SAFETY DATA SHEET

BROMINE

Section 1 : Chemical Product and Company Identification

Chemical Name: Bromine	**Contact Information:**
CAS#: 7726-95-6	**Satyesh Brinechem Pvt. Limited.**
Chemical Formula: Br2	Sandesh Bhavan, 3rd Floor, Lad Society Road
Synonym: Bromine Molecule (Br2)	Bodakdev, Ahmedabad - 380015, Gujarat, India
CI#: Not available	Board No. +91 79 4000 4000
	Online : www.satyeshbrine.com

Section 2 : Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Bromine	7726-95-6	100

Toxicological Data on Ingredients: Bromine: ORAL (LD50): Acute: 3100 mg/kg [Mouse]. 4160 mg/kg [Rabbit]. 2600 mg/kg [Rat]

Section 3 : Hazards Identification

Potential Acute Health Effects: Very hazardous in case of skin contact (corrosive). Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns.
Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death.

Potential Chronic Health Effects: CARCINOGENIC EFFECTS Classified 4 (No evidence.) by NTP, None. by OSHA, None. by NIOSH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to mucous membranes. The substance may be toxic to kidneys, liver, cardiovascular system, central nervous system (CNS), thyroid. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4 : First Aid Measures

Eye Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

Skin Contact: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5 : Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Flammable in presence of combustible materials of reducing materials of organic materials of aluminum

Explosion Hazards in Presence of Various Substances: Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Flammable in the form of liquid or vapor by spontaneous chemical reaction with reducing materials. May cause fire in contact with wood, sawdust, cotton, straw, etc. Flammable with A N T I M O N Y , B O R O N , C E S I U M A C E T Y L E N E C A R B I D E , CHLOROTRIFLUOROETHYLENE, COPPER HYDRIDE, CUPROUS ACETYLIDE, FLUORINE, GERMANIUM, LITHIUM CARBIDE, MAGNESIUM PHOSPHIDE, PHOSPHINE, PHOSPHORUS, PHOSPHORUS OXIDE, PHOSPHORUS TRIOXIDE, RUBIDIUM ACETYLENE CARBIDE, RUBIDIUM CARBIDE, & SODIUM ACETYLENE CARBIDE, STRONTIUM PHOSPHIDE & ZIRCONIUM DICARBIDE. IT COMBINES READILYWITH POTASSIUM, PHOSPHORUS & TIN, & REACTION MAY BE ACCOMPANIED BY SPONTANEOUS IGNITION.

Special Remarks on Explosion Hazards: Reacts explosively with ACETYLENE, ACRYLONITRILE, AMMONIA, DIMETHYL FORMAMIDE, ETHYL PHOSPHINE, HYDROGEN, ISOBUTYROPHENONE, NICKEL CARBONYL, NITROGEN TRIIODIDE, OZONE, OXYGEN DIFLUORIDE, PHOSPHORUS, POTASSIUM, SILVER AZIDE, SODIUM, & SODIUM CARBIDE. Lithium is stable in contact with dry bromine, but heavy impact will initiate explosion, while sodium in contact with bromine needs only moderate impact for initiation. Potassium ignites in bromine vapor and explodes violently in contact with liquid bromine and rubidium ignites in bromine vapor. During preparation of praseodymium bromide, accidental contact of liquid bromine with small particles of praseodymium led to a violent explosion.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill: Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions: Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as reducing agents, combustible materials, organic materials.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls: Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection: Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill: Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: TWA: 0.66 STEL: 1.3 (mg/m3) from ACGIH (TLV) [United States] TWA: 0.1 STEL: 0.2 (ppm) from ACGIH (TLV) [United States] TWA: 0.1 from OSHA (PEL) [United States] TWA: 0.7 (mg/m3) from OSHA (PEL) [United States] TWA: 0.66 STEL: 2 (mg/m3) [United Kingdom (UK)] TWA: 1 STEL: 0.3 (ppm) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.
Odor: Pungent. Suffocating. (Strong.)
Taste: Not available.
Molecular Weight: 159.808 g/mole
Color: Red-Brown (Dark.)
pH (1% soln/water): Not available.
Boiling Point: 58.78°C (137.8°F)
Melting Point: -7.25°C (18.9°F)
Critical Temperature: 315°C (599°F)
Specific Gravity: 3.12 at (@ 20°C)
Vapor Pressure: 23.3 kPa (@ 20°C)
Vapor Density: 7.1 (Air = 1)
Volatility: Not available.
Odor Threshold: 0.05 ppm
Water/Oil Dist. Coeff.: Not available.
Ionicity (in Water): Not available.
Dispersion Properties: See solubility in water, diethyl ether.
Solubility: Easily soluble in diethyl ether. Very slightly soluble in cold water. Freely soluble in alcohol, chloroform, carbon disulfide, carbon tetrachloride, concentrated hydrochloric acid, and aqueous solution of bromides.

Section 10: Stability and Reactivity Data

Stability: The product is stable. **Instability**
Temperature: Not available. **Conditions of**
Instability: Incompatible materials
Incompatibility with various substances: Highly reactive with reducing agents, combustible materials, organic materials.
Corrosivity: Extremely corrosive in presence of aluminum, of zinc, of stainless steel(304), of stainless steel(316). Highly corrosive in presence of copper. Non-corrosive in presence of glass.
Special Remarks on Reactivity: Incompatible with organic compounds containing active hydrogen atoms adjacent to the carbonyl group (aldehydes, ketones, carboxylic acids). They may react violently in unmoderated contact with bromine. Also incompatible with diethyl zinc, potassium, germanium, rubidium, aluminum, mercury, titanium, liquid halogen, silane, acetylene, acrylonitrile, ammonia, dimethyl formamide, ethyl phosphine, hydrogen, isobutyrophenone, nickel carbonyl, nitrogen triiodide, ozone, oxygen difluoride, phosphorous, potassiuml, silver azide, sodium , sodium carbide, alkali hydroxides, arsenites, ferrous, mercurous salts, hypophosphites, and other oxidizable materials, saw dust, antimony, tin, boron, cesium acetylene carbide, chlorotrifluoroethylene, copper hydride, cuprous, acetylide, fluorine,lithium carbide, megnesium phosphide, phosphine, phosphorous oxide, phosphorus trioxide, rubidium acetylene carbide, rubidium carbide, sodium acetylene carbide, strontium phosphide, zirconium dicarbide, wood, cotton, straw. Bromine reacts violently in contact with natural rubber, but more slowly with some synthetic rubbers. Aluminum, mercury, or titanium react violently with dry bromine.
Special Remarks on Corrosivity: Corrodes iron, stainless steel and copper. Severe corrosive effect on bronze.
Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Inhalation. Ingestion.
Toxicity to Animals: WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 2600 mg/kg [Rat]. Acute toxicity of the vapor (LC50): 750 1 hours [Mouse].
Chronic Effects on Humans: CARCINOGENIC EFFECTS: Classified 4 (No evidence.) by NTP, None. by OSHA, None. by NIOSH. Causes damage to the following organs: mucous membranes. May cause damage to the following organs: kidneys, liver, cardiovascular system, central nervous system (CNS), thyroid.
Other Toxic Effects on Humans:
Special Remarks on Toxicity to Animals: Not available.
Special Remarks on Chronic Effects on Humans: Not available.
Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Contact with liquid is corrosive and causes ulceration and skin burns. In milder cases, it might cause skin rash, pustules, measles-like eruptions, furuncles, and cold and clammy skin with cyanosis or pale color. Eyes: It is a lachrymator and causes eye irritation, eyelid inflammation at low concentration. At higher concentrations it may cause blepharospasm, photophobia, conjunctivitis, and burns. Inhalation: Inhalation of smaller amounts may cause severe irritation of the respiratory tract with coughing, chest tightness, shortness of breath, and nosebleed. Inhalation of larger amounts may cause pulmonary edema, chemical pneumonitis, bronchospasm, pneumomidiastinum, glottal spasm, glottal edema, inflammatory lesions in the mucous membranes, inflamed tongue and palate, chemical burns of the lungs, asthmatic bronchitis, and severe choking. Death may occur due to circulatory collapse, asphyxiation from edema of the glottis, aspiration pneumonia, or pulmonary edema. It may also affect behavior/central nervous system and gastrointestinal tract, cardiovascular system, thyroid, Symptoms may include dizziness, headache, fatigue, disturbances of sleep and sexual function, feeling of oppression, vertigo, anxiety, depression, muscle incoordination, emotional instability, delirium, stupor, vomiting, diarrhea, abdominal pain, tachycardia, hypotension. Ingestion: May cause severe and permanent damage to the digestive tract. It may cause gastrointestinal tract burns, burning pain of the mouth and esophagus, corrosive gastroenteritis with vomiting, abdominal pain, diarrhea, and possible bloody feces. It may cause kidney damage (hemorrhagic nephritis with oliguria or anuria, and liver damage, brownish discoloration of lips, tongue and mucous membranes It may also affect the cardiovascular system (tachycardia, hypotension, and cyanosis and behavior/central nervous system (symptoms similar to inhalation) Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure may affect respiration and endocrine system (thyroid), metabolism, behavior/central nervous system, and cardiovascular system, and cause kidney and liver damage. Effects may be delayed

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation: Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise. Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself. Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal: Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification:

Class 8: Corrosive material CLASS 6.1: Poisonous material.

Identification: : Bromine UNNA: 1744 PG: I

Special Provisions for Transport: Poison-inhalation hazard, Zone A

Section 15: Other Regulatory Information

Federal and State Regulations: Connecticut hazardous material survey.: Bromine Illinois toxic substances disclosure to employee act: Bromine Illinois chemical safety act: Bromine New York release reporting list: Bromine Rhode Island RTK hazardous substances: Bromine Pennsylvania RTK: Bromine Minnesota: Bromine Massachusetts RTK: Bromine Massachusetts spill list: Bromine New Jersey: Bromine New Jersey spill list: Bromine Louisiana RTK reporting list: Bromine California Director's list of Hazardous Substances: Bromine TSCA 8(b) inventory: Bromine SARA 302/304/311/312 extremely hazardous substances: Bromine SARA 313 toxic chemical notification and release reporting: Bromine.

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC): R26- Very toxic by inhalation. R35- Causes severe burns. R50- Very toxic to aquatic organisms. S1/2- Keep locked up and out of the reach of children. S7/9- Keep container tightly closed and in a well-ventilated place. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S61- Avoid release to the environment. Refer to special instructions/ Safety data sheets.

Health Hazard: 3

Fire Hazard: 0

Reactivity: 0

Personal Protection:

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment: Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

Other Special Considerations: Not available.

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A strong base, vigorous reaction with 1,2,4,5 Tetrachlorobenzene has caused many industrial explosions and form extremely toxic 2,3,7,8 Tetrachlorobenzodioxine under proper conditions of temperature pressure and state of Division, it can react or ignite violently with Acetic acid, Acetaldehyde, Acetic Anhydride, Acrolein, Arcylonitrile, Allyl Chloride.