

Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
  	Combustible material; avoid heat and sources of ignition. Corrosive to eyes and skin on contact. Irritating to skin, eyes, and the respiratory system. Stench -- do not inhale, use under a fume hood. POSSIBLE MUTAGEN. MINIMIZE EXPOSURE.	

Section I. Chemical Product and Company Identification

Chemical Name	1,4-Diaminobutane		
Catalog Number	D0239	Supplier	TCI America 9211 N. Harborage St. Portland OR 1-800-423-8616
Synonym	1,4-Butanediamine; Putrescine		
Chemical Formula	NH ₂ (CH ₂) ₄ NH ₂		
CAS Number	110-60-1	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
1,4-Diaminobutane	110-60-1	Min. 98.0 (GC)	This compound is classified as a possible mutagen. There is no acceptable exposure limit for a mutagen.	Rat LDLo (subcutaneous) 1000 mg/kg Mouse LDLo (oral) 1600 mg/kg Mouse LD ₅₀ (intraperitoneal) 1750 mg/kg

Section III. Hazards Identification

Acute Health Effects	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. This material produces an irritating stench. Do not inhale and always use under a fume hood. Inhalation can result in inflammation of the respiratory system, headaches, nausea, and vomiting. 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 : Unscheduled DNA synthesis: Mouse (liver) 2 mmol/L DNA inhibition: Mouse (Ascites tumor) 10 mmol/L DNA inhibition: Mouse (liver) 20 mmol/L TERATOGENIC EFFECTS : Not available. DEVELOPMENTAL TOXICITY Reproductive effects: Mouse (intraperitoneal) 314 mg/kg. Duration: female- 12 days of pregnancy. Effects on embryo: Fetotoxicity. 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. DO NOT use an eye ointment. Flush eyes with running water for a minimum of 15 minutes, occasionally lifting the upper and lower eyelids. Seek medical attention. Treat symptomatically and supportively.
Skin Contact	After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. Seek medical attention. Treat symptomatically and supportively. Wash any contaminated clothing before reusing.
Inhalation	If the victim is not breathing, perform artificial respiration. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, oxygen can be administered. Seek medical attention. Treat symptomatically and supportively.
Ingestion	DO NOT induce vomiting. Loosen tight clothing such as a collar, tie, belt, or waistband. If the victim is not breathing, administer artificial respiration. 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. Seek immediate medical attention and, if possible, show the chemical label. Treat symptomatically and supportively.

Section V. Fire and Explosion Data			
Flammability	Combustible.	Auto-Ignition	Not available.
Flash Points	51°C (123.8°F)	Flammable Limits	Not available.
Combustion Products	These products are toxic carbon oxides (CO, CO ₂), nitrogen oxides (NO, NO ₂).		
Fire Hazards	Highly flammable in presence of open flames and sparks, of heat.		
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. No additional information is available regarding the risks of explosion.		
Fire Fighting Media and Instructions	SMALL FIRE: Use DRY chemicals, CO ₂ , water spray or foam. LARGE FIRE: Use water spray, fog or foam. DO NOT use water jet.		

Section VI. Accidental Release Measures	
Spill Cleanup Instructions	Combustible liquid. Corrosive liquid. Irritating liquid. In case of a spill and/or a leak, always shut off any sources of ignition, ventilate the area, and exercise caution. If the product is in its solid form: Use a shovel to put the material into a convenient waste disposal container. If the product is in its liquid form: Absorb with an inert material and put the spilled material in an appropriate waste disposal. Consult federal, state, and/or local authorities for assistance on disposal.

Section VII. Handling and Storage	
Handling and Storage Information	COMBUSTIBLE. CORROSIVE. IRRITANT. STENCH. MUTAGEN. Keep away from heat and sources of ignition. Mechanical exhaust required. When not in use, tightly seal the container and store in a dry, cool place. Avoid excessive heat and light. DO NOT ingest. DO NOT breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Treat symptomatically and supportively. Avoid contact with skin and eyes. Always store away from incompatible compounds such as oxidizing agents, acids.

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	Face shield. Lab coat. Dust respirator. Boots. Gloves. A MSHA/NIOSH approved respirator must be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.
	
Exposure Limits	This compound is classified as a possible mutagen. There is no acceptable exposure limit for a mutagen.

Section IX. Physical and Chemical Properties			
Physical state @ 20°C	Crystalline.	Solubility	Very soluble in water.
Specific Gravity	0.88		
Molecular Weight	88.15	Partition Coefficient	Not available.
Boiling Point	160°C (320°F)	Vapor Pressure	Not available.
Melting Point	27°C (80.6°F)	Vapor Density	Not available.
Refractive Index	Not available.	Volatility	Not available.
Critical Temperature	Not available.	Odor	Strong piperidine- like odor.
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	Highly reactive with oxidizing agents, acids, acid chlorides, and acid anhydrides.

Section XI. Toxicological Information

RTECS Number	EJ6800000
Routes of Exposure	Ingestion. Inhalation. Eye contact. Skin contact.
Toxicity Data	Rat LDLo (subcutaneous) 1000 mg/kg Mouse LDLo (oral) 1600 mg/kg Mouse LD ₅₀ (intraperitoneal) 1750 mg/kg
Chronic Toxic Effects	CARCINOGENIC EFFECTS : Not available. MUTAGENIC EFFECTS : Unscheduled DNA synthesis: Mouse (liver) 2 mmol/L DNA inhibition: Mouse (Ascites tumor) 10 mmol/L DNA inhibition: Mouse (liver) 20 mmol/L TERATOGENIC EFFECTS : Not available. DEVELOPMENTAL TOXICITY Reproductive effects: Mouse (intraperitoneal) 314 mg/kg. Duration: female- 12 days of pregnancy. Effects on embryo: Fetotoxicity. Repeated or prolonged exposure to this compound is not known to aggravate existing medical conditions.
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Section XII. Ecological Information

Ecotoxicity	Not available.
Environmental Fate	Not available.

Section XIII. Disposal Considerations

Waste Disposal	Recycle to process, if possible. Consult your local or 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 this substance.
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Section XIV. Transport Information

DOT Classification	DOT CLASS 4.1: Flammable solid. DOT CLASS 8: Corrosive.
PIN Number	UN2925
Proper Shipping Name	Flammable solid, corrosive, organic, n.o.s.
Packing Group (PG)	II
DOT Pictograms	 

Section XV. Other Regulatory Information and Pictograms

TSCA Chemical Inventory (EPA)	This product is ON the EPA Toxic Substances Control Act (TSCA) inventory.
WHMIS Classification (Canada)	WHMIS CLASS D-2B: Material causing other toxic effects (TOXIC).
EINECS Number (EEC)	203-782-3
EEC Risk Statements	R38- Irritating to skin. R41- Risk of serious damage to eyes. R10- Flammable. R34- Causes burns.
Japanese Regulatory Data	Not available.

Section XVI. Other Information**Version 1.0****Validated on 10/31/1997.****Printed 2/2/2005.****Notice to Reader**

TCI laboratory chemicals are for research purposes only and are NOT intended for use as drugs, food additives, household, 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.

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