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MSDS
COVER SHEET

Pages including cover sheet: 11

Product Name: **CAP MIX A**
Catalog Number: **40-4010-XX**
Product Description: Tetrahydrofuran/ 2,6-Lutidine/ Acetic Anhydride

Glen Research Corporation provides Material Safety Data Sheets (MSDS) based on the hazardous components of each product.

Components and MSDS attached

Tetrahydrofuran (80%)	CAS number	109-99-9
2,6-Lutidine (10%)	CAS number	108-48-5
Acetic Anhydride (10%)	CAS number	108-24-7

Material Safety Data Sheet

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Section I: Identification & Information

Name: Tetrahydrofuran
Chemical Family: Cycloaliphatic Ether

Synonyms: THF, Tetramethylene Oxide, 1,4-Epoxy-Butane, Butylene Oxide, Cyclotetramethylene Oxide, Diethylene Oxide, 1,4-Epoxybutane, Furanidine, Hydrofuran, Oxacyclopentane, Oxolane
Formula: C_4H_8O M.W.: 72.11

DOT Proper Shipping Name: Tetrahydrofuran
DOT Identification No.: UN2056 CAS No.: 109-99-9
DOT Hazard Class: Flammable Liquid

Section II: Physical Properties

Appearance: Clear, colorless liquid
Vapor Pressure @ 20°C: 143mmHg
Percent Volatile by Volume: ca 100
Evaporation Rate (BuAc =1): <1
Boiling Point: 65°C-67°C
Solubility in Water: @20°C complete

Odor: Ether-like odor
Vapor Density (air=1): 2.5
Specific Gravity (H_2O=1): @20°C 0.89
Stability: stable
Freezing point: -108.5°C
Water Reactive: n/a

Section III: Reactivity Hazard Data

Hazardous polymerization may occur.

Conditions to avoid: Heat, sparks, open flames, open containers, poor ventilation.

Materials to avoid: Oxidizing agents and strong acids and bases.

Hazardous decomposition products: Incomplete combustion can generate carbon monoxide and other toxic vapors. Explosive peroxides can form after standing or upon exposure to air or direct sunlight.

Section IV: Fire and Explosion Hazard Data

Flash Point: -17°C 1°F Auto ignition temperature: 321°C 610°F
Flammable Limits in air % by volume: Lower limit: 1.8 Upper limit: 11.8

Extinguishing Media: dry chemical, CO_2, water mist or fog, alcohol foam

Special Fire Fighting Procedures: Wear full protective clothing and self-contained breathing apparatus. Heat will build pressure and may rupture closed storage containers. Keep fire-exposed containers cool with water spray.

Unusual Fire and Explosion Hazards: Very volatile and extremely flammable. Can form heat sensitive peroxides which could explode during concentration or evaporation. Do not concentrate if peroxide concentrations are above 5ppm or 0.05%. Vapor may travel considerable distance to source of ignition and flash back.

Section V: Hazardous Ingredients

Tetrahydrofuran ca 100%

Occupational Exposure Limits:

OSHA PEL=8H TWA 200ppm ACGIH TLV-TWA=200ppm;STEL=250ppm

IDLH: 2,000ppm

Butylated hydroxytoluene (if stabilized) 250ppm TLV not listed CAS# 128-37-0

Section VI: Toxicity and Health Hazard Data

See Registry of Toxic Effects of Chemical Substances (RTECS).

Tetrahydrofuran is not listed as a carcinogen by IARC, NTP, OSHA, or ACGIH.

Primary routes of entry: Inhalation, skin absorption, ingestion.

- Ingestion: Systemic effects similar to inhalation.
- Eye contact: Liquid and high vapor concentration can cause irritation.
- Skin contact: Prolonged and repeated contact can cause irritation and dermatitis through defatting of the skin.
- Inhalation: Exposure can cause nausea, dizziness, headache and central nervous system depression. Vapors can be irritating to the mucous membranes and upper respiratory tract.

Effects of overexposure: Nausea, dizziness, headache, and narcosis. Liver and kidney damage can occur from chronic exposure.

Medical Condition Aggravated by Exposure: Preclude from exposure those individuals susceptible to dermatitis.

Target Organs: Liver, Kidneys and Central Nervous System

Emergency First Aid:

• Ingestion: Call poison control center for assistance. Get emergency medical assistance. Never induce vomiting or give anything by mouth to a victim who is unconscious or having convulsions.

• Eye contact: Rinse with copious amounts of water for at least 15 minutes. Get emergency medical assistance.

• Skin contact: Flush thoroughly with water for at least 15 minutes. Wash affected skin with soap and water. Remove contaminated clothes and shoes. Wash clothing before reuse and discard contaminated shoes. Get emergency medical assistance.

• Inhalation: Immediately remove to fresh air. If not breathing, give artificial respiration. Get emergency medical assistance.

Section VII: Special Protection

Ventilation: Adequate ventilation is required to protect personnel from exposure to chemical vapors exceeding the PEL and to minimize fire hazards. The choice of ventilation equipment, either local or general, will depend on the conditions of use, quantity of material, and other operating procedures.

Respiratory Protection: Use approved respiratory equipment. Follow NIOSH and equipment manufacturer's recommendations to determine appropriate equipment.

Skin Protection: Protective gloves and clothing are recommended. The choice of material must be based on chemical resistance and other user requirements. Individuals who are acutely and specifically sensitive to tetrahydrofuran may require additional protective equipment.

Eye Protection: Laboratory safety glasses are minimum protection. Goggles are preferred and may be necessary depending on quantity of material and conditions of use.

Emergency eye wash fountains and safety showers should be available in the vicinity of any potential exposure. Ground and bond metal containers to minimize sparks.

Section VIII: Spill and Disposal Procedures

If a spill occurs, protect from ignition. Wear protective clothing and use approved respiration equipment. Absorb spilled material in an absorbent recommended for solvent spills and remove to a safe location for disposal by approved methods. Use nonsparking tools. If released to the environment, comply with all regulatory notification requirements.

Waste Disposal: Dispose of tetrahydrofuran as an EPA hazardous waste.

Section IX: Storage

Tetrahydrofuran should be protected from temperature extremes and direct sunlight. Proper storage of tetrahydrofuran must be determined based on other materials stored and their hazards and potential chemical incompatibility. In general, tetrahydrofuran should be stored in an acceptably protected and secure flammable liquid storage room. Periodically check for peroxides in stored material and prior to use, especially before concentration or heating.

Key:
ca: Approximately
PEL:Permissible Exposure Level
STEL: Short Term Exposure Level
TWA: Time Weighted Average
IDLH: Immediately Dangerous to Life and Health
BuAc: Butyl Acetate
TLV: Threshold Limit Value
n/a: not available

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Section I: Identification & Information

Name: 2,6-Lutidine Chemical Family: Aromatic Heterocycle
Synonyms: Pyridine; 2,6-Dimethylpyridine; 2,6-Lutidine practical
Formula: C_7H_9N M.W.: 107.16

DOT Proper Shipping Name: 2,6-Lutidine
DOT Identification No.: n/a CAS No.: 108-48-5
DOT Hazard Class: Flammable Liquid

Section II: Physical Properties

Appearance: Oily, colorless to yellow liquid
Odor: Pyridine and peppermint
Vapor Pressure @ 20°C: none
Specific Gravity (H_2O=1): 0.92
Vapor Density (air=1): 3.7
Percent Volatile by volume: n/a
Evaporation Rate (Ether=1): none
Water Reactive: n/a
Stability: Stable
Solubility in H_2O: Soluble
Boiling Point: 143-145°C
Melting point: -6°C

Section III: Reactivity Hazard Data

Stable material under ordinary conditions of use and storage. Hazardous polymerization does not occur.

Conditions to avoid: Heat, sparks, open flames, open containers, poor ventilation.

Materials to avoid: Acids, acid chlorides, oxidizers and chloroformates.

Hazardous decomposition products: Thermal decomposition may produce carbon monoxide, carbon dioxide, and nitrogen oxides.

Section IV: Fire and Explosion Hazard Data

Flash Point: 33°C 92°F Autoignition temperature: not known
Flammable Limits in air % by volume: Lower limit: not known Upper limit: not known

Extinguishing Media: dry chemical, CO_2, foam.

Special Fire Fighting Procedures: Wear full protective clothing and self-contained breathing apparatus.

Unusual Fire and Explosion Hazards: Explosive vapor-air mixtures may be formed. Vapor may travel considerable distance to source of ignition and flash back.

Section V: Hazardous Ingredients

2,6-Lutidine ca 100%

Section VI: Toxicity and Health Hazard Data

See Registry of Toxic Effects of Chemical Substances (RTECS).
Information on the human health effects from exposure to 2,6-lutidine is limited.

Primary routes of entry: Inhalation, skin absorption, ingestion.

- Inhalation: Vapors and mist inhalation is irritating to the mucous membranes of the upper respiratory tract.
- Ingestion: No information found, but should be handled as a potential health hazard.
- Eye contact: Causes severe eye irritation.
- Skin contact: Causes skin irritation. May be absorbed through the skin.
- Chronic exposure: Can cause coughing, chest pains, difficulty in breathing, and gastrointestinal disturbances.

Emergency First Aid:

- Ingestion: Wash out mouth with water, if person conscious. Call poison control center for assistance. Get emergency medical assistance.

- Eye contact: Rinse with copious amounts of water for at least 15 minutes. Get emergency medical assistance.

- Skin contact: Flush thoroughly with water for at least 15 minutes. Wash contaminated clothing. Get emergency medical assistance if irritation develops.

- Inhalation: Immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Keep patient warm and at rest. Contact emergency medical assistance.

Section VII: Special Protection

Ventilation: Use only in a chemical fume hood. Adequate ventilation is required to control vapors and odor.
Respiratory Protection: Half-mask charcoal respirators should be worn if exposure to vapor is apparent.
Skin Protection: Impervious protective rubber gloves and clothing are recommended. The choice of material must be based on chemical resistance and other user requirements.

Eye Protection: Laboratory safety glasses are minimum protection. Goggles are preferred. Contact lenses should not be worn when working with this material.

Emergency eye wash fountains and safety showers should be available in the vicinity of any potential exposure. Ground and bond metal containers to minimize sparks.

Section VIII: Spill and Disposal Procedures

If a spill occurs, protect from ignition. Evacuate area. Ventilate area of spill. Wear protective clothing (rubber boots and heavy rubber gloves) and use approved respiration equipment suitable for vapors. Use non-sparking tools and transport outdoors. Contain and recover liquid when possible. Collect as hazardous waste: absorb with vermiculite, dry sand, earth or similar material for disposal as hazardous waste.

Waste Disposal: Dispose of in a suitable, approved combustion chamber. Do not flush to sewer. Ensure compliance with local, state and federal regulations.

Section IX: Storage

2,6-Lutidine should be stored in a tightly sealed container, protected from physical damage and stored in a cool, dry, ventilated area away from areas where fire hazards may be acute. Separate from oxidizing materials.

Containers should be bonded and grounded for transfers to avoid static sparks.

Key:

ca: Approximately	n/a: not available
	PEL:Permissible Exposure Level
STEL: Short Term Exposure Level	BuAc: Butyl Acetate
TLV: Threshold Limit Value	TWA: Time Weighted Average

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Section I: Identification & Information

Name: Acetic Anhydride Chemical Family: Anhydride

Synonyms: Acetanhydride; acetyl oxide; acetic acid, anhydride
Formula: $(CH_3CO)_2O$ M.W.: 102.09

DOT Proper Shipping Name: Acetic Anhydride
DOT Identification No.: UN1715 CAS No.: 108-24-7
DOT Hazard Class: Corrosive and Flammable Liquid

Section II: Physical Properties

Appearance: Clear, colorless liquid

Odor: Strong acetic odor; good warning properties

Vapor Pressure @ 20°C: 4mmHg
Vapor Density (air=1): 3.52
Stability: Stable
Boiling Point: 140°C
Water Reactive: yes

Specific Gravity (H_2O=1): 1.08
Evaporation Rate (BuAc=1): 0.46
Solubility in H_2O: Soluble
Melting point: -73°C

Section III: Reactivity Hazard Data

Stable material under ordinary conditions of use and storage. Heat will contribute to instability. Hazardous polymerization does not occur.

Conditions to avoid: Heat, sparks, open flames, open containers, poor ventilation.

Materials to avoid: Water, steam, oxidizing materials, alcohols, acids, bases, reducing agents, finely powdered metals.

Hazardous decomposition products: Toxic fumes of carbon monoxide and carbon dioxide.

Section IV: Fire and Explosion Hazard Data

Flash Point: 130F (54°C) Autoignition temperature: 390°C
Flammable Limits in air % by volume: Lower limit: 2.7 Upper limit: 10.3

Extinguishing Media: dry chemical, CO_2, alcohol or polymer foam.

Special Fire Fighting Procedures: Wear full protective clothing and self-contained breathing apparatus. Avoid contact with skin and eyes.

Unusual Fire and Explosion Hazards: May be ignited by distant ignition sources.

Section V: Hazardous Ingredients

Acetic Anhydride ca 100%

Occupational Exposure Limits

OSHA PEL=8H TWA 5ppm ACGIH: TLV –TWA 5ppm

IDLH=200ppm

Section VI: Toxicity and Health Hazard Data

See Registry of Toxic Effects of Chemical Substances (RTECS).

Primary routes of entry: Inhalation, skin absorption, ingestion.

- Inhalation: Vapors are corrosive to the mucous membranes of the upper respiratory tract. Exposure to vapor may cause irritation of the nose and throat, and coughing. Heavier exposure may result in severe damage to the lungs. Symptoms of lung edema are often delayed and are aggravated by physical effort. Inhalation may be fatal.
- Ingestion: Corrosive. Causes a burning pain in the stomach, followed by nausea and vomiting.
- Eye contact: Corrosive lachrymator. Liquid or vapor may produce a burning sensation and tearing. Redness, pain and blurred vision may occur. The appearance of eye burns may be delayed.
- Skin contact: Corrosive. Does not cause severe burning on contact but can cause delayed reaction burns. If not removed by washing, the skin may become reddened and later turn white and wrinkled. Continued skin contact may cause dermatitis.
- Chronic exposure: Repeated and prolonged exposure to vapor may cause irritation of the skin and chronic eye irritation as well as lung damage. Individuals with preexisting skin disorders or eye problems, or impaired respiratory functions may be susceptible to the effects of this substance.

Target Organs: Eyes, skin, and respiratory system

Emergency First Aid:

- Ingestion: Call poison control center for assistance. Get emergency medical assistance. Wash out mouth with water if the person is conscious. DO NOT induce vomiting. Never give anything orally to a person who is unconscious or in convulsions.

- Eye contact: Rinse with copious amounts of water for at least 15 minutes. Get emergency medical assistance.

- Skin contact: Flush thoroughly with water for at least 15 minutes. Remove contaminated clothes and shoes. Wash clothing and shoes before reuse. Get emergency medical assistance.

- Inhalation: Immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Keep patient warm and at rest. Get emergency medical assistance.

Section VII: Special Protection

Ventilation: Adequate ventilation is required to control vapors and odor. Use only in a chemical fume hood.

Respiratory Protection: Cartridge respirators should be worn if the TLV is exceeded.

Skin Protection: Protective rubber gloves and clothing are recommended. The choice of material must be based on chemical resistance and other user requirements.

Eye Protection: Laboratory safety glasses are minimum protection. Goggles or faceshield are preferred. Contact lenses should not be worn when working with this material.

Emergency eye wash fountains and safety showers should be available in the vicinity of any potential exposure. Ground and bond metal containers to minimize sparks.

Section VIII: Spill and Disposal Procedures

If a spill occurs, protect from ignition. Evacuate area. Ventilate area of spill. Wear protective clothing and use approved respiration equipment suitable for toxic and corrosive vapors. Contain and recover liquid when possible. Absorb spilled material with activated carbon, or absorbent recommended for solvent spills and remove to a safe location for disposal by approved methods. If released to the environment, comply with all regulatory notification requirements.

Waste Disposal: In a RCRA approved facility.

Section IX: Storage

Acetic anhydride should be stored in a tightly sealed container, protected from physical damage and stored in a cool, dry, ventilated area away from sources of heat, moisture and incompatible materials.

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Key:

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