table VIII.

TABLE VIII Typical properties of isooctane reference fuel

Boiling point	99.2°C
Flash point	40°F
Freezing point	-107.4°C
Refractive index	1.3915
Specific gravity	0.6919
Vapor pressure (21°C)	40.6mm

5.9.3 Use data. Isooctane reference fuel is intended for military use in determining the knock characteristics in terms of motor octane numbers and performance number of fuels for use in gasoline engines.

5.9.4 Packaging data and labeling. Isooctane reference fuels are packaged for military use in 55 gal unit quantity drums. Each container shall bear the DoT red label for flammable liquids as well as the following precautionary label:

ISOOCTANE
WARNING! FLAMMABLE LIQUID
VAPOR HARMFUL

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

5.9.5 Storage data. Isooctane reference fuel should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers. It should be stored away from sources of heat and combustible materials. Udner these storage conditions, the shelf life is indefinite, however, containers should be inspected periodically for deterioration.

5.10 Name. METHYL CYCLOPENTADIENYL MANGANESE TRICARBONYL, TECHNICAL $CH_3C_5H_4Mn(CO)_3$ FW 218.09
Smoke Suppressant Additive
(HAZARDOUS)

5.10.1 Specifications. None.

5.10.2 Technical description. Methyl cyclopentadienyl manganese tricarbonyl is a liquid organic manganese compound, dark orange in color and derived from methyl cyclopentadiene with manganese carbonyl. It has a faint, pleasant, herbaceous odor and is sensitive to light, decomposing upon exposure. This material has a minimum manganese percentage by weight of 24.7; a density of 1.38 (20°C, g/ml); viscosity at 20°C of 5.0 centipoises; a flash point above 230°F (open cup) and a freezing point of minus 2°C. It is completely soluble in hydrocarbons and it is miscible in distillate fuels.

5.10.3 Use data. Methyl cyclopentadienyl manganese tricarbonyl technical is intended for military use as an additive to distillate and residual fuels in improving combustion, reducing carbon and soot in flue gases, improving furnace efficiency and reducing fire box residue.

5.10.4 Packaging data and labeling. Methyl cyclopentadienyl manganese tricarbonyl, technical is packaged for military use in 10 gal unit quantity drums. Each container must bear the DoT poison label for Class B poisons in addition to the following precautionary label:

METHYL CYCLOPENTADIENYL MANGANESE TRICARBONYL
WARNING! HAZARDOUS LIQUID
VAPOR HARMFUL

Do not get in eyes, on skin, on clothing.
Avoid breathing vapor.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.

5.10.5 Storage data. Methyl cyclopentadienyl manganese tricarbonyl, technical should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers. It should be stored away from sources of heat and combustible materials, and protected from light. Under these storage conditions, the shelf life is indefinite. Containers should be inspected periodically for deterioration.

5.11 Name. NAPHTHA, ALIPHATIC (Acrylic plastic cleaner)
Petroleum Naphtha
(HAZARDOUS)

5.11.1 Specifications. Federal Specification TT-N-95, Naphtha, Aliphatic.

5.11.2 Technical description. Naphtha, aliphatic or petroleum naphtha is a generic term applied to refined, partly refined, or unrefined petroleum products and liquid products of natural gas, not less than 10% of which distills below 347°F (175°C) and not less than 95% of which distills below 464°F (240°C) when subjected to distillation in accordance with ASTM Method D86, Test for Distillation of Petroleum Products. This standard covers three performance characteristics. Naphtha, aliphatic (acrylic plastic cleaner) shall conform to the requirements shown in Table IX when tested in accordance with the procedures prescribed in referenced specification.

TABLE IX Requirements for naphtha, aliphatic (acrylic plastic cleaner)

Property	Requirements
Appearance	Clear; free from suspended matter and undissolved water
Color, Saybolt (max)	25
Copper corrosion	No blacking or corroding of clean metallic copper
Distillation data (760 mm pressure)	
Initial boiling point (min)	85°C
10% fraction, by volume (max)	102°C
50% fraction, by volume (max)	107°C
90% fraction, by volume (max)	121°C
End point (max)	143°C
Acidity	No free mineral acid
Doctor test	Negative
Spot test	Negative
Specific gravity (20°/20°C)	0.708-0.768
API gravity at 15.56°/15.56°C (degrees)	51.8-67.2
Nonvolatile matter, g per 100 ml (max)	0.005
Kauri-butanol value	30-45

5.11.3 Use data. Naphtha, aliphatic is intended for military use in cleaning acrylic plastics. It may also be used in the manufacture of organic coatings.

5.11.4 Packaging data and labeling. Naphtha, Aliphatic (acrylic plastic cleaner) is packaged for military use in 1 gal and 5 gal unit quantity cans and in 55 gal unit quantity drums. Shipping containers must bear the DoT red label for flammable liquids. In addition, each individual container must bear the following precautionary label:

NAPHTHA
WARNING! FLAMMABLE LIQUID
VAPOR MAY BE HARMFUL

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

5.11.5 Storage data. Naphtha, aliphatic (acrylic plastic cleaner) should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers. It should be stored away from sources of heat and combustible materials. Under these storage conditions, the shelf life is indefinite. Containers should be inspected periodically for deterioration.

5.12 Name. NAPHTHA, ALIPHATIC (Rubber Solvent)
Petroleum Naphtha
(HAZARDOUS)

5.12.1 Specifications. Federal Specification ZZ-T-416, Tire Rebuilding and Tire and Tube Repair Materials.

5.12.2 Technical description. The technical description in paragraph 5.11.2 applies. Naphtha, aliphatic (rubber solvent) shall consist entirely of petroleum distillate and shall be water clear in color. It shall be free of foreign substances, acid, water, and anti-knock materials and shall show no evidence of any oily residue. When tested in accordance with Part 7 of Amercian Society for Testing and Materials Designations - ASTM D86 and ASTM 1093, it shall have an initial boiling point range of 100°-140°F (37.78°-60°C) and an end point range of 250°-300°F (121.11°-148.89°C).

5.12.3 Use data. Naphtha, aliphatic (rubber solvent) is intended for military use as a thinner for rubber cement and for the preparation of tire paint in rebuilding tires used on aircraft or ground vehicles.

5.12.4 Packaging data and labeling. Naphtha, aliphatic (rubber solvent) is packaged for military use in 55 gal unit quantity drums. Containers must bear the DoT red label for flammable liquids. In addition, each container must bear the following precautionary label:

NAPHTHA
WARNING! FLAMMABLE LIQUID
VAPOR MAY BE HARMFUL

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

5.12.5 Storage data. Naphtha, aliphatic (rubber solvent) should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers away from sources of heat and combustible materials. Under these storage conditions, the shelf life is indefinite. Containers should be inspected periodically for deterioration.

5.13 Name. NAPHTHA, ALIPHATIC (ASTM Precipitation Naphtha)
Petroleum Naphtha
(HAZARDOUS)

5.13.1 Specifications. None.

5.13.2 Technical description. The technical description in paragraph 5.11.2 applies. Naphtha, aliphatic (ASTM precipitation naphtha) shall conform to the requirements shown in Table X when tested in accordance with test methods prescribed by Part 7 of Amercian Society for Testing and Materials Designations - ASTM D86, ASTM D287 and ASTM D611.

TABLE X Requirements for naphtha, aliphatic
(ASTM precipitation naphtha)

Property	Requirements
Gravity, deg API at 60°F	70-73
Aniline point	58°-60°C
Initial boiling point (min)	50°C
50% point	70°-80°C
End point (max)	130°C

5.13.3 Use data. Naphtha, aliphatic (ASTM precipitation naphtha) is intended for military use in the determination of the precipitation number of lubricating oils.

5.13.4 Packaging data and labeling. Naphtha, aliphatic (ASTM precipitation naphtha) is packaged for military use in 1 gal and 5 gal unit quantity cans. Outside shipping containers must bear the DoT red label for flammable liquids. In addition, each individual container must bear the following precautionary label:

NAPHTHA
WARNING! FLAMMABLE LIQUID
VAPOR MAY BE HARMFUL

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

5.13.5 Storage data. Naphtha, aliphatic (ASTM precipitation naphtha) should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers away from sources of heat and combustible materials. Under these storage conditions, the shelf life is indefinite.

5.14 Name. NAPHTHA, AROMATIC
(HAZARDOUS)

5.14.1 Specifications. Federal Specification TT-N-97, Naphtha, Aromatic.

5.14.2 Technical description. This standard encompasses three functional types of aromatic naphthas. These are thw low boiling range, intermediate boiling range, and the high boiling range. Naphtha, aromatic shall consist completely of hydrocarbons. It shall be clear and free from separated water, sediment and suspended matter when examined by transmitted light. It shall possess a sweet, slightly aromatic odor after 24 hours of air dry at room temperature from filter paper. Not more than 0.03 mg of potassium hydroxide shall be required to neutralize the acidity of 1 g of the naphtha. After distillation the naphtha shall contain no free mineral acid. In addition to the above, naphtha, aromatic shall conform to the requirements shown in Table XI when tested in accordance with procedures prescribed in referenced specification.

TABLE XI Requirements for naphtha, aromatic

Property	Requirements		
	Low boiling range (88°-140°C)	Intermediate boiling range (129°-191°C)	High boiling range (171°-218°C)
Specific gravity at 20°/20°C	0.810-0.871	0.825-0.875	0.855-0.890
Flash point (min)	-	80°F	122°F
Distillation data (760 mm pressure)			
Initial boiling point (min)	88°C	129°C	171°C
50 percent (by volume)	100°-116°C	143°-168°C	182°-200°C
End point (max)	140°C	191°C	218°C
Mixed aniline point (max)	27°C	28°C	34°C
Nonvolatile matter from 100 ml (g) (max)	0.2	0.2	0.2
Color, Saybolt, chromometer (min)	25	21	18
Copper corrosion	to pass test	to pass test	to pass test
Stability	to pass test	to pass test	to pass test

5.14.3 Use data. Naphtha, aromatic is intended for military use in the manufacture of organic protective coatings and for cleaning.

5.14.4 Packaging data and labeling. Naphtha, aromatic (low boiling range) is packaged for military use in 1 pt, 1 gal and 5 gal unit quantity cans, and in 55 gal unit quantity drums. Naphtha, aromatic (intermediate boiling range) is packaged for military use in 1 gal unit quantity cans and in 55 gal unit quantity drums. Naphtha, aromatic (high boiling range) is packaged

for military use in 55 gal unit quantity drums. Outside shipping containers of the low and intermediate boiling range naphthas must bear the DoT red label for flammable liquids. In addition, individual containers must bear the following precautionary label:

NAPHTHA
WARNING! FLAMMABLE LIQUID
VAPOR MAY BE HARMFUL

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

The high boiling range naphtha must bear the same precautionary label except that the words WARNING! FLAMMABLE LIQUID should be changed to CAUTION! COMBUSTIBLE LIQUID.

5.14.5 Storage data. Naphtha, aromatic should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers away from sources of heat and combustible materials. Under these storage conditions, the shelf life is indefinite. Containers should be inspected periodically for deterioration.

5.15 Name. NAPHTHA, COMPASS
(HAZARDOUS)

5.15.1 Specifications. MIL-L-5020, Liquid, Compass, Aircraft.

5.15.2 Technical description. Naphtha, compass is a refined liquid fraction of crude petroleum. It shall be free from moisture, acidity, glue, suspended matter, and other impurities. It shall be non-corrosive to a copper test strip showing no corrosion or pitting thereon when subjected to performance tests prescribed by the referenced specification. The fluorescence shall not exceed 1.0 microlambert and it shall not gel, crystallize, or solidify after being maintained at a temperature not exceeding -53.9°C for a period of 30 minutes. In addition, naphtha, compass shall conform to the requirements as shown in Table XII.

TABLE XII Requirements for naphtha, compass

Property	Requirements
Flash point (min)	90°F
Distillation end point (max)	260°C
Reaction after oxidation	Neutral
Color, Saybolt (min)	
Original	+25
After light stability test	+21
After oxygen stability test	+21
Kinematic viscosity, centistokes	
at 37.8°C	0.90-1.15
at 0°C	Not more than 2.0 times that at 37.8°C
Aromatics, percent volume (max)	10.0

5.15.3 Use data. Naphtha, compass is intended for military use in aircraft magnetic compasses.

5.15.4 Packaging data and labeling. Naphtha, compass is packaged for military use in 1 qt unit quantity cans. There are no applicable DoT packaging or shipping regulations for this material. Each container must bear the following precautionary label:

NAPHTHA, COMPASS
CAUTION! COMBUSTIBLE LIQUID

Keep away from heat, sparks, and open flame.
Keep container closed.
Use with adequate ventilation.

5.15.5 Storage data. Naphtha, compass should be plainly labeled and stored in a cool, dry area in tightly sealed containers. Under these storage conditions, the shelf life is indefinite.

5.16 Name. NITROMETHANE, TECHNICAL (HAZARDOUS) CH_3NO_2 FW 61.04

5.16.1 Specifications. None.

5.16.2 Technical description. Nitromethane, technical is a poisonous oily liquid derived by the reaction of methane or propane with nitric acid under pressure. The material covered by this standard shall have a specific gravity of 1.139 at 20°/20°C and an initial boiling point of 101°C at 760 mm pressure. It is slightly soluble in water and soluble in alcohol, ether and dimethyl formamide. Water solutions are acid to litmus.

TABLE XIII Typical properties of nitromethane, technical

Vapor pressure at 20°C	27.8 mm
Flash point, (open cup)	112°F
(closed cup)	95°F
Melting point	-29°C
Refractive index	1.3817
Wt/gal (20°C)	9.5 lb

5.16.3 Use data. Nitromethane, technical is intended for military use as a solvent, a gasoline additive, and in rocket fuel.

5.16.4 Packaging data and labeling. Nitromethane, technical is packaged for military use in 55 gal unit quantity drums. There are no applicable DoT packaging or shipping regulations for this material, however containers must bear the following precautionary label:

NITROMETHANE
WARNING! COMBUSTIBLE LIQUID
VAPOR HARMFUL
MAY EXPLODE ON IMPACT

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

5.16.5 Storage data. Nitromethane, technical should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers away from heat and combustible materials. Under these storage conditions, the shelf life is indefinite. Containers should be inspected periodically for deterioration.

5.17 Name. PETROLEUM ETHER, TECHNICAL
Ligroin
Petroleum Benzin
(HAZARDOUS)

5.17.1 Specifications. Federal Specification O-E-751, Ether, Petroleum; Technical Grade.

5.17.2 Technical description. Petroleum ether, technical is a low boiling fraction of petroleum consisting chiefly of hydrocarbons of the methane series, principally pentanes and hexanes. It is a volatile, non-fluorescent, highly flammable liquid, whose vapors, mixed with air, explode if ignited. It is insoluble in water and miscible with absolute alcohol, benzene, chloroform, carbon disulfide and carbon tetrachloride.

Petroleum ether, technical, as covered by this standard, shall be a clear liquid, free from suspended matter and sediment. Its odor as received and during evaporation shall not be disagreeable or sulfuretted and there shall be no residual odor after evaporation. Its color shall not be darker than No. 28 Saybolt. In addition, petroleum ether, technical shall conform to the requirements shown in Table XIV when tested in accordance with the procedures prescribed in referenced specification.

TABLE XIV Requirements for petroleum ether, technical

Property	Requirements
Nonvolatile matter, wt per 100 ml (max)	0.0010 g
Distillation data:	
Initial boiling point (min)	35°C
End point, dry flask (max)	65°C
Specific gravity	0.6360-0.6476
Bromine number per 100 g (max)	0.35 g
Aromatics (max)	3.0%
Spot test	to pass test
Acidity	to pass test

5.17.3 Use data. Petroleum ether, technical is intended for military use as a solvent. It is not intended for medical use.

5.17.4 Packaging data and labeling. Petroleum ether, technical is packaged for military use in 1 gal unit quantity cans. Shipping containers must bear the DoT red label for flammable liquids. In addition, each individual container must bear the following precautionary label:

PETROLEUM ETHER
WARNING! EXTREMELY FLAMMABLE
VAPOR HARMFUL

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

5.17.5 Storage data. Petroleum ether, technical should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers away from sources of heat and combustible materials. Under these storage conditions, the shelf life is indefinite. Containers should be inspected periodically for deterioration.

5.18 Name. PINE TAR, TECHNICAL
Retort Pine Tar

5.18.1 Specifications. Federal Specification LLL-P-430, Pine Tar, Technical.

5.18.2 Technical description. Pine tar is a very viscous, dark brown to black liquid with a strong characteristic odor and sharp taste. It is soluble in alcohol, acetone, fixed and volatile oils, and in sodium hydroxide solution. It is slightly soluble in water. Its chief constituents are complex phenols, in addition to turpentine, rosin, toluene, xylene and other hydrocarbons. The pine tar covered by this standard is the dark viscous liquid obtained by distilling off a part of the volatile oils contained in the tar oil portion of the condensate obtained when pine wood is destructively distilled (carbonized) in retorts. Pine tar, technical shall be free from miscible or immiscible non-tarry foreign matter other than moisture and shall be free flowing and of uniform consistency. It shall have a bright dark red-brown color when viewed through a thin film on a glass surface. When one or two drops of the tar are rubbed out between two sheets of white writing paper, the resulting spot shall have a uniform light golden brown color, with not more than a trace of dirt specks or other foreign matter remaining unabsorbed by the paper. The odor of the tar shall be slightly empyreumatic, not unpleasant, and characteristic of retort tar made from dry seasoned wood. In addition, pine tar, technical shall conform to the requirements shown in Table XV when tested in accordance with the procedures prescribed by referenced specification.

TABLE XV Requirements for pine tar, technical

Property	Requirements	
	Minimum	Maximum
Specific gravity (25°/15.5°C)	1.055	1.075
Moisture (percent by weight) (occluded and separated water)	-	2.5
Loss on heating (percent by weight)	-	8.0
Viscosity (centipoises)	1400	2500
Distillation data: (percent by volume)		
Distilled below 170°C (incl. water)	-	5
Distilled below 200°C	-	8
Distilled below 370°C	75	-

5.18.3 Use data. Pine tar, technical is intended for military use primarily for testing and waterproofing rope, cordage, netting, and other marine supplies.

5.18.4 Packaging data and labeling. Pine tar, technical is packaged for military use in 5 gal unit quantity cans. There are no applicable DoT packaging or shipping regulations for this material.

5.18.5 Storage data. Pine tar, technical shall be plainly labeled and stored in a cool, dry area in tightly sealed containers away from sources of heat and oxidizing materials. Under these storage conditions, the shelf life is indefinite.

5.19 Name. PYRIDINE, TECHNICAL (C_5H_5N) FW 79.10
(HAZARDOUS)

5.19.1 Specifications. None.

5.19.2 Technical description. Pyridine is a slightly yellow or colorless liquid with a sharp penetrating empyreumatic odor. It is slightly alkaline in reaction. It is soluble in water, alcohol ether, benzene, ligroin and fatty oils. It is an important organic base.

TABLE XVI Typical properties of pyridine, technical

Specific gravity (25°C)	0.970-0.980
Refractive index	1.5102
Flash point (closed cup)	68°F
Explosive limits in air (% by volume in air)	1.8-12.4
Vapor density (air=1.00	2.73
Boiling point (760 mm)	115.5°C

5.19.3 Use data. Pyridine, technical is intended for military use in denaturing alcohol and as a solvent for rubber, paints, etc.

5.19.4 Packaging data and labeling. Pyridine, technical is packaged for military use in 5 lb unit quantity cans. Shipping containers must bear the DoT red label for flammable liquids. In addition, each individual container must bear the following precautionary label:

PYRIDINE
WARNING! 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.

5.19.5 Storage data. Pyridine, technical should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers away from sources of heat and combustible materials. Under these storage conditions, the shelf life is indefinite. Containers should be inspected periodically for deterioration.

5.20 Name. TOLUENE, TECHNICAL ($CH_3C_6H_5$) FW 92.13
Toluol
Methylbenzene
(HAZARDOUS)

5.20.1 Specifications. Federal Specification TT-T-548, Toluene, Technical.

5.20.2 Technical description. Toluene is a colorless, refractive, flammable liquid with a benzene-like odor. As compared with benzene, its vapors are less dangerously toxic, less flammable, and it has a slower rate of evaporation. It has a melting point of -94.5°C, a boiling point of 110.7°C, a refractive index of 1.497, and a flash point of 4-50°F. Its explosive limits in air are 1.5 to 7% by volume. It is soluble in alochol, benzene, and ether, and insoluble in water. Toluene, technical, as covered by this standard, shall be clear and free from sediment and suspended matter when examined by transmitted light. When tested in accordance with the procedures described in referenced specification, it shall be no darker than No. 20 on the platinum-cobalt scale. Toluene shall have no residual odor. It shall contain no free acid and the acid wash color shall be no darker than No. 4 color standard. The copper corrosion test strip shall show no more corrosion or discoloration than Class 2 of Method D in ASTM D1616. Toluene shall have no evidence of turbidity or free water. It shall be free from hydrogen sulfide and sulfur dioxide. In addition, toluene, technical shall conform to the requirements shown in Table XVII.

TABLE XVII Requirements for toluene, technical

Property	Requirements	
	Minimum	Maximum
Specific gravity (20°/20°C)	0.860	0.870
Distillation range (760 mm pressure) from initial boiling point to dry point (includes 110.6°C)	-	2°C -

5.20.3 Use data. Toluene, technical is intended for military use as a solvent or thinner for organic coatings. Because of its uniformity, high dilution ratio, and narrow boiling range, it is used as a diluent for some cellulosic lacquers and dopes. It is also used as a solvent for various resins used in varnishes and enamels and a dilutent or solvent for vinyl resins. It is also used as a solvent for chlorinated rubber:

5.20.4 Packaging data and labeling. Toluene, technical is packaged for military use in 1 qt and 1 gal unit quantity cans, in 5 gal unit quantity pails, and in 55 gal unit quantity drums. Unless otherwise exempt under the provisions of Section 173.118, Title 49, Code of Federal Regulations, shipping container must bear the DoT red label for flammable liquids. In addition, each individual container must bear the following precautionary label:

TOLUENE
WARNING! FLAMMABLE VAPOR
VAPOR HARMFUL

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

5.20.5 Storage data. Toluene, technical should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers away from sources of heat and combustible materials. Under these storage condition,s the shelf life is indefinite. Containers should be inspected periodically for deterioration.

5.21 Name. XYLENE, TECHNICAL $C_6H_4(CH_3)_2$ FW 106.16
Xylol
Dimethylbenzene
(HAZARDOUS)

5.21.1 Specifications. Federal Specification TT-X-916, Xylene (For use in Organic Coatings).

5.21.2 Technical description. Xylene is a clear, mobile, flammable liquid. It is soluble in alcohol and ether and insoluble in water. This standard covers two grades of xylene; ten degree xylene and industrial xylene. Xylene, technical shall conform to the following requirements when tested in accordance with the procedures prescribed by referenced specification. It shall be clear and free from sediment and suspended matter when examined by transmitted light. It shall be no darker than a solution of 0.0030 g of reagent grade potassium dichromate in 1 liter of distilled water. It shall have the characteristic odor of xylene and shall leave no residual odor after evaporation from filter paper. The color of the acid layer shall be no darker than reference color standard No. 6 for ten degree xylene and reference color standard No. 10 for industrial grade xylene. The residue after distillation shall not be acidic and the xylene shall be free from hydrogen sulfide and sulfur dioxide. In addition, xylene, technical shall conform to the requirements shown in Table XVIII.

TABLE XVIII Requirements for xylene, technical

Property	Requirements			
	Ten degree xylene		Industrial xylene	
	Min	Max	Min	Max
Specific gravity (15.56°/15.56°C)	0.860	0.870	0.850	0.870
Distillation data: (760 mm pressure)				
Initial boiling point	135°C	-	123°C	-
Distillate below 130°C (% by volume)	-	-	-	5
Distillate below 145°C (% by volume)	-	-	90	-
Dry point		145°C		155°C
Flash point (tag closed cup)	80°F	-	75°F	-

5.21.3 Use data. Xylene, technical is intended for military use as a thinner or solvent for organic finishes. Ten degree xylene is a good diluent for nitrocellulose lacquers where higher boiling and slower evaporating thinners than toluene are desired. Industrial xylene is widely used in bronzing liquids and aluminum paints since it promotes excellent "leafing" and minimizes discoloration of the metallic pigment. Both grades of xylene have high solvent power and produce low viscosity liquids especially when used in asphaltum varnishes or with alkyd type resins. On grinding carbon blacks in varnishes, xylene has proven very useful in dispersing the pigment.

5.21.4 Packaging data and labeling. Xylene technical (ten degree xylene) is packaged for military use in 1 pt and 1 gal unit quantity cans, and in 5 gal unit quantity pails. Xylene, technical (industrial xylene) is packaged for military use in 1 qt unit quantity bottles, 1 gal unit quantity cans, 5 gal unit quantity pails, and in 55 gal unit quantity drums. Unless otherwise exempt under the provisions of section 173.118, Title 49, Code of Federal Regulations, shipping container must bear the DoT red label for flammable liquids. In addition, each individual container must bear the following label:

XYLENE
WARNING! FLAMMABLE

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

5.21.5 Storage data. Xylene, technical should be plainly labeled and stored in a cool, dry, well ventilated area in tightly sealed containers away from sources of heat and combustible materials. Under these storage conditions, the shelf life is indefinite. Containers should be inspected periodically for deterioration.

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
Navy - YD
Air Force - 68

Preparing Activity: Army - MU

Review Activities: Army - MD, MI, MU
Navy - YD
Air Force - 68

User Activities: Army - AT, ME
Navy - AS, MC

Project No. 6810-0705

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