






Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
   	<p>THIS MATERIAL IS TOXIC BY INHALATION. Highly toxic compound, do not ingest or inhale. Avoid all contact with this material. Flammable material; avoid heat and sources of ignition. Corrosive to eyes and skin on contact. CARCINOGEN. MINIMIZE EXPOSURE. TUMORIGEN. MINIMIZE EXPOSURE. MUTAGEN. MINIMIZE EXPOSURE. Hygroscopic -- keep container tightly sealed. Store under nitrogen.</p>	

Section I. Chemical Product and Company Identification

Chemical Name	Methylhydrazine		
Catalog Number	M0558	Supplier	TCI America 9211 N. Harborside St. Portland OR 1-800-423-8616
Synonym	Hydrazine, Methyl- (9 CI)		
Chemical Formula	NH ₂ NHCH ₃		
CAS Number	60-34-4	In case of Emergency Call	Chemtrec® (800) 424-9300 (U.S.) (703) 527-3887 (International)

Section II. Composition and Information on Ingredients

Chemical Name	CAS Number	Percent (%)	TLV/PEL	Toxicology Data
Methylhydrazine	60-34-4	Min. 98.0 (GC)	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen. This compound is classified as a mutagen. There is no acceptable exposure limit for a mutagen. ACGIH TLV-TWA: 0.01ppm (skin) IDLH Value: 20ppm OSHA PEL Ceiling: 0.2ppm	Rat LC ₅₀ (inhalation) 34ppm/4H Rat LD ₅₀ (oral) 32mg/kg Rabbit LD ₅₀ (dermal) 95mg/kg

Section III. Hazards Identification

Acute Health Effects	<p>Highly toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death.</p> <p>Corrosive to skin, eyes, and respiratory system. Liquid or spray mist may produce tissue damage, particularly in mucous membranes of the eyes, mouth and respiratory tract. Skin contact may produce burns. Eye contact can result in corneal damage or blindness. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Corrosive materials may cause serious injury if ingested.</p> <p>Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.</p>
Chronic Health Effects	<p>CARCINOGENIC EFFECTS : This product is Carcinogenic by RTECS criteria.</p> <p>MUTAGENIC EFFECTS : Not available.</p> <p>TERATOGENIC EFFECTS : TUMORIGENIC EFFECTS:</p> <p>Rat TCLo (inhalation) 20ppb/6 Hours/1 Year, intermittent.</p> <p>Toxic Effects:</p> <p>Tumorigenic- Carcinogenic by RTECS criteria.</p> <p>Blood- Leukemia.</p> <p>Rat TDLo (oral) 10gm/kg/1 Year, continuous.</p> <p>Toxic Effects:</p> <p>Tumorigenic- Neoplastic by RTECS criteria.</p> <p>Lung, Thorax, or Respiration- Tumors.</p> <p>Blood- Lymphomas including Hodgkin's disease.</p> <p>Hamster TDLo (oral) 3000mg/kg/47 Weeks, continuous.</p> <p>Toxic Effects:</p> <p>Tumorigenic- Carcinogenic by RTECS criteria.</p> <p>Gastrointestinal- Colon tumors.</p> <p>Liver- Tumors.</p> <p>DEVELOPMENTAL TOXICITY: REPRODUCTIVE EFFECTS:</p> <p>Rat TDLo (intraperitoneal) 100mg/kg, female, 6-15 Days of pregnancy.</p> <p>Toxic Effects:</p> <p>Effects on Fertility- Post-implantation mortality.</p> <p>Rat TDLo (intravenous) 24mg/kg, female, 6-13 Days of pregnancy.</p> <p>Toxic Effects:</p> <p>Effects on Fertility- Post-implantation mortality.</p> <p>Effects on Embryo or Fetus- Other effects to embryo.</p> <p>Rat TDLo (oral) 5mg/kg, female, 6 Days of pregnancy.</p> <p>Toxic Effects:</p> <p>Effects on Fertility- Pre-implantation mortality.</p> <p>Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or</p>

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prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section IV. First Aid Measures

Eye Contact	Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.
Skin Contact	In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.
Inhalation	If the victim is not breathing, perform mouth-to-mouth resuscitation. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, oxygen can be administered. Seek medical attention if respiration problems do not improve.
Ingestion	DO NOT INDUCE VOMITING. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive.

Section V. Fire and Explosion Data

Flammability	Flammable.	Auto-Ignition	194 °C (381.2 °F)
Flash Points	17 °C (62.6 °F).	Flammable Limits	LOWER: 2.5% UPPER: 97%
Combustion Products	These products are toxic carbon oxides (CO, CO ₂), nitrogen oxides (NO, NO ₂).		
Fire Hazards	Not available.		
Explosion Hazards	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.		
Fire Fighting Media and Instructions	Flammable liquid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, carbon dioxide or fog. Consult with local fire authorities before attempting large scale fire-fighting operations.		


Section VI. Accidental Release Measures

Spill Cleanup Instructions	This material is toxic by inhalation. Highly toxic material. Flammable material. Corrosive material. Carcinogenic material. Tumorigenic material. Mutagenic material. Hygroscopic material. Store under nitrogen. Keep away from heat. Mechanical exhaust required. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. DO NOT get water inside container. DO NOT touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Consult federal, state, and/or local authorities for assistance on disposal.
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Section VII. Handling and Storage

Handling and Storage Information	THIS MATERIAL IS TOXIC BY INHALATION. HIGHLY TOXIC. FLAMMABLE. CORROSIVE. CARCINOGEN. TUMORIGEN. MUTAGEN. HYGROSCOPIC. STORE UNDER NITROGEN. Keep locked up. Keep container dry. Keep away from heat. Mechanical exhaust required. Avoid excessive heat and light. DO NOT ingest. Do not breathe gas/fumes/vapor/spray. Never add water to this product. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Treat symptomatically and supportively. Always store away from incompatible compounds such as oxidizing agents.
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Section VIII. Exposure Controls/Personal Protection

Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash station and safety shower is proximal to the work-station location.
Personal Protection	Face shield. Lab coat. Vapor respirator. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product. Be sure to use a MSHA/NIOSH approved respirator or equivalent. 
Exposure Limits	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen. This compound is classified as a mutagen. There is no acceptable exposure limit for a mutagen. ACGIH TLV-TWA: 0.01ppm (skin) IDLH Value: 20ppm OSHA PEL Ceiling: 0.2ppm

Section IX. Physical and Chemical Properties

Physical state @ 20 °C	Liquid. (Clear, colorless.)	Solubility	>10% in ethyl ether. >10% in ethanol. >10% in water. Miscible with water, hydrazine, low mol wt monohydric alcohols. Soluble in hydrocarbons, petroleum ether, carbon tetrachloride.
Specific Gravity	0.874 (water=1)		
Molecular Weight	46.07	Partition Coefficient	K _{ow} = -1.05
Boiling Point	87 °C (188.6 °F)	Vapor Pressure	4.8 kPa (@ 20 °C)
Melting Point	-52.4 °C (-62.3 °F)	Vapor Density	Not available.

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Refractive Index	1.4325 @ 20°C	Volatility	Not available.	
Critical Temperature	Not available.	Odor	Ammonia-like.	
Viscosity	Not available.	Taste	Not available.	

Section X. Stability and Reactivity Data	
Stability	This material is stable if stored under proper conditions. (See Section VII for instructions)
Conditions of Instability	Avoid excessive heat and light.
Incompatibilities	Ignites spontaneously on contact with strong oxidizing agents such as fluorine, chlorine trifluoride, nitrogen tetroxide, fuming nitric acid. Reactive with oxygen, peroxides, copper, copper alloys, porous materials, oxides of iron.

Section XI. Toxicological Information	
RTECS Number	MV5600000
Routes of Exposure	Eye Contact. Ingestion. Inhalation. Skin contact.
Toxicity Data	Rat LC ₅₀ (inhalation) 34ppm/4H Rat LD ₅₀ (oral) 32mg/kg Rabbit LD ₅₀ (dermal) 95mg/kg
Chronic Toxic Effects	CARCINOGENIC EFFECTS : This product is Carcinogenic by RTECS criteria. MUTAGENIC EFFECTS : Not available. TERATOGENIC EFFECTS : TUMORIGENIC EFFECTS: Rat TCLo (inhalation) 20ppb/6 Hours/1 Year, intermittent. Toxic Effects: Tumorigenic- Carcinogenic by RTECS criteria. Blood- Leukemia. Rat TDLo (oral) 10gm/kg/1 Year, continuous. Toxic Effects: Tumorigenic- Neoplastic by RTECS criteria. Lung, Thorax, or Respiration- Tumors. Blood- Lymphomas including Hodgkin's disease. Hamster TDLo (oral) 3000mg/kg/47 Weeks, continuous. Toxic Effects: Tumorigenic- Carcinogenic by RTECS criteria. Gastrointestinal- Colon tumors. Liver- Tumors. DEVELOPMENTAL TOXICITY: REPRODUCTIVE EFFECTS: Rat TDLo (intraperitoneal) 100mg/kg, female, 6-15 Days of pregnancy. Toxic Effects: Effects on Fertility- Post-implantation mortality. Rat TDLo (intravenous) 24mg/kg, female, 6-13 Days of pregnancy. Toxic Effects: Effects on Fertility- Post-implantation mortality. Effects on Embryo or Fetus- Other effects to embryo. Rat TDLo (oral) 5mg/kg, female, 6 Days of pregnancy. Toxic Effects: Effects on Fertility- Pre-implantation mortality. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.
Acute Toxic Effects	Highly toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death. Corrosive to skin, eyes, and respiratory system. Liquid or spray mist may produce tissue damage, particularly in mucous membranes of the eyes, mouth and respiratory tract. Skin contact may produce burns. Eye contact can result in corneal damage or blindness. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Corrosive materials may cause serious injury if ingested. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.

Section XII. Ecological Information	
Ecotoxicity	Not available.
Environmental Fate	Methylhydrazine's production and use as a rocket fuel may result in its direct release to the environment during refueling and transfer operations. It may also be released in various waste streams during the production or use of this compound as an intermediate in chemical synthesis and as a solvent. If released to the atmosphere, methylhydrazine will exist solely in the vapor phase in the ambient atmosphere, based on a measured vapor pressure of 50 mm Hg at 25 deg C. Vapor-phase methylhydrazine is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals and ozone with estimated half-lives of about 6 hours and 1-12 minutes, respectively. Both vapor phase methylhydrazine and methylhydrazine dissolved in aerosols are expected to react rapidly with ozone. An estimated Koc value of 6 suggests that methylhydrazine will have very high mobility in soil. Hydrazines are weak bases and should exist predominantly in their protonated form at pH values below their pKa value. A positive charge on the hydrazine could either increase or decrease the adsorption capacity of this compound depending on the soil and pH. Some chemical decomposition of methylhydrazine was reported in soil. Volatilization from moist soil surfaces is not expected to occur based on an estimated Henry's Law constant of 3.2X10 ⁻⁸ atm-cu m/mole. Volatilization from dry soil surfaces may be significant given the vapor pressure of this compound. Methyl hydrazine may also undergo direct photolysis on soil and water surfaces since hydrazines strongly absorb UV light in the environmentally significant range. Based on limited data, methylhydrazine may biodegrade in soil and water under aerobic conditions. In water, methylhydrazine is not expected to adsorb to sediment and particulate matter based on its Koc value although it may adsorb strongly to clay particulates and organic matter based on soil studies. This compound should not volatilize from water surfaces given its estimated Henry's Law constant. Estimated half-lives of methylhydrazine present at 9.5

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mM in pond and sea water are 18.0 and 24.1 days, respectively, and at 19.0 mM are 13.1 days in both pond and sea water. Release to water is expected to result in oxidation by dissolved oxygen, especially at high pH values; the half-life of the reaction between methylhydrazine and dissolved oxygen in water is about 2 hr at 30 deg C and pH 9.16. Bioconcentration in aquatic organisms should be low based on an estimated BCF value of 0.1. Occupational exposure may occur through inhalation or dermal contact at sites where methylhydrazine is produced or used. The general population may be exposed to methylhydrazine via dermal contact with vapors and products containing methylhydrazine. (HSDB)

Section XIII. Disposal Considerations

Waste Disposal

Recycle to process, if possible. Consult your local regional authorities. You may be able to dissolve or mix material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber system. Observe all federal, state and local regulations when disposing of the substance.

Section XIV. Transport Information

DOT Classification

Forbidden to ship by Air
CLASS 6.1: Toxic material.
CLASS 3: Flammable liquid.
CLASS 8: Corrosive material.

PIN Number

UN1244

Proper Shipping Name

Methylhydrazine (RQ: 10lbs (4.54kg))

Packing Group (PG)

I (DOT: Zone A; 68ppm)

DOT Pictograms



Section XV. Other Regulatory Information and Pictograms

TSCA Chemical Inventory (EPA)

This compound is **ON** the EPA Toxic Substances Control Act (TSCA) inventory list. This product is subject to SARA Section 313 reporting requirements. On EPA IRIS Database.

WHMIS Classification (Canada)

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
CLASS E: Corrosive liquid.
On NDSL.

EINECS Number (EEC)

200-471-4

EEC Risk Statements

R10- Flammable.
R18- In use, may form flammable/explosive vapor-air mixture.
R24/25- Toxic in contact with skin and if swallowed.
R26- Very toxic by inhalation.
R34- Causes burns.
R45- May cause cancer.
R46- May cause heritable genetic damage.
R47- May cause birth defects.

Japanese Regulatory Data

ENCS No. 2-2385

Section XVI. Other Information

Version 1.0

Validated on 9/23/2003.

Printed 9/13/2012.

Notice to Reader

TCI laboratory chemicals are for research purposes only and are NOT intended for use as drugs, food additives, households, or pesticides. The information herein is believed to be correct, but does not claim to be all inclusive and should be used only as a guide. Neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All chemical reagents must be handled with the recognition that their chemical, physiological, toxicological, and hazardous properties have not been fully investigated or determined. All chemical reagents should be handled only by individuals who are familiar with their potential hazards and who have been fully trained in proper safety, laboratory, and chemical handling procedures. Although certain hazards are described herein, we can not guarantee that these are the only hazards which exist. Our MSDS sheets are based only on data available at the time of shipping and are subject to change without notice as new information is obtained. Avoid long storage periods since the product is subject to degradation with age and may become more dangerous or hazardous. It is the responsibility of the user to request updated MSDS sheets for products that are stored for extended periods. Disposal of unused product must be undertaken by qualified personnel who are knowledgeable in all applicable regulations and follow all pertinent safety precautions including the use of appropriate protective equipment (e.g. protective goggles, protective clothing, breathing equipment, facial mask, fume hood). For proper handling and disposal, always comply with federal, state, and local regulations.