



SIGMA-ALDRICH

Material Safety Data Sheet

Date Printed: 01/28/2004
Date Updated: 09/05/2003
Version 1.50

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
BROMINE	7726-95-6	Yes
Formula	Br ₂	
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	Flammability: 0	Reactivity: 0	Special Hazard(s): Oxidizer
Health: 3*			
NFPA Rating	Flammability: 0	Reactivity: 0	Special Hazard(s): Oxidizer
Health: 3			

*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.

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 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.

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General Hygiene Measures

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

Exposure Limits

Country
Poland
Poland
Poland

Value
0.7 MG/M3
2 MG/M3

Type
NDS
NDSch
NDSP

Exposure Limits, RTECS

Country
USA
USA
USA

Value
0.2 PPM
0.1 PPM
0.1 PPM (0.7

Type
STEL
TWA
TWA

Source
ACGIH
ACGIH
MSHA Standard-air

OSHA

PEL

Value
8H TWA 0.1
PPM (0.7
MG/M3)

New Zealand

OEL

TWASTEL

Remarks: check ACGIH TLV

NIOSH

Value
0.1 PPM 0.3
PPM

Section 9 - Physical/Chemical Properties

Appearance

Physical State

Liquid

Molecular Weight:

159.82 AMU

pH

N/A

BP/MP Range

58 - 59 °C

Freezing Point

-7.2 °C

Vapor Pressure

175 mmHg

Saturated Vapor Conc.

7.14 g/l

SG/Density

3.11 g/cm3

Bulk Density

N/A

Odor Threshold

N/A

Volatiles

N/A

VOC 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

20 °C

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

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.

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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

Deminitals: 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. 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.

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1/28/04

MSDS Address Confirmation

Our records indicate your MSDS address as:

Acct.# 0049487708
SCHOOLCRAFT COLLEGE
18600 HAGGERTY RD
LIVONIA, MI 48152-3932
US

Address Correction:

Telephone: _____

Comments(if necessary):

Please read and sign below if your organization does not wish to receive any further MSDS mailings from Sigma Aldrich.

*I hereby certify that my organization meets all 29 CFR 1910.1200 OSHA HAZCOMM requirements by alternative means, electronic or otherwise, and do not require Sigma-Aldrich to send me a paper copy of MSDS' for any and all products ordered from Sigma-Aldrich Corporation.

Signature of Corporate Product Safety Director _____

Date _____

Please fax completed confirmation to our CMMG department at 877-380-2660 or 314-286-8083 or e-mail address changes to cmmg@sial.com.



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M A T E R I A L S A F E T Y D A T A S H E E T

PAGE 1

SECTION 1. - - - - - CHEMICAL IDENTIFICATION - - - - -

CATALOG #: 20788-8
NAME: BROMINE

SECTION 2. - - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - - -

CAS #: 7726-95-6
MF: BR2
EC NO: 231-778-1

SYNONYMS

BROM (GERMAN) * BROME (FRENCH) * BROMINE (ACGIH:DOT:OSHA) * BROMINE
SOLUTIONS (DOT) * BROMO (ITALIAN) * BROOM (DUTCH) * DIBROMINE *
UN1744 (DOT) *

SECTION 3. - - - - - HAZARDS IDENTIFICATION - - - - -

LABEL PRECAUTIONARY STATEMENTS

HIGHLY TOXIC (USA)

VERY TOXIC (EU)

CORROSIVE

CONTACT WITH COMBUSTIBLE MATERIAL MAY CAUSE FIRE.

VERY TOXIC BY INHALATION.

CAUSES SEVERE BURNS.

LACHRYMATOR.

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.

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).

SECTION 4. - - - - - FIRST-AID MEASURES - - - - -

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS
AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED
CLOTHING AND SHOES.

ASSURE ADEQUATE FLUSHING OF THE EYES BY SEPARATING THE EYELIDS

WITH FINGERS.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL

RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS.

CALL A PHYSICIAN IMMEDIATELY.

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CATALOG #: 20788-8
NAME: BROMINE

DISCARD CONTAMINATED CLOTHING AND SHOES.

SECTION 5. - - - - - FIRE FIGHTING MEASURES - - - - -

EXTINGUISHING MEDIA
NONCOMBUSTIBLE.

SPECIAL FIREFIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO
PREVENT CONTACT WITH SKIN AND EYES.

UNUSUAL FIRE AND EXPLOSIONS HAZARDS
VIGOROUSLY SUPPORTS COMBUSTION.
CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.
CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS.

SECTION 6. - - - - - ACCIDENTAL RELEASE MEASURES - - - - -

EVACUATE AREA.
USE ONLY IN A CHEMICAL FUME HOOD.
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 - - - - -

REFER TO SECTION 8.

SECTION 8. - - - - - EXPOSURE CONTROLS/PERSONAL PROTECTION - - - - -

WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT
GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.
USE ONLY IN A CHEMICAL FUME HOOD.
SAFETY SHOWER AND EYE BATH.
FACESHIELD (8-INCH MINIMUM).
DO NOT BREATHE VAPOR.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.
WASH THOROUGHLY AFTER HANDLING.
HIGHLY TOXIC.
LACHRYMATOR.
CORROSIVE.
HARMFUL VAPOR.
KEEP TIGHTLY CLOSED.
DO NOT STORE NEAR, NOR ALLOW CONTACT WITH, CLOTHING AND OTHER
COMBUSTIBLE MATERIAL.
MAY DEVELOP PRESSURE.

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PAGE 3

CATALOG #: 20788-8
NAME: BROMINE

STORE AWAY FROM HEAT AND DIRECT SUNLIGHT.
STORE IN A COOL DRY PLACE.

SECTION 9. - - - - - PHYSICAL AND CHEMICAL PROPERTIES - - - - -

APPEARANCE AND ODOR
DARK-RED LIQUID

PHYSICAL PROPERTIES

BOILING POINT: 58.8 C
MELTING POINT: -7.2 C
FLASHPOINT: NONE
VAPOR PRESSURE: 175MM 20 C 671MM 55 C
SPECIFIC GRAVITY: 3.119
VAPOR DENSITY: 7.14

SECTION 10. - - - - - STABILITY AND REACTIVITY - - - - -

INCOMPATIBILITIES

REDUCING AGENTS
ALKALI METALS
FINELY POWDERED METALS
ALUMINUM
CORRODES STEEL
STAINLESS STEEL
GALVANIZED IRON
COPPER, COPPER ALLOYS
ORGANIC MATERIALS

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
NATURE OF DECOMPOSITION PRODUCTS NOT KNOWN.

SECTION 11. - - - - - TOXICOLOGICAL INFORMATION - - - - -

ACUTE EFFECTS

MAY BE FATAL IF INHALED, SWALLOWED, OR ABSORBED THROUGH SKIN.
CAUSES BURNS.
MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF THE MUCOUS MEMBRANES
AND UPPER RESPIRATORY TRACT, EYES AND SKIN.
INHALATION MAY BE FATAL AS A RESULT OF 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.

RTECS #: EF9100000
BROMINE

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M A T E R I A L S A F E T Y D A T A S H E E T

PAGE 4

CATALOG #: 20788-8
NAME: BROMINE

TOXICITY DATA

ORL-HMN LDLO:14 MG/KG
IHL-HMN LCLO:1000 PPM
ORL-RAT LD50:2600 MG/KG
IHL-RAT LC50:2700 MG/M3
ORL-MUS LD50:3100 MG/KG
IHL-MUS LC50:750 PPM/9M
ORL-RBT LD50:4160 MG/KG
ORL-GPG LD50:5500 MG/KG
ORL-MAM LD50:440 MG/KG

34ZIAG -,645,69
34ZIAG -,645,69
GISAAA 35(11),11,70
GTPZAB 20(3),36,76
GISAAA 35(11),11,70
AIHAAP 39,129,78
GISAAA 35(11),11,70
GISAAA 35(11),11,70
GISAAA 39(4),86,74

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

SECTION 12. ----- ECOLOGICAL INFORMATION -----

DATA NOT YET AVAILABLE.

SECTION 13. ----- DISPOSAL CONSIDERATIONS -----

CAUTIOUSLY ACIDIFY A 3% SOLUTION OR A SUSPENSION OF THE MATERIAL TO PH 2 WITH SULFURIC ACID. GRADUALLY ADD A 50% EXCESS OF AQUEOUS SODIUM BISULFITE WITH STIRRING AT ROOM TEMPERATURE. AN INCREASE IN TEMPERATURE INDICATES THAT A REACTION IS TAKING PLACE. IF NO REACTION IS OBSERVED ON THE ADDITION OF ABOUT 10% OF THE SODIUM BISULFITE SOLUTION INITIATE IT BY CAUTIOUSLY ADDING MORE ACID. IF MANGANESE, CHROMIUM, OR MOLYBDENUM ARE PRESENT ADJUST THE PH OF THE SOLUTION TO 7 AND TREAT WITH SULFIDE TO PRECIPITATE FOR BURIAL AS HAZARDOUS WASTE. DESTROY EXCESS SULFIDE. NEUTRALIZE AND FLUSH THE SOLUTION DOWN THE DRAIN. OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14. ----- TRANSPORT INFORMATION -----

CONTACT ALDRICH CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.

SECTION 15. ----- REGULATORY INFORMATION -----

EUROPEAN INFORMATION

EC INDEX NO: 035-001-00-5
VERY TOXIC
CORROSIVE
R 26
VERY TOXIC BY INHALATION.
R 35
CAUSES SEVERE BURNS.
S 7/9

CONTINUED ON NEXT PAGE

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PO#: 815436

M A T E R I A L S A F E T Y D A T A S H E E T

PAGE 5

CATALOG #: 20788-8
NAME: BROMINE

KEEP CONTAINER TIGHTLY CLOSED AND IN WELL-VENTILATED PLACE.

S 26

IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.

S 36/37/39

WEAR SUITABLE PROTECTIVE CLOTHING, GLOVES AND EYE/FACE PROTECTION.

S 45

IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).

REVIEWS, STANDARDS, AND REGULATIONS

DEL=MAK

ACGIH TLV-TWA 0.1 PPM; STEL 0.3 PPM 85INA8 6,150.91
EPA FIFRA 1988 PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION

FEREAC 54,7740.89

MSHA STANDARD-AIR:TWA 0.1 PPM (0.7 MG/M3)

DTLVS* 3,27.71

OSHA PEL (GEN INDU):8H TWA 0.1 PPM (0.7 MG/M3)

CFRGBR 29,1910.1000.94

OSHA PEL (CONSTRUC):8H TWA 0.1 PPM (0.7 MG/M3)

CFRGBR 29,1926.55.94

OSHA PEL (SHIPYARD):8H TWA 0.1 PPM (0.7 MG/M3)

CFRGBR 29,1915.1000.93

OSHA PEL (FED CONT):8H TWA 0.1 PPM (0.7 MG/M3)

CFRGBR 41,50-204.50.94

DEL-ARAB REPUBLIC OF EGYPT:TWA 0.1 PPM (0.7 MG/M3) JAN93

DEL-AUSTRALIA:TWA 0.1 PPM (0.7 MG/M3);STEL 0.3 PPM (2 MG/M3) JAN93

DEL-AUSTRIA:TWA 0.1 PPM (0.7 MG/M3) JAN93

DEL-BELGIUM:TWA 0.1 PPM (0.66 MG/M3);STEL 0.3 PPM (2 MG/M3) JAN93

DEL-DENMARK:TWA 0.1 PPM (0.7 MG/M3) JAN93

DEL-FINLAND:STEL 0.1 PPM (0.7 MG/M3);SKIN JAN93

DEL-FRANCE:STEL 0.1 PPM (0.7 MG/M3) JAN93

DEL-GERMANY:TWA 0.1 PPM (0.7 MG/M3) JAN93

DEL-HUNGARY:STEL 0.7 MG/M3;SKIN JAN93

DEL-INDIA:TWA 0.1 PPM (0.7 MG/M3);STEL 0.3 PPM (2 MG/M3) JAN93

DEL-JAPAN:TWA 0.1 PPM (0.65 MG/M3) JAN93

DEL-THE NETHERLANDS:TWA 0.1 PPM (0.7 MG/M3) JAN93

DEL-THE PHILIPPINES:TWA 0.1 PPM (0.7 MG/M3) JAN93

DEL-POLAND:TWA 0.7 MG/M3 JAN93

DEL-RUSSIA:TWA 0.1 PPM;STEL 0.5 MG/M3 JAN93

DEL-SWEDEN:TWA 0.1 PPM (0.7 MG/M3);STEL 0.3 PPM (2 MG/M3) JAN93

DEL-SWITZERLAND:TWA 0.1 PPM (0.7 MG/M3);STEL 0.2 PPM (1.4 MG/M3) JAN93

DEL-TURKEY:TWA 0.1 PPM (0.7 MG/M3) JAN93

DEL-UNITED KINGDOM:TWA 0.1 PPM (0.7 MG/M3);STEL 0.3 PPM JAN93

DEL IN BULGARIA, COLOMBIA, JORDAN, KOREA CHECK ACGIH TLV

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M A T E R I A L S A F E T Y D A T A S H E E T

PAGE 6

CATALOG #: 20788-8
NAME: BROMINE

DEL IN NEW ZEALAND, SINGAPORE, VIETNAM CHECK ACGIH TLV
NIOSH REL TO BROMINE-AIR:10H TWA 0.1 PPM;STEL 0.3 PPM
NIOSH* DHHS #92-100,92
NOHS 1974: HZD 13100; NIS 17; TNF 583; NOS 16; TNE 23977
NOES 1983: HZD 13100; NIS 40; TNF 1679; NOS 55; TNE 62214; TFE 10780
EPA TSCA SECTION 8(B) CHEMICAL INVENTORY
EPA TSCA SECTION 8(D) UNPUBLISHED HEALTH/SAFETY STUDIES
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, APRIL 1996
NIOSH ANALYTICAL METHOD, 1994: BROMINE AND CHLORINE, 6011
OSHA ANALYTICAL METHOD #ID-108

U.S. INFORMATION

THIS PRODUCT IS SUBJECT TO SARA SECTION 313 REPORTING REQUIREMENTS.

SECTION 16. - - - - - OTHER INFORMATION- - - - -

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CUST # 938609 DATE: 03/10/87
P.O. #

*Mr
ve
updated*

M A T E R I A L S A F E T Y D A T A S H E E T

PAGE: 1

IDENTIFICATION

PRODUCT # 20788-8 NAME: BROMINE
CAS # 7726-95-6

TOXICITY HAZARDS

RTECS # EF9100000

BROMINE

TOXICITY DATA

ORL-HMN LDLO: 14 MG/KG

IHL-HMN LCLO: 1000 PPM

IHL-MUS LC50: 750 PPM/9M

34ZIAG -,645,69

34ZIAG -,645,69

AIHAAP 39,129,78

REVIEWS, STANDARDS, AND REGULATIONS

MSHA STANDARD-AIR: TWA 0.1 PPM (0.7 MG/M3) DTLVS* 3,27,71

OSHA STANDARD-AIR: TWA 0.1 PPM FEREAC 39,23540,74

EPA GENETIC TOXICOLOGY PROGRAM, JANUARY 1984

REPORTED IN EPA TSCA INVENTORY, 1983

MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FEREAC 47,30420,
82

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS)
DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

HEALTH HAZARD DATA

ACUTE EFFECTS

DANGER

HIGHLY TOXIC.

CORROSIVE.

CAUSES BURNS.

MAY BE FATAL IF INHALED, SWALLOWED, OR ABSORBED THROUGH SKIN.

INHALATION MAY BE FATAL AS A RESULT OF SPASM, INFLAMMATION AND EDEMA

OF THE LARYNX AND BRONCHI, CHEMICAL PNEUMONITIS AND PULMONARY EDEMA.

HIGH CONCENTRATIONS ARE EXTREMELY DESTRUCTIVE TO TISSUES OF THE MUCOUS

MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN.

VAPOR OR MIST IS IRRITATING TO THE EYES, MUCOUS MEMBRANES AND UPPER

RESPIRATORY TRACT.

FIRST AID

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS
AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED
CLOTHING AND SHOES.

ASSURE ADEQUATE FLUSHING OF THE EYES BY SEPARATING THE EYELIDS
WITH FINGERS.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL
RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IF BREATHING IS DIFFICULT,
GIVE OXYGEN.

IN CASE OF EXPOSURE, OBTAIN MEDICAL ATTENTION IMMEDIATELY.

DISCARD CONTAMINATED CLOTHING AND SHOES.

WASH THOROUGHLY AFTER HANDLING.

PHYSICAL DATA

MELTING POINT: -7.2 C

BOILING POINT: 58.8 C

SPECIFIC GRAVITY: 3.119

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PAGE: 2

CATALOG # 20788-8

NAME: BROMINE

----- FIRE AND EXPLOSION HAZARD DATA -----

FLASH POINT: NONE
EXTINGUISHING MEDIA
NONCOMBUSTIBLE.
SPECIAL FIRE FIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO
PREVENT CONTACT WITH SKIN AND EYES.
UNUSUAL FIRE AND EXPLOSION HAZARDS
STRONG OXIDIZER.
CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.
CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS.

----- REACTIVITY DATA -----

INCOMPATIBILITIES
REDUCING AGENTS
ALKALI METALS
FINELY POWDERED METALS
ALUMINUM
CORRODES STEEL
STAINLESS STEEL
GALVANIZED IRON
COPPER, COPPER ALLOYS
ORGANIC MATERIALS
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
TOXIC FUMES

----- SPILL OR LEAK PROCEDURES -----

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

EVACUATE AREA.
WEAR FULL PROTECTIVE EQUIPMENT SUCH AS, A BUTYL RUBBER CHEMICAL-PROOF
AIR SUIT, WITH BREATHING AIR SUPPLIED.
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.

WASTE DISPOSAL METHOD

IN A RETENTION AREA, DROWN THE MATERIAL BY FLOODING WITH WATER OR BY
ADDING IT TO A VERY LARGE EXCESS OF WATER AT A CONTROLLED RATE. ADJUST
THE PH TO NEUTRAL AND PROCESS ANY INSOLUBLE MATERIALS AS HAZARDOUS
WASTE. THE HYDROLYSIS AND NEUTRALIZATION REACTIONS MAY GENERATE LARGE
QUANTITIES OF HEAT AND FUMES. THEREFORE APPROPRIATE CARE SHOULD
BE TAKEN.

OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.

--- PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE ---

CHEMICAL SAFETY GOGGLES.
RUBBER APRON.
USE ONLY IN A CHEMICAL FUME HOOD.
OSHA/MSHA-APPROVED RESPIRATOR IN NONVENTILATED AREAS AND/OR FOR
EXPOSURE ABOVE TLV.
FACESHIELD (8-INCH MINIMUM).
DO NOT BREATHE VAPOR.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
KEEP TIGHTLY CLOSED.
MAY DEVELOP PRESSURE.
DO NOT STORE NEAR, NOR ALLOW CONTACT WITH, CLOTHING AND OTHER
COMBUSTIBLE MATERIAL.
STORE AWAY FROM HEAT AND DIRECT SUNLIGHT.
STORE IN A COOL DRY PLACE.

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PAGE: 3

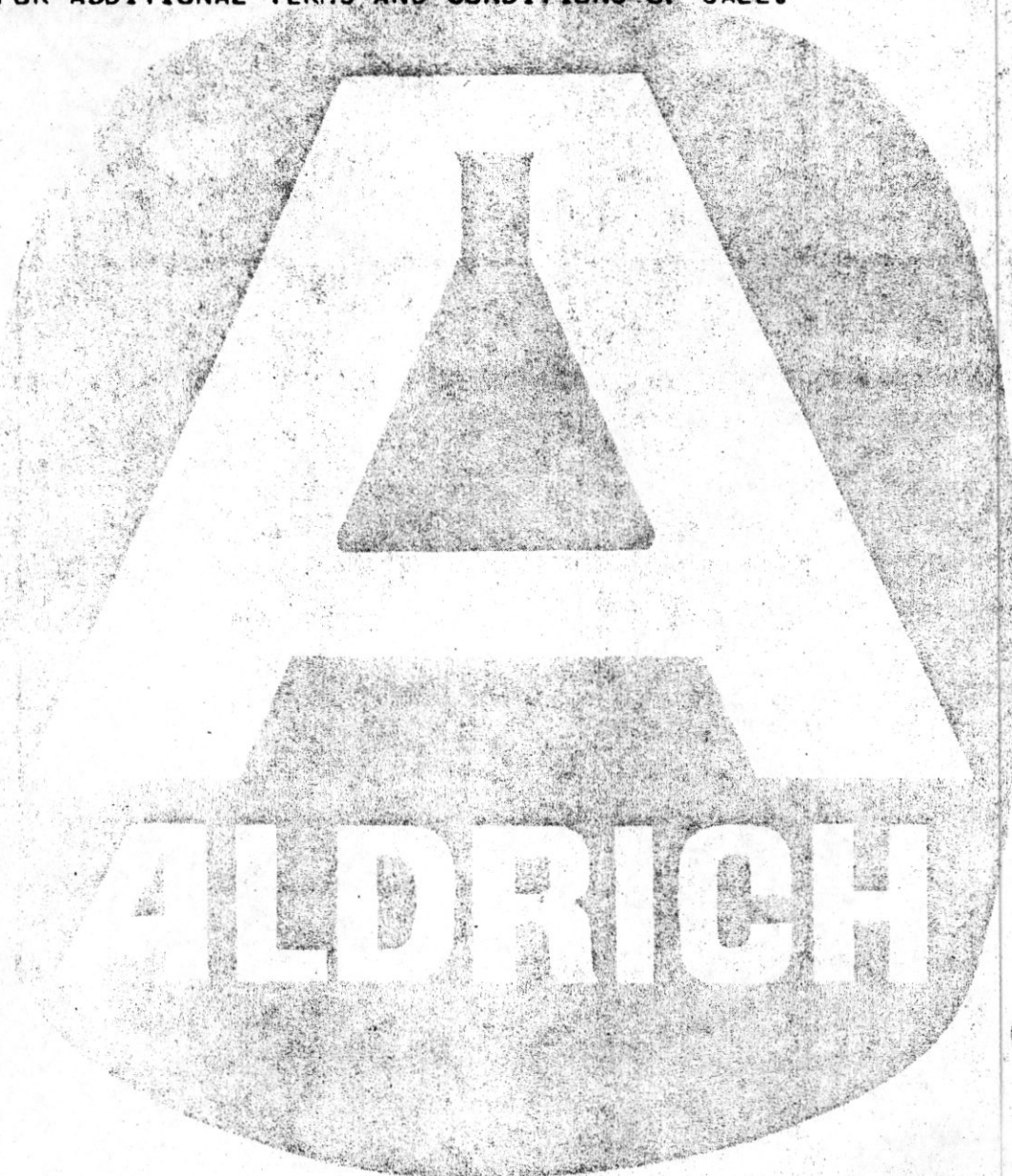
CATALOG # 20788-8

NAME: BROMINE

----- ADDITIONAL PRECAUTIONS AND COMMENTS -----

NOT APPLICABLE

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