

## Material Safety Data Sheet

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Version 1.2

According to 91/155/EEC

Classified as Hazardous according to the criteria of EU Annex 1 and NOHSC.

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1 - Product and Company Information

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Product Name	1,4-DIAMINOBTANE, 99%
Product Number	D13208
Company	Sigma-Aldrich Pty. Ltd. 12 Anella Avenue Castle Hill NSW 2154 Australia
Technical Phone #	+61 2 9841 0555 (1800 800 097)
Fax	+61 2 9841 0500 (1800 800 096)
Emergency Phone #	+44 8701906777 (1800 448 465)

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2 - Composition/Information on Ingredients

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Product Name	CAS #	EC no	Annex I Index Number
1,4-DIAMINOBTANE	110-60-1	203-782-3	None
Formula	C4H12N2		
Molecular Weight	88.15 AMU		
Synonyms	Butylenediamine * 1,4-Butylenediamine * 1,4-Diaminobutane * Putrescin * Putrescine * Tetramethylenediamine * 1,4-Tetramethylenediamine		

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3 - Hazards Identification

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SPECIAL INDICATION OF HAZARDS TO HUMANS AND THE ENVIRONMENT  
Highly flammable. Harmful in contact with skin and if swallowed.  
Causes burns.

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4 - First Aid Measures

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## AFTER INHALATION

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

## AFTER SKIN CONTACT

In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes.  
Call a physician.

## AFTER EYE CONTACT

In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

## AFTER INGESTION

If swallowed, wash out mouth with water provided person is

conscious. Call a physician.

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## 5 - Fire Fighting Measures

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### EXPLOSION DATA

Dust Potential: This material, like most materials in powder form, is capable of creating a dust explosion.

### EXTINGUISHING MEDIA

Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

### SPECIAL RISKS

Specific Hazard(s): Flammable solid. Emits toxic fumes under fire conditions.

### SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS

Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

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## 6 - Accidental Release Measures

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### PERSONAL PRECAUTION PROCEDURES TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area. Shut off all sources of ignition. Use nonsparking tools.

### PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

### METHODS FOR CLEANING UP

Avoid raising dust. Sweep up, place in a bag and hold for waste disposal. Ventilate area and wash spill site after material pickup is complete.

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## 7 - Handling and Storage

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### HANDLING

Directions for Safe Handling: Avoid contact with eyes, skin, and clothing. Avoid breathing dust. Avoid prolonged or repeated exposure.

### STORAGE

Conditions of Storage: Keep container closed. Keep away from heat, sparks, and open flame.

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## 8 - Exposure Controls / Personal Protection

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### ENGINEERING CONTROLS

Safety shower and eye bath. Use nonsparking tools. Mechanical exhaust required.

### GENERAL HYGIENE MEASURES

Wash thoroughly after handling.

### PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection: Government approved respirator.  
Hand Protection: Compatible chemical-resistant gloves.  
Eye Protection: Chemical safety goggles.

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## 9 - Physical and Chemical Properties

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Appearance	Physical State: Solid	
Property	Value	At Temperature or Pressure
pH	N/A	
BP/BP Range	60 - 61 °C	11 mmHg
MP/MP Range	25 °C	
Flash Point	51 °C	Method: closed cup
Flammability	N/A	
Autoignition Temp	N/A	
Oxidizing Properties	N/A	
Explosive Properties	N/A	
Explosion Limits	Lower: 0.98 % Upper: 9.08 %	
Vapor Pressure	N/A	
SG/Density	0.874 g/cm3	
Partition Coefficient	N/A	
Viscosity	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
Evaporation Rate	N/A	
Bulk Density	N/A	
Decomposition Temp.	N/A	
Solvent Content	N/A	
Water Content	N/A	
Surface Tension	N/A	
Conductivity	N/A	
Miscellaneous Data	N/A	
Solubility	Solubility in Water:Miscible.	

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## 10 - Stability and Reactivity

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### STABILITY

Stable: Stable.

Materials to Avoid: Acids, Acid chlorides, Acid anhydrides, Strong oxidizing agents.

### HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, and nitrogen oxides.

### HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

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## 11 - Toxicological Information

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RTECS NUMBER: EJ6800000

### ACUTE TOXICITY

LD50

Oral

Rat

463 mg/kg

Remarks: Behavioral:Somnolence (general depressed activity). Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Etosis. Kidney, Ureter, Bladder:Other changes in urine composition.

LD50

Intraperitoneal

Mouse

1750 MG/KG

Remarks: Behavioral:Muscle contraction or spasticity.

Vascular:BP lowering not characterized in autonomic section.

LD50

Skin

Rabbit

1576 mg/kg

Remarks: Behavioral:Somnolence (general depressed activity).

Kidney, Ureter, Bladder:Other changes in urine composition. Skin

and Appendages:Skin: After systemic exposure: Dermatitis, other

#### SIGNS AND SYMPTOMS OF EXPOSURE

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.

Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema.

Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Exposure may affect cell growth rate and morphology.

#### ROUTE OF EXPOSURE

Skin Contact: Causes burns.

Skin Absorption: Harmful if absorbed through skin.

Eye Contact: Causes burns.

Inhalation: May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.

Ingestion: Harmful if swallowed.

#### CHRONIC EXPOSURE - MUTAGEN

Mouse

2 MMOL/L

Cell Type: liver

Unscheduled DNA synthesis

Mouse

10 MMOL/L

Cell Type: Ascites tumor

DNA inhibition

Mouse

20 MMOL/L

Cell Type: liver

DNA inhibition

#### CHRONIC EXPOSURE - TERATOGEN

Species: Mouse

Dose: 314 MG/KG

Route of Application: Intraperitoneal

Exposure Time: (12D PREG)

Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Other effects to embryo. Specific Developmental Abnormalities: Musculoskeletal system.

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#### 12 - Ecological Information

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No data available.

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## 13 - Disposal Considerations

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### SUBSTANCE DISPOSAL

Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

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## 14 - Transport Information

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### RID/ADR

UN#: 2925  
Class: 4.1  
PG: II  
Proper Shipping Name: Flammable solid, corrosive, organic, n.o.s.

### IMDG

UN#: 2925  
Class: 4.1  
PG: II  
Subrisk: 8  
Proper Shipping Name: FLAMMABLE SOLID, CORROSIVE, ORGANIC, N.O.S.  
Marine Pollutant: No  
Severe Marine Pollutant: No  
Technical Name: Required

### IATA

UN#: 2925  
Class: 4.1  
PG: II  
Subrisk: 8  
Proper Shipping Name: Flammable solid, corrosive, organic, n.o.s.  
Inhalation Packing Group I: No  
Technical Name: Required

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## 15 - Regulatory Information

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### CLASSIFICATION AND LABELING ACCORDING TO EU DIRECTIVES

INDICATION OF DANGER: F C  
Highly Flammable. Corrosive.  
R-PHRASES: 11 21/22 34  
Highly flammable. Harmful in contact with skin and if swallowed. Causes burns.  
S-PHRASES: 16 26 36/37/39 45  
Keep away from sources of ignition - no smoking. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

### COUNTRY SPECIFIC INFORMATION

#### Germany

WGK: 2 (self-classification)

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## 16 - Other Information

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#### WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2005 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.

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