Bromine

J.T. BAKER INC., 222 Red School Lane, Phillipsburg, NJ 08865

SECTION I - PRODUCT IDENTIFICATION

Product Name: Bromine
Common Synonyms: N/A
Chemical Family: Halogens
Formula: Br
Formula Wt.: 79.90
CAS No.: 7726-95-6
NIOSH/RTECS No.: EF9100000
Product Use: Laboratory Reagent
Product Codes: 9764,9780

PRECAUTIONARY LABELING

BAKER SAF-T-DATA System

HEALTH FLAMMABILITY REACTIVITY CONTACT
4 0 3 4
EXTREME NONE SEVERE EXTREME

Laboratory Protective Equipment

GOGGLES & SHIELD LAB COAT & APRON VENT HOOD PROPER GLOVES

U.S. Precautionary Labeling

POISON! DANGER!
CAUSES SEVERE BURNS. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR EXTREMELY IRITATING. INHALATION HAZARD. STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.
Keep from contact with clothing and other combustible materials. Do not store near combustible materials. Do not get in eyes, on skin, on clothing. Do not breathe vapor. Use only with adequate ventilation and in a closed system. Wear goggles, synthetic rubber gloves, and synthetic rubber protective clothing when handling. Keep in tightly closed container. Wash thoroughly after handling. In case of fire, soak with water. In case of spill, keep upwind and flush away by flooding with water applied quickly to entire spill.

Continued on Page: 2
B305-04
Effective: 05/01/89

International Labeling

Very toxic by inhalation. Causes severe burns.
Keep container tightly closed and in a well-ventilated place. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

SAF-T-DATA* Storage Color Code: Yellow Stripe (store separately)

SECTION II - COMPONENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS No.</th>
<th>Weight %</th>
<th>OSHA/PEL</th>
<th>ACGIH/TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bromine</td>
<td>7726-95-6</td>
<td>90-100</td>
<td>0.1 ppm</td>
<td>0.1 ppm</td>
</tr>
</tbody>
</table>

SECTION III - PHYSICAL DATA

- Boiling Point: 59°C (138°F) (at 760 mm Hg)
- Melting Point: -7°C (19°F) (at 760 mm Hg)
- Specific Gravity: 3.12 (H₂O=1)
- Solubility (H₂O): Moderate (1-10%)
- pH: N/A
- Odor Threshold (ppm): N/A
- Coefficient Water/Oil Distribution: N/A

Vapor Pressure (mmHg): 226 (20°C)
Vapor Density (air=1): 7.1
Evaporation Rate: N/A
% Volatiles by Volume: 100 (21°C)
Physical State: Liquid

Continued on Page: 3
B3905-04
Effective: 05/01/89

Page: 3
Issued: 02/05/91

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Closed Cup): N/A
Autoignition Temperature: N/A
Flammable Limits: Upper - N/A Lower - N/A

Fire Extinguishing Media
Use water spray.

Special Fire-Fighting Procedures
Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode. Move containers from fire area if it can be done without risk. Use water to keep fire-exposed containers cool.

Unusual Fire & Explosion Hazards
Strong oxidizer. Contact with other material may cause fire.

Toxic Gases Produced
hydrogen bromide

Explosion Data-Sensitivity to Mechanical Impact
None identified.

Explosion Data-Sensitivity to Static Discharge
None identified.

SECTION V - HEALTH HAZARD DATA

Threshold Limit Value (TLV/TWA): 0.7 mg/m³ (0.1 ppm)
Short-Term Exposure Limit (STEL): 2 mg/m³ (0.3 ppm)
Permissible Exposure Limit (PEL): 0.7 mg/m³ (0.1 ppm)

Toxicity of components

Inhalation Mouse LC₅₀ for Bromine 750 ppm

Carcinogenicity: NTP: No IARC: No Z List: No OSHA Reg: No

Continued on Page: 4

0031
Bromine

Carcinogenicity
None identified.

Reproductive Effects
None identified.

Effects of Overexposure

INHALATION: irritation of nose and throat, severe irritation of respiratory system, coughing, chest pains, irritation of nose and throat, may cause pulmonary edema

SKIN CONTACT: irritation, severe irritation or burns

EYE CONTACT: irritation, severe irritation or burns

SKIN ABSORPTION: none identified

INGESTION: nausea, vomiting, gastrointestinal irritation, burns to mouth and throat

CHRONIC EFFECTS: none identified

Target Organs
respiratory system, eyes, skin, central nervous system, heart

Medical Conditions Generally Aggravated by Exposure
asthma, heart disorders, respiratory system disease, damaged skin

Primary Routes of Entry
inhalation, ingestion, eye contact, skin contact

Emergency and First Aid Procedures

INGESTION: CALL A PHYSICIAN. If swallowed, do NOT induce vomiting. If conscious, give water, milk, or milk of magnesia.

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

SKIN CONTACT: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before re-use.
SECTION V - HEALTH HAZARD DATA (CONTINUED)

EYE CONTACT: In case of eye contact, immediately flush with plenty of water for at least 15 minutes.

SARA/TITLE III HAZARD CATEGORIES and LISTS

Acute: Yes Chronic: Yes Flammability: Yes Pressure: No Reactivity: No
Extremely Hazardous Substance: Yes Contains Bromine (RQ = 1 LB, TPQ = 500 LBS)
CERCLA Hazardous Substance: No
SARA 313 Toxic Chemicals: No
TSCA Inventory: Yes

SECTION VI - REACTIVITY DATA

Stability: Stable Hazardous Polymerization: Will not occur
Conditions to Avoid: heat, moisture, sunlight
Incompatibles: strong reducing agents, combustible materials, most common metals, potassium, alkalies, organic materials, alcohols, amines and ammonia
Decomposition Products: hydrogen bromide

SECTION VII - SPILL & DISPOSAL PROCEDURES

Steps to be Taken in the Event of a Spill or Discharge
Wear self-contained breathing apparatus and full protective clothing. Stop leak if you can do so without risk. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Flush area with flooding amounts of water. (Use caution.)

Disposal Procedure
Dispose in accordance with all applicable federal, state, and local environmental regulations.

Hazardous Waste Number: D001, D002 (Ignitable, Corrosive Waste)
B395 - 04
Effective: 05/01/89

Bromine

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

Ventilation: Use general or local exhaust ventilation to meet TLV requirements.

Respiratory Protection: Respiratory protection required if airborne concentration exceeds TLV. At concentrations up to 5 ppm, a chemical cartridge respirator with acid cartridge is recommended. Above this level, a self-contained breathing apparatus is advised.

Eye/Skin Protection: Safety goggles with face shield, uniform, protective suit, synthetic rubber gloves are recommended.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

Storage Color Code: Yellow Stripe (store separately)

Storage Requirements
Keep container tightly closed. Store separately and away from flammable and combustible materials. Keep containers out of sun and away from heat. Store above 6°C.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

Domestic (D.O.T.)

Proper Shipping Name: Bromine, "POISON - INHALATION HAZARD"
Hazard Class: Corrosive material (liquid)
UN/NA: UN1744
Labels: CORROSIVE, POISON
Regulatory References: 49CFR 172.101; 173.252; 173.3a

International (I.M.O.)

Proper Shipping Name: Bromine
Hazard Class: 8
UN: UN1744
Marine Pollutants: No
Labels: CORROSIVE, POISON
Regulatory References: 49CFR 172.102; Part 176; IMO

Continued on Page: 7
SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (CONTINUED)

AIR (I.C.A.O.)

Proper Shipping Name: Bromine
Hazard Class: 8
UN: UN1744
Packaging Group: I
Labels: CORROSIVE, POISON
Regulatory References: 49CFR 172.101; 173.6; Part 175; ICAO/IATA
U.S. Customs Harmonization Number: 28013020007

N/A = Not Applicable or Not Available
N/E = Not Established

The information in this Material Safety Data Sheet meets the requirements of the United States OCCUPATIONAL SAFETY AND HEALTH ACT and regulations promulgated thereunder (29 CFR 1910.1200 et. seq.) and the Canadian WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. This document is intended only as a guide to the appropriate precautionary handling of the material by a person trained in, or supervised by a person trained in, chemical handling. The user is responsible for determining the precautions and dangers of this chemical for his or her particular application. Depending on usage, protective clothing including eye and face guards and respirators must be used to avoid contact with material or breathing chemical vapors/fumes.

Exposure to this product may have serious adverse health effects. This chemical may interact with other substances. Since the potential uses are so varied, Baker cannot warn of all of the potential dangers of use or interaction with other chemicals or materials. Baker warrants that the chemical meets the specifications set forth on the label.

BAKER DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.

The user should recognize that this product can cause severe injury and even death, especially if improperly handled or the known dangers of use are not heeded. READ ALL PRECAUTIONARY INFORMATION. As new documented general safety information becomes available, Baker will periodically revise this Material Safety Data Sheet.

Note: CHEMTREC, CANUTEC, and NATIONAL RESPONSE CENTER emergency telephone numbers are to be used ONLY in the event of CHEMICAL EMERGENCIES involving a spill, leak, fire, exposure, or accident involving chemicals. All non-emergency questions should be directed to Customer Service (1-800-JTBAKER) for assistance.

Continued on Page: 8
B3-05-04  Bromine
Effective: 05/01/89

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Approved by Quality Assurance Department.