



MATERIAL SAFETY DATA SHEET

1. Identification of the substance & the company

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| Chemical Name | Bromine |
| Chemical formula | Br ₂ |
| Chemical family | Halogens |
| Molecular weight | 159.81 |
| Type of product and use | For manufacturing of pharmaceuticals, flame retardants, dyes, fumigants, sanitizers, petrol antiknock compounds and other organic derivative . An analytical reagent. |
| Company | Solaris Chemtech Limited Khavda marine chemical complex, P/O Khavda - 370510. (Tal.) Bhuj Dist:Kutch, Gujarat, India. |
| Telephone (Works) | : 02803- 288255 |
| Fax Works) | : 02803-288216 |
| Tele (Bhuj office) | : 02832 –254252 ,2 27768 |
| Fax (Bhuj office) | : 02832-253386 |
| Contact persons in | : Mr. Y.SINGH |
| Emergency | : Mr. M.G. Mavani Mr. A.K.PANDEY |

2.composition/information on ingredients

| Component | Weight % | Annex No. | EEC No. | Classification | Notes |
|----------------------|----------|---------------|-----------|-----------------------------|-------|
| BROMINE 7726-95-6 | 99.9 | #035-001-00-5 | 231-778-1 | T+; R26 C; R35 N; R50 | |

3. Hazards identification

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| Adverse human health effects | :Very toxic by inhalation Liquid bromine rapidly attacks the skin and other tissues, producing irritation and burn which heal very slowly. Even comparatively low concentrations of vapor are highly irritating and painful to the respiratory tract. |
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4. First-aid measures

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| Eye contact | :Holding the eyelids apart, flush eyes promptly with copious flowing water for at least 20 minutes. Get medical attention immediately. |
| Skin contact | Flood skin with water directing a stream of water under the clothing it is being removed. Wash skin thoroughly with mild soap and plenty of water for at least 15 minutes. Get medical attention immediately. It is highly important to wash immediately, with water, any contaminated skin or eyes and then get medical attention. NO DECONTAMINANTS OTHER THAN WATER SHOULD BE USED BE ON HUMANS. |
| Inhalation | In case of inhalation, remove person to fresh air. Keep him quite and warm. Apply artificial respiration if necessary and get medical attention immediately. |
| Ingestion | If swallowed, wash mouth thoroughly with plenty of water. Get medical attention immediately. NOTE: Never give an unconscious person to drink. |
| Notes to physician | Corrosive In case ingestion DO NOT induce vomiting. No specific antidote. Treat symptomatically and supportively. |

5. Fire – fighting measures

| | |
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| Flash point | None |
| Auto-ignition temp. | Not self –ignitable. |
| Suitable extinguishing media | Material is not combustible. Use extinguishing media appropriate to surrounding fire conditions. |
| Fire fighting procedure | Stay upwind.Avoid any bodily contact. Wear self-contained breathing appatus in positive pressure mode and appropriate protective clothing. Wear full chemical protective suit if contact with material or dense fumes smoke anticipated. Use water from side and from safe distance to keep fire exposed containers cool. |
| Unusal fire and explosion | Although non-combustible it self,this fuming liquid will react with combustible materials and may cause them to Ignite.Hydrogen,many organic compounds and some metals will burn in a bromine atmosphere. If exposed to fire. Containers may exposed violently releasing their contents. |

6. Accident release measures

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| Personal precaution | Evacuate area. Full protective clothing ,including self-contained breathing apparatus,must be used. |
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Method for cleaning up

Consult an expert. Collect liquid in sealable containers. Neutralize and wash away.

In case of vapour leakage, release gaseous anhydrous ammonia from a safe distance. In general, lime slurry is the most commonly used neutralizing agent due to its availability. The bromine safety Hand book focuses entirely on this method of treatment which is used by SCL emergency team.

The following neutralizing agents for liquid bromine are listed in order of neutralizing efficiency.

1. 10-50% potassium carbonate solution.

2. 10-30% sodium carbonate solution.

3. 5-10% sodium bicarbonate solution.

4. Sodium thiosulfate solution (prepared by dissolving 4kg of technical grade sodium thio sulfate in 9 litre of water and adding 100gr of soda ash)

please note that there is a high heat of reaction release in this procedure.

5. 5% magnesium hydroxide slurry (very slow neutralization action)

6. 5% slaked lime

7. Handling and storage.

Handling

Avoid breathing vapours and any other bodily contact.

Keep above -6.7°C to prevent freezing.

All personnel handling bromine should be fully trained and provided with suitable protective clothing. Totally enclosed system should be used for processes involving bromine.

Pipe work and tanks should be checked regularly for leaks.

In laboratories, bromine containers should be kept closed and only handled in fume cupboard or under extraction hoods.

Warm containers should be allowed to cool to room temperature before they are opened. Before transferring bromine between containers, check should be made that the receiving container has room for it.

Storage

Store in a dry, well-ventilated area away from incompatible materials (see "materials to avoid"). Containers should be stored upright and all be clearly labelled.

Glass, ceramic, nickel or lead containers are suitable for bromine.

Lead-lined steel tank can be used. Only highly fluorinated plastic (PVDF) will resist corrosion. A free space of 10% by volume should be left in container.

Outside shaded or detached storage areas are preferred. A detached storage area is either an outside shaded area or a separate building containing no incompatible materials and is located away from all other structures.

In the case of detached storage the building construction should be



Fire resistant and provision made for potential fire fighting activities, according to relevant local and National codes, and in Consultation with local fire-fighting professionals. The fire extinguishers and hydrant should include provision for an adequate supply of water. Fire extinguishers and hydrant should be distributed around the area. Fire fighting of water run off should be prevented from polluting water sources. Floors should be of impervious construction, preferably concrete. Containers should not be dropped or handled roughly.

8. Explore controls/personal protection

Explore limits:

| components | ACGHI-TLV Data | OSHA(PEL)Data |
|----------------------|--|--------------------------------|
| BROMINE 7726-95-6 | 0.1ppm(0.66mg/m ³)TWA 0.2ppm(1.3mg/m ³)STEL | 0.1 ppm(0.7mg/m ³) |

Ventilation requirements : Ventilation required at floor level.
Ventilation must be sufficient to maintain atmospheric concentration below exposure limit.

Personal protective

Equipment

Respiratory protection

:
Respirator with cartridge providing protection against bromine (up to 5ppm). for short term exposure to low concentrations. An approved combination acid gas vapour-gas mask is suitable.
The wearer should be warned to get out of the area at the first sign of bromine gas odour coming through the mask.
NIOSH Recommendations for respirator selection includes any chemical cartridge respirator with a full facepiece and cartridge. Only nonoxidizable sorbents are allowed (not charcoal).
Neoprene or rubber gloves (tucked under sleeves)
Chemical safety goggles or face shield with safety glasses.

Hand protection

Eye protection



- Skin and body protection** : Protective impervious clothing ,hard hat and neoprene or rubber boots
- Hygiene measures** : Avoid bodily contact.
Safety shower and eye bath should be provided. Do not eat
Drink or smoke until after-work showing and changing clothes.

9.Physical and chemical properties.

- Appearance** : Heavily red-brown ,fuming liquid with a sharp,harsh irritating odour.
- Melting point/rang** : -7.3 C
- Boiling point/rang** : 58.8 C
- Vapour pressure** : 175mm Hg at 20 C
- Vapour density** : 5.5
- Evaporation rate (ether=1)** Not applicable under standard conditions.
- Solubility :**
- Solubility in water** : 3.5g/100ml at 20 c
- Decomposition**
- Temperature** : not available.

10.stability and reactivity.

- Stability** : Stable under normal condition
- Material to avoid** : In the presence of water react vigorously with phenol, Amines,hydrocarbons, organic acids and aliphatic ketones.
Dry bromine react violently with many metals ,notably Alluminium,titanium mercury and potassium and with Phosphours
- Condition of avoid.** : Extreme temperatures.
- Hazardous decomposition**
- Products** : None
- Hazards polymerization** : Will not occur

11.Toxicological information

- Acute toxicity:**
- Rat inhantion LC50** : 2700mg/m3
- Mouse inhantionLC50** : 750ppm/9min



- Ocular** : Corrosive
Symptoms include redness ,pain and blurred vision
Lachrimation occurs at less than 1ppm.
- Dermal** : Corrosive
Symptoms includes redness pain and edema.
- Inhalation** : Corrosive to mucous membranes and upper respiratory tract.
Symptoms include sore throat,dizziness, headache,nose bleed,
Coughing,abdominal pain and some time a rash.
Liquid or concentrated bromine vapour may cause severe burns
That ulcerate and are slow to heal.
- Ingestion** : Corrosive by ingestion.
Symptoms as of inhalation.
- Chronic toxicity** : Prolenged exposure may cause chronic bronchitis,contact and
allergic dermatitis.
- Mutagenicity** : Not avilable.
- Carcinogenity** : Not known to be a carcinogen
Not classified by IARC
Not included in NTP 9th report on carcinogens.

12.Ecological information

Information on ecological : Bromine is not bio degradable.

Effects Because of its high vapour density , bromine is not transferred to
the high atmospheric levels.

13.Disposal consideration

waste disposal May be disposed of by absorption on vermiculite or other
equivalent absorbent and disposed in sealed containers in a secured
landfill.
Observe all federal , state and local environment regulations when
disposing of this material.

14.Transportation information



UN NO. : 1744
IMO : Proper shipping name : Bromine
Class:8 –Corrosives
Label: CORROSIVE(8); and TOXIC
Packing Group:I
ADR/RID : Class:8 – Corrosives
Classification Code: CT1
Danger label model No.: 8+6.1
Packing group: I
Hazards identification No.886
ICAO/IATA : Hazards label(s): Corrosive & Poison
Passenger aircraft – Forbidden
Class:8 Subsidiary Risk 6.1
DOT : Proper shipping name : Bromine
Class:8- Corrosives
Label CORROSIVE(8) and POISON
Shipping description inhalation Hazards: Hazards zone A
Packing Group :I