



SIGMA-ALDRICH

Material Safety Data Sheet

Date Printed: 04/27/2004
Date Updated: 04/11/2004
Version 1.60

Section 1 - Product and Company Information

Product Name: Bromine
Product Number: 207888
Brand: Aldrich Chemical
Company: Sigma-Aldrich
Street Address: 3050 Spruce Street
City, State, Zip, Country: SAINT LOUIS, MO 63103 US
Technical Phone: 314 771 5765
Fax: 800 325 5052
Emergency Phone: 414 273 3850 Ext. 5996

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313	EC no	Annex I Index Number
BROMINE	7726-95-6	Yes	231-778-1	035-001-00-5

Formula: Br₂
Synonyms: Brom (German), Brome (French), Bromine (ACGIH:OSHA), Bromo (Italian), Broom (Dutch), Dibromine

Section 3 - Hazards Identification

Emergency Overview
Oxidizing, Highly Toxic (USA) Very Toxic (EU), Dangerous for the environment.
Contact with combustible material may cause fire. Very toxic by inhalation. Causes severe burns. Very toxic to aquatic organisms.
Strong oxidizer. Lachrymator. Target organ(s): Lungs, Nerves.

HMIS Rating
Health: 3* Flammability: 0 Reactivity: 0 Special Hazard(s): Oxidizer

NFPA Rating
Health: 3 Flammability: 0 Reactivity: 0 Special Hazard(s): Oxidizer

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

Oral Exposure
If swallowed, wash out mouth with water provided person is conscious. Call a physician.

Inhalation Exposure
If inhaled, remove to fresh air. If breathing becomes difficult, call a physician.

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

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Eye Exposure
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.

Section 5 - Fire Fighting Measures

Explosion Hazards
Container explosion may occur under fire conditions.

Conditions of Flammability
Vigorously supports combustion.

Autoignition Temp: N/A

Firefighting
Protective Equipment
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s)
Emits toxic fumes under fire conditions. Contact with other material may cause fire. May accelerate combustion.

Section 6 - Accidental Release Measures

Procedure to be Followed in Case of Leak or Spill
Evacuate area and keep personnel upwind.

Procedure(s) of Personal Precaution(s)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

Methods for Cleaning Up
Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

Handling
User Exposure
Do not breathe the vapor. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure. Handle bromine only with equipment made of Kynar, Teflon, monel, Pyrex glass, and lead-lined steel.

Storage
Suitable
Keep tightly closed. Keep away from combustible materials, heat, sparks, and open flame. Store in a cool dry place.
Unsuitable
Do not store in polyethylene containers.

Special Requirements
May develop pressure. Open carefully.

Section 8 - Exposure Controls / PPE

Engineering Controls
Use only in a chemical fume hood. Safety shower and eye bath.

Personal Protective Equipment
Respiratory
Self-contained breathing apparatus should be worn
Eye
Use safety shield.
Other
Impervious protective clothing.

General Hygiene Measures

Wash thoroughly after handling. Remove and wash contaminated clothing promptly.

Exposure Limits

Country	Type	Value
Poland	NDS	0.7 MG/M3
Poland	NDSch	2 MG/M3
Poland	NDSP	

Exposure Limits, RTECS

Country	Source	Type	Value
USA	ACGIH	STEL	0.2 PPM
USA	ACGIH	TWA	0.1 PPM
USA	MSHA Standard-air	TWA	0.1 PPM (0.7 MG/M3)
USA	OSHA	PEL	8H TWA 0.1 PPM (0.7 MG/M3)
New Zealand	OEL		
Remarks: check ACGIH TLV			
USA	NIOSH	TWASTEL	0.1 PPM 0.3 PPM

Section 9 - Physical/Chemical Properties**Appearance**

Physical State
Liquid

Molecular Weight: 159.82 AMU

pH	N/A
BP/BP Range	58 - 59 °C
MP/MP Range	-7.2 °C
Freezing Point	N/A
Vapor Pressure	175 mmHg 20 °C
Vapor Density	7.14 g/l
Saturated Vapor Conc.	N/A
SG/Density	3.11 g/cm3
Bulk Density	N/A
Odor Threshold	N/A
Volatile%	N/A
VOC Content	N/A
Water Content	N/A
Solvent Content	N/A
Evaporation Rate	N/A
Viscosity	N/A
Partition Coefficient	N/A
Decomposition Temp.	N/A
Flash Point °F	N/A
Flash Point °C	N/A
Explosion Limits	N/A

Flammability N/A
Autoignition Temp N/A

Solubility N/A

N/A = not available

Section 10 - Stability and Reactivity**Stability**

Stable
Stable.

Materials to Avoid

Reducing agents, Alkali metals, Finely powdered metals, Aluminum, Stainless steel, Corrodes steel., Galvanized iron, Copper, Copper alloys, Organic materials, Bromine will attack some types of plastics, rubber, and coatings.

Hazardous Decomposition Products**Hazardous Decomposition Products**

Hydrogen bromide gas.

Hazardous Polymerization**Hazardous Polymerization**

Will not occur.

Section 11 - Toxicological Information**Route of Exposure****Skin Contact**

Causes severe burns.

Skin Absorption

May be harmful if absorbed through the skin.

Eye Contact

Causes severe burns.

Inhalation

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

Ingestion

May be harmful if swallowed.

Target Organ(s) or System(s)

Nerves. Lungs.

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 can cause: Cyanosis. Cardiovascular effects. Respiratory depression.

RTECS Number: EF9100000

Toxicity Data

Oral - Human: 14 mg/kg (LDLO)

Inhalation - Human: 1,000 ppm (LCLO)

Oral - Rat: 2600 mg/kg (LD50)

Inhalation - Rat: 2,700 mg/m3 (LC50)

Remarks: Lungs, Thorax, or Respiration: Other changes.

Oral - Mouse: 3100 mg/kg (LD50)

Inhalation - Mouse: 750 ppm (LC50)

Oral - Rabbit: 4160 mg/kg (LD50)

Oral - Guinea pig: 5500 mg/kg (LD50)

Oral - Mammal: 440 mg/kg (LD50)

Irritation Data

Eyes - :
Remarks: Severe irritation effect

Skin - :
Remarks: Severe irritation effect

Section 12 - Ecological Information

Acute Ecotoxicity Tests

Test Type
EC50 Daphnia
Species
Daphnia magna
Time: Value:
24.0 h 1.07 mg/l

Test Type
LC50 Fish
Species
Lepomis macrochirus (Bluegill)
Time: Value:
24.0 h 0.52 mg/l

Test Type
LC50 Fish
Species
Lepomis macrochirus (Bluegill)
Time: Value:
24.0 h 0.31 mg/l

Section 13 - Disposal Considerations

Appropriate Method of Disposal of Substance or Preparation

Contact a licensed professional waste disposal service to dispose of this material.
Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT

Proper Shipping Name: Bromine [or] Bromine solutions
UN#: 1744
Class: 8
Packing Group: Packing Group I
Hazard Label: Corrosive
Hazard Label: Poison inhalation hazard
PIH: Zone A

IATA

Proper Shipping Name: Bromine
IATA UN Number: 1744
Hazard Class: 8
Packing Group: I
Not Allowed - Aircraft: Not permitted for air transport.

Section 15 - Regulatory Information

EU Directives Classification

Symbol of Danger: T+ C N

Indication of Danger

Very toxic. Corrosive. Dangerous for the environment.

Risk Statements R: 26 35 50

Very toxic by inhalation. Causes severe burns. Very toxic to aquatic organisms.

Safety Statements S: 7/9 26 45 61

Keep container tightly closed and in well-ventilated place. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Avoid release to the environment. Refer to special instructions/safety data sheets.

US Classification and Label Text

Indication of Danger

Oxidizing. Highly Toxic (USA) Very Toxic (EU). Dangerous for the environment.

Risk Statements

Contact with combustible material may cause fire. Very toxic by inhalation. Causes severe burns. Very toxic to aquatic organisms.

Safety Statements

Keep container tightly closed and in well-ventilated place. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Avoid release to the environment. Refer to special instructions/safety data sheets.

US Statements

Strong oxidizer. Lachrymator. Target organ(s): Lungs. Nerves.

United States Regulatory Information

SARA Listed: Yes

Deminimis: 1 %

Notes: This product is subject to SARA section 313 reporting requirements.

TSCA Inventory Item: Yes

Canada Regulatory Information

WHMIS Classification

This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes

NDSL: No

Section 16 - Other Information

Disclaimer

For R&D use only. Not for drug, household or other uses.

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 2004 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.

