

Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
	Flammable material; avoid heat and sources of ignition. Harmful compound, minimize exposure. Irritating to skin, eyes, and the respiratory system. This compound is a skin and respiratory sensitizer. POSSIBLE CARCINOGEN. MINIMIZE EXPOSURE. Hygroscopic -- keep container tightly sealed.	

Section I. Chemical Product and Company Identification

Chemical Name	Hexamethylenetetramine		
Catalog Number	H0093	Supplier	TCI America 9211 N. Harborgate St. Portland OR 1-800-423-8616
Synonym	1,3,5,7-Tetraazatricyclo[3.3.1.1 ^{3,7}]decane (CA INDEX NAME); 1,3,5,7-Tetrazaadamantane; HMTA		
Chemical Formula	C ₆ H ₁₂ N ₄		
CAS Number	100-97-0	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
Hexamethylenetetramine	100-97-0	Min. 99.0 (GC, T)	This chemical is classified as a possible carcinogen. There is no acceptable exposure limit for a carcinogen.	Mouse LD ₅₀ (oral) 569 mg/kg Rat LD ₅₀ (intravenous) 9200 mg/kg Mouse LD ₅₀ (subcutaneous) 215 mg/kg

Section III. Hazards Identification

Acute Health Effects	Harmful if ingested or inhaled. Minimize exposure to this material. Severe overexposure can result in injury or death. Irritating to eyes and skin on contact. Inhalation causes irritation of the lungs and respiratory system. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering. Skin contact may result in sensitization. Always cover all exposed skin with an impermeable layer and use proper eye protection. A OSHA/MSHA approved dust and vapor respirator is required when working with this material. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.
Chronic Health Effects	CARCINOGENIC EFFECTS : Not available. MUTAGENIC EFFECTS : Not available. TERATOGENIC EFFECTS : Tumorigenic effects. Rat TDLo Subcutaneous 140 gm/kg for 78 weeks intermittent TOXIC EFFECTS: Tumorigenic - Equivocal tumorigenic agent by RTECS criteria Tumorigenic - Tumors at site of application DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure to this compound is not known to aggravate existing medical conditions.

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	INDUCE VOMITING by sticking finger in throat. Lower the head so that the vomit will not reenter the mouth and throat. 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	410 °C (770 °F)
Flash Points	250 °C (482 °F)	Flammable Limits	Not available.
Combustion Products	These products are toxic carbon oxides (CO, CO ₂), nitrogen oxides (NO, NO ₂).		
Fire Hazards	Not available.		

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Emergency phone number (800) 424-9300

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 solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion. Consult with local fire authorities before attempting large scale fire-fighting operations.


Section VI. Accidental Release Measures

Spill Cleanup Instructions	Flammable material. Harmful material. Irritating material. This material is a skin and respiratory sensitizer. Possibly carcinogenic material. Hygroscopic material. Stop leak if without risk. DO NOT touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all sources of ignition. Consult federal, state, and/or local authorities for assistance on disposal.
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Section VII. Handling and Storage

Handling and Storage Information	FLAMMABLE. HARMFUL. IRRITANT. SENSITIZER. POSSIBLE CARCINOGEN. HYGROSCOPIC. Keep away from heat. Mechanical exhaust required. Avoid excessive heat and light. Do not breathe dust. Always store away from incompatible compounds such as oxidizing agents, metals, acids, moisture.
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Section VIII. Exposure Controls/Personal Protection

Engineering Controls	Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.
Personal Protection	Splash goggles. Lab coat. Dust 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 possible carcinogen. There is no acceptable exposure limit for a carcinogen.

Section IX. Physical and Chemical Properties

Physical state @ 20°C	Solid. (White crystalline powder.)	Solubility	Very soluble in water (448,600 mg/L @ 12°C). Soluble in alcohol, chloroform. Very slightly soluble in ether, benzene.
Specific Gravity	1.33 (water=1)		
Molecular Weight	140.19	Partition Coefficient	LOG P _{ow} : -2.84
Boiling Point	Not available.	Vapor Pressure	0.5 Pa (@ 25 °)
Melting Point	280°C (536°F) (subl.)	Vapor Density	4.9 (Air = 1)
Refractive Index	Not available.	Volatility	Not available.
Critical Temperature	Not available.	Odor	Odorless.
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. Hygroscopic; keep container tightly closed.
Incompatibilities	Reactive with oxidizing agents, metals, acids, moisture. Attacks aluminum and zinc.

Section XI. Toxicological Information

RTECS Number	MN4725000
Routes of Exposure	Eye Contact. Ingestion. Inhalation.
Toxicity Data	Mouse LD ₅₀ (oral) 569 mg/kg Rat LD ₅₀ (intravenous) 9200 mg/kg Mouse LD ₅₀ (subcutaneous) 215 mg/kg
Chronic Toxic Effects	CARCINOGENIC EFFECTS : Not available. MUTAGENIC EFFECTS : Not available. TERATOGENIC EFFECTS : Tumorigenic effects. Rat TDLo Subcutaneous 140 gm/kg for 78 weeks intermittent TOXIC EFFECTS: Tumorigenic - Equivocal tumorigenic agent by RTECS criteria Tumorigenic - Tumors at site of application DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure to this compound is not known to aggravate existing medical conditions.

Acute Toxic Effects	Harmful if ingested or inhaled. Minimize exposure to this material. Severe overexposure can result in injury or death. Irritating to eyes and skin on contact. Inhalation causes irritation of the lungs and respiratory system. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering. Skin contact may result in sensitization. Always cover all exposed skin with an impermeable layer and use proper eye protection. A OSHA/MSHA approved dust and vapor respirator is required when working with this material. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.
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Section XII. Ecological Information

Ecotoxicity	Not available.
Environmental Fate	Methenamine's production and use as an ammonia or formaldehyde donor may result in its release to the environment through various waste streams. If released to air, methenamine's vapor pressure of 4.0X10 ⁻³ mm Hg at 25 deg C indicates methenamine will exist solely as a vapor in the ambient atmosphere. Vapor-phase methenamine will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 15 minutes. If released to soil, methenamine is expected to have high mobility based upon an estimated Koc of 55. Volatilization from moist soil and dry soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 1.6X10 ⁻⁹ atm-cu m/mole and this compound's vapor pressure, respectively. Hydrolysis may be important in some soils. Methenamine hydrolyzes in water at pH 3 or 7, the half-life in each case is slightly over 1 day. If released into water, methenamine is not expected to adsorb to suspended solids and sediment in water based upon the estimated Koc. Volatilization from water surfaces is not expected to be an important fate process based upon this compound's estimated Henry's Law constant. An estimated BCF of 0.40 suggests the potential for bioconcentration in aquatic organisms is low. In a semi-continuous activated sludge system, methenamine removal ranged from 1.1% after 5 days to 52.5% after 50 days; removal was attributed to acid hydrolysis of methenamine to formaldehyde and ammonia followed by biodegradation of these two compounds. 70 to 87% removal was observed after 28 days using an activated sludge inoculum. In a 5-day BOD test using a sewage seed, methenamine reached 2.02% of its theoretical BOD. Occupational exposure to methenamine may occur through inhalation of dust particles and dermal contact with this compound at workplaces where methenamine is produced or used.

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.
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Section XIV. Transport Information

DOT Classification	DOT CLASS 4.1: Flammable solid.
PIN Number	UN1328
Proper Shipping Name	Hexamethylenetetramine
Packing Group (PG)	III
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.
WHMIS Classification (Canada)	CLASS B-4: Flammable solid. On DSL.
EINECS Number (EEC)	202-905-8
EEC Risk Statements	R10- Flammable. R18- In use, may form flammable/explosive vapor-air mixture. R20/21/22- Harmful by inhalation, in contact with skin and if swallowed. R36/37/38- Irritating to eyes, respiratory system and skin. R42/43- May cause sensitization by inhalation and skin contact. R45- May cause cancer.
Japanese Regulatory Data	ENCS No. 5-1155

Section XVI. Other Information

Version 1.0
Validated on 1/6/2010.
Printed 7/18/2011.

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.