Material Safety Data Sheet
Bromine, p.a.

MSDS# 95925

Section 1 - Chemical Product and Company Identification

MSDS Name: Bromine, p.a.
Catalog Numbers: AC196660000, AC196660010, AC196660250, AC196662500, AC402840000, AC402840010
Synonyms: Dibromine; Diatomic bromine; Bromine molecule.

Company Identification:
Acros Organics BVBA
Janssen Pharmaceuticala 3a
2440 Geel, Belgium

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

For information in the US, call:
800-ACROS-01
For information in Europe, call:
+32 14 57 52 11
Emergency Number, Europe:
+32 14 57 52 99
Emergency Number US:
201-796-7100
CHEMTREC Phone Number, US:
800-424-9300
CHEMTREC Phone Number, Europe:
703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#: 7726-95-6
Chemical Name: Bromine
%
EINECS#: 231-778-1

Hazard Symbols: T+ C N
Risk Phrases: 26 35 50

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Danger! Strong oxidizer. Contact with other material may cause a fire. Causes eye and skin burns. Causes digestive and respiratory tract burns. May be fatal if inhaled. Corrosive to metal. Target Organs: Eyes, skin, mucous membranes.

Potential Health Effects

Eye: Causes eye burns. Lachrymator (substance which increases the flow of tears). Vapors may cause eye injury.
      May cause permanent corneal opacification.

Skin: Contact with liquid is corrosive and causes severe burns and ulceration.

Ingestion: Causes gastrointestinal tract burns.
           May be fatal if inhaled. Causes chemical burns to the respiratory tract. Bromine vaporizes rapidly at room temperature. Potential symptoms of overexposure are dizziness, headache, nosebleed, coughing, feeling of oppression, pulmonary edema and pneumonia.

Chronic: Prolonged inhalation may cause respiratory tract inflammation and lung damage.
Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.

Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

Ingestion: If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

Inhalation: POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician:

Section 5 - Fire Fighting Measures

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Strong oxidizer. Contact with other material may cause fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products.

Extinguishing Media: Use extinguishing media most appropriate for the surrounding fire.

Autoignition Temperature: Not applicable.
Flash Point: Not applicable.
Explosion Limits: Lower:
Explosion Limits: Upper:
NFPA Rating: ; instability: OX

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Use water spray to disperse the gas/vapor. Provide ventilation. Evacuate unnecessary personnel. Approach spill from upwind.

Control runoff and isolate discharged material for proper disposal. Neutralize with lime water slurry, soda ash, or hypo solution (36.5 lb sodium thiosulfate in 50 gallons water), and flush to sump with cold water. Maintain mild ammonia atmosphere while cleaning up to minimize vapor attack.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Discard contaminated shoes. Do not breathe vapor or mist. Inform laundry personnel of contaminant's hazards. Use only with adequate ventilation or respiratory protection. Handle bromine only with equipment made of Kynar, Teflon, Monel, Pyrex, glass or lead-lined steel.

Keep away from heat, sparks, and flame. Do not store near combustible materials. Do not store in direct sunlight.

Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Keep away from reducing agents. Loosen closure cautiously before opening.

Section 8 - Exposure Controls, Personal Protection

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bromine</td>
<td>0.1 ppm; 0.2 ppm</td>
<td>0.1 ppm TWA; 0.7</td>
<td>0.1 ppm TWA; 0.7</td>
</tr>
<tr>
<td></td>
<td>STEL</td>
<td>mg/m3 TWA 3 ppm</td>
<td>mg/m3 TWA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IDLH</td>
<td></td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Bromine: 0.1 ppm TWA; 0.7 mg/m3 TWA

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Personal Protective Equipment

Eyes: Wear chemical splash goggles and face shield.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a Respirators: NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Color: dark red-brown
Odor: suffocating odor
pH: Not available
Vapor Pressure: 175 mm Hg @ 20 deg C
Vapor Density: 5.51 (air=1)
Evaporation Rate: Not available
Viscosity: 0.98 cps @ 20 deg C
Boiling Point: 58.7 deg C (137.66°F)
Freezing/Melting Point: -7.2 deg C (19.04°F)
Decomposition Temperature: Not available
Solubility in water: Negligible
Specific Gravity/Density: 3.11 g/cm3
Molecular Formula: Br2
Molecular Weight: 159.81

Section 10 - Stability and Reactivity

Chemical Stability: Stable.
Conditions to Avoid: Confined spaces.
Incompatibilities with Other Materials: Metals, reducing agents, acrylonitrile, alcohols, ammonia, fluorine, acetaldehyde, acetylene, alkalies, arsenites, mercurous salts, hypophosphites, ignition or explosion may occur with readily oxidizable, organic, or flammable materials or chemical accelerants, ferrous salts.
Hazardous Decomposition Products: Hydrogen bromide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: CAS# 7726-95-6: EF9100000

RTECS:

CAS# 7726-95-6: Inhalation, mouse: LC50 = 750 ppm/9M;
Inhalation, mouse: LC50 = 2900 mg/m3;
Inhalation, rat: LC50 = 2700 mg/m3;
Inhalation, rat: LC50 = 2700 mg/m3;
Oral, mouse: LD50 = 3100 mg/kg;
Oral, rabbit: LD50 = 2500 mg/kg;
Oral, rat: LD50 = 1700 mg/kg;

LD50/LC50:

Other: In a derived model for the lethal toxicity of bromine to humans, the concentrations lethal at the 50% level for a 10-minute exposure with a standard level of activity are estimated as 650, 260, and 546 ppm for the "regular, vulnerable, and average" populations, respectively; in the same populations, the estimates are
375, 150, and 315 ppm, respectively, for a 30-minute exposure. Bromine is considered to be 1.5 times less toxic than chlorine.

Carcinogenicity: Bromine - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.

Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Other: No information available.

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT
Shipping Name: BROMINE
Hazard Class: 8
UN Number: UN1744
Packing Group: I
Canada TDG
Shipping Name: BROMINE
Hazard Class: 8.61
UN Number: UN1744
Packing Group: I

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T+ C N
Risk Phrases:
  R 26 Very toxic by inhalation.
  R 35 Causes severe burns.
  R 50 Very toxic to aquatic organisms.
Safety Phrases:
  S 7/9 Keep container tightly closed and in a well-ventilated place.
  S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
  S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
  S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 7726-95-6: 3

Canada

CAS# 7726-95-6 is listed on Canada's DSL List
Canadian WHMIS Classifications: C, D1A, E
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
CAS# 7726-95-6 is listed on Canada's Ingredient Disclosure List

US Federal

TSCA

CAS# 7726-95-6 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 9/02/1997
réclamations, aux pertes ou aux dommages aux tiers ou pour les profits perdus ou quelconques dommages-intérêts particuliers, indirects, accessoires ou autrement occasionnés même au cas où la société aurait été informée que lesdits dommages puissent survenir.

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REVIEWED

DATE: 02 April 2012

[Signature]