

**Material Safety Data Sheet****YARDNEY TECHNICAL PRODUCTS, INC.**

May be used to comply with  
 OSHA's Hazard Communication Standard,  
 29 CFR 1910.1200. Standard must be  
 consulted for specific requirements.

82 Mechanic Street  
 Pawcatuck, CT 06379

**Chemical Identity:****Bromine Solution****Chemical Identity** (As used on Label and List)

Note: Blank spaces are not permitted. If any item is not applicable, or no  
 information is available, the space must be marked to indicate that.

**Bromine Solution****I. PRODUCT IDENTIFICATION**

**Manufacturer:** YARDNEY TECHNICAL PRODUCTS, INC.  
 82 Mechanic Street  
 Pawcatuck, CT 06379

**Regular Telephone:** (860) 599-1100**Revision Date:** August 19, 2009

**Trade Name:** Bromine Solution with Lithium Tetrachloroaluminate  
 and Sulfur Dioxide in Thionyl Chloride

**EMERGENCY TELEPHONE NUMBERS**

CHEMTEL: 1-800-255-3924

**Synonyms:** Bromine Electrolyte Solution with Lithium Tetrachloroaluminate  
 and Sulfur Dioxide in Thionyl Chloride

**National Fire Prevention Code 704****Chemical Formula:** LiAlCl<sub>4</sub> + SOCl<sub>2</sub> + SO<sub>2</sub> + Br**Chemical Family:** Alkali Chloroaluminate/Bromine/Thionyl Chloride Solution**C.A.S. No.:** 1402-11-4, 7719-09-7 and 7726-95-6**UN / NA** UN 1745, PG 1**Product Use:** Battery Electrolyte

NFPA RATING	
HEALTH	3
FIRE	0
REACTIVITY	2
SPECIAL NOTE	-W-

**II. HAZARD LABEL STATEMENT****Special Precautions:** Corrosive, Poison, T+ Very Toxic**Health Hazards:** Corrosive to eyes (may cause blindness), skin and respiratory tract.

**Physical Hazards:** Continuous inhalation of fumes may cause lung damage.  
 Causes severe burns.  
 Reacts violently with water or humid air to give off corrosive fumes of hydrochloric acid,  
 sulfur oxide and bromine.

**Special Fire Fighting Procedure:** **DO NOT USE WATER. USE CARBON DIOXIDE OR DRY CHEMICALS.**

**Handling and Storage:** KEEP AWAY FROM WATER AND HUMID AIR. Do not get in eyes, on skin, or clothing.  
 Avoid breathing vapors. Use in a dry, closed system. Keep container closed.  
 Wash thoroughly after handling. Store in cool, dry area away from heat.

**First Aid:**

**Eyes:** Immediately flush eyes with water for 15 minutes, lifting the upper and lower lids.  
 See a physician immediately.

**Skin:** Immediately wash with plenty of water. Remove contaminated clothing. If irritation occurs and  
 persists, obtain medical attention.

**Inhalation:** Remove to fresh air. Support respiration with oxygen, if necessary. If breathing discomfort  
 occurs and persists, obtain medical attention immediately.

**Ingestion:** If available, drink a mixture of Baking Soda and water to neutralize the Thionyl Chloride.  
 If Baking Soda is not available, drink copious amounts of water to dilute the Thionyl Chloride.  
 DO NOT induce vomiting. Do not give anything by mouth to an unconscious person. See  
 a physician immediately.

### III. INGREDIENTS

#### INGREDIENT EXPOSURE LIMITS

Material or Component	C.A.S. No.	Wt. %	TLV Data				
			PEL (OSHA)	TWA (ACGIH)	STEL (ACGIH)	Ceiling (OSHA)	IDLH (OSHA)
Lithium Tetrachloroaluminate	14024-11-4	10-20	REFER TO SECTION V - HAZARDOUS DECOMPOSITION PRODUCTS				
Sulfur Dioxide	7446-09-5	4-5	5 ppm		2 ppm		
Thionyl Chloride	7719-09-7	90-80	-	-	-	1.0 ppm 5 mg/m <sup>3</sup>	
Bromine	7726-95-6	10-20	0.1 ppm	0.1 ppm	0.2 ppm		

#### INGREDIENT ANIMAL TEST DATA

Material or Component	LD 50	LC 50
	Species and Route	Species and Route
Lithium Tetrachloroaluminate	N/A	N/A
Thionyl Chloride	N/A	(Rat) 500 ppm, 1 hr. Inhalation

### IV. PHYSICAL DATA

<b>Physical State:</b>	Liquid	<b>Vapor Density</b>	Not Applicable
		Air = 1	
<b>Appearance and Odor:</b>	Deep red color clear liquid with pungent odor of hydrogen chloride, sulfur dioxide and Bromine.	<b>Vapor Pressure:</b>	100 mm Hg @ 21°C (70°F)
<b>Odor Threshold:</b>	Not Applicable		
<b>Boiling Point:</b>	78° to 85°C (172° to 185°F)	<b>Freezing Point:</b>	-100°C (-148°F)
<b>Density or Specific Gravity:</b>	1.6 to 1.9 g/ml	<b>Solubility in Water:</b>	Reacts violently with water
<b>Volatiles:</b>	80 to 90%	<b>pH (as is) @ 25°C:</b>	Not applicable
<b>Evaporation Rate:</b>	>1	<b>pH (1% Soln.) @ 25°C:</b>	<3
<b>Coefficient of Water/Oil Distribution:</b>	Not applicable		

### V. FIRE, EXPLOSION, AND REACTIVITY DATA

<b>Physical Hazard:</b>	Non-Flammable. Reacts violently with water or humid air, and alkalis.
<b>Flash Point:</b>	Not applicable
<b>Autoignition Temperature:</b>	Not applicable
<b>Flammable Limits in Air:</b>	Upper: Not applicable      Lower: Not Applicable
<b>Extinguishing Media:</b>	<b>DO NOT USE WATER. USE CARBON DIOXIDE OR DRY CHEMICAL.</b>
<b>Special Fire Fighting Procedure:</b>	Wear self-contained breathing apparatus and full fire fighting protective clothing when fighting significant-sized fires.
<b>Unusual Fire &amp; Explosion Hazard:</b>	Reacts violently with water or humid air.
<b>Hazardous Combustion Products:</b>	Toxic chlorine, sulfur monochloride and bromine gasses.
<b>Explosion Data:</b>	This product is not an explosive.
<b>Sensitivity to Mechanical Impact:</b>	Not applicable
<b>Sensitivity to Static Discharge:</b>	Not applicable
<b>Stability:</b>	Stable
<b>Conditions Contributing to Instability:</b>	None

**Incompatibility:**

Water, humid air, alkalis, and temperatures above 140°C (284°F)

**Conditions of Reactivity:**

Contact with water, humid air, alkalis, or temperatures above 140°C (284°F).

**Hazardous Decomposition Products:**

Water or moist air reacts readily to decompose the product, to release the gasses of sulfur dioxide, hydrogen chloride and bromine. Also, decomposed by heat, above 140°C (284°F), releasing chlorine and sulfur monochloride gasses.

PEL (NIOSH)

Substance C.A.S. No.	PEL (OSHA)		PEL (NIOSH)		IDLH (OSHA)	TVL (ACHIG)		ACGIH Ceiling
	Standard	Ceiling	Standard	Ceiling		TWA	STEL	
Chlorine (7782-50-5)	*	1 ppm 3 mg/m <sup>3</sup>	*	0.5 ppm 1.5 mg/m <sup>3</sup>	25 ppm	1 ppm 3 mg/m <sup>3</sup>	3 ppm 9 mg/m <sup>3</sup>	LC50 inhalation/ Rat, 1 hr:293 ppm TOXIC

PEL (NIOSH)

Substance C.A.S. No.	PEL (OSHA)		PEL (NIOSH)		IDLH (OSHA)	TVL (ACHIG)		ACGIH Ceiling
	Standard	Ceiling	Standard	Ceiling		TWA	STEL	
Sulfur Monochloride	1 ppm 6 mg/m <sup>3</sup>	*	*	*	*	1 ppm 6 mg/m <sup>3</sup>	3 ppm 18 mg/m <sup>3</sup>	*
Sulfur Dioxide (10025-67-9)	5 ppm 13 mg/m <sup>3</sup>	*	0.5 ppm	*	*	2 ppm 5 mg/m <sup>3</sup>	5 ppm 10 mg/m <sup>3</sup>	*
Hydrogen Chloride (7647-01-0)	*	5 ppm 7 mg/m <sup>3</sup>	*	*	100 ppm	*	*	5 ppm 7 mg/m <sup>3</sup>
Bromine (7726-95-6)	0.1 ppm							

\* No other applicable information was found.

**Conditions Contributing****Hazardous Polymerization:**

Does not polymerize.

**VI. PRODUCT HEALTH HAZARD INFORMATION****Product Health Hazard:**

Corrosive to eyes (may cause blindness), skin, nose and throat.

**Product Exposure Limits:**OSHA ceiling value is 1 ppm or 5mg/m<sup>3</sup>.**Product Animal Hazard Test Data:**

No data available.

**Route(s) of Exposure:**HazardProduct Toxicity Data and Reference:Eye Contact:

Corrosive

No toxicology data available

Inhalation:Corrosive  
T+ Very ToxicNo corrosive data available  
LC50 (rat) 500 ppm (1 hr.), Thionyl ChlorideSkin Contact:

Corrosive

No toxicology data available

Skin Absorption:

No applicable information was found

No toxicology data available

Ingestion:

Corrosive

No toxicology data available

**Effects of Overexposure:**Acute Effects:

This materials is toxic by inhalation and corrosive to eyes (may cause blindness), skin, nose or throat. Continuous inhalation of fumes may cause lung damage.

Chronic Effects:

See Acute Effects.

**First Aid Procedures:**Eyes:

Immediately flush eyes with water for 15 minutes, lifting the upper and lower lids occasionally. See a physician immediately.

Skin:

Immediately wash with plenty of water. Remove contaminated clothing. If irritation occurs or persists, obtain medical attention.

Inhalation:

Remove to fresh air. Support respiration with oxygen, if necessary. If breathing discomfort

occurs and persists, obtain medical attention.

Ingestion:

Rinse mouth with water. Drink two glasses of water. DO NOT induce vomiting. Do not give anything by mouth to an unconscious person.

Decontamination Procedure:

Wash with soap and water.

**NOTES TO PHYSICIAN:**

Lithium Tetrachloroaluminate, sulfur dioxide and bromine in Thionyl Chloride is corrosive. Removal from exposure should be immediate, using copious water flushes. Assessment for esophageal burns with careful endoscopy and lavage, and management for esophageal stricture, should be considered for ingestion exposure. Treatment is otherwise symptomatic and supportive.

Other Toxicological Properties:

Carcinogenicity:

Product is not indicated to be carcinogenic.

NTP Annual:

Neither product nor its ingredients are listed.

IARC Monograph:

Neither product nor its ingredients are listed.

OSHA 29 CFR Part 1910 Subpart Z:

Neither product nor its ingredients are listed.

ACGIH (Appendix A):

Neither product nor its ingredients are listed.

Irritancy:

No applicable, corrosive

Sensitization:

No applicable information was found.

Teratogenicity:

No applicable information was found.

Mutagenicity:

No applicable information was found.

Toxicologically

Synergistic Products:

No applicable information was found.

Any Medical Conditions Generally  
Recognized as being Aggravated by  
Exposure:

No applicable information was found.

**VII. OTHER GOVERNMENTAL LISTINGS**

SARA III SECTION 313:

This product does not contain any toxic chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40 CFR Part 372.

This information must be included in all MSDSs that are copied and distributed for this material.

ISCA:

Listed

CERCLA:

Neither product nor its ingredients are listed.

SECTION 302:

Neither product nor its ingredients are listed.

RCRA:

Neither product nor its ingredients are specifically listed. It is a hazardous waste by characteristic.

California Proposition 65:

Neither product nor its ingredients are listed.

OSHA:

This product is listed in 29CFR 1910.119 Process Safety Management.  
The threshold quantity is 250 lbs.

**VIII. DISPOSAL, SPILL OR LEAK PROCEDURES**

Procedure for Release or Spill:

Cover with sodium bicarbonate or 1:1 mixture of soda ash and slaked lime. Cautiously apply water fog. Transfer into suitable containers.

Waste Disposal Method:

Dispose of waste according to federal EPA, state and local regulations.

**IX. PERSONAL PROTECTION INFORMATION**

Ventilation Requirements:

Use in a closed, dry system (i.e. glove box).

**Specific Personal Protection Equipment:**

Keep away from foodstuffs, beverages and feed. Remove all soiled and contaminated clothing immediately.  
Wash hands before breaks and at the end of work. Store protective clothing separately. Avoid contact with the eyes & skin.

**Respiratory:** Use suitable respirator when high concentrations are present.

**Eyes:** Safety glasses, tightly sealed goggles, full face protection.

**Gloves:** Impervious gloves

**Footwear:** No special requirement.

**Clothing:** Protective work clothing.

**Others:** Quick-drench eyewash and safety shower.

**X. HANDLING AND STORAGE**

**KEEP AWAY FROM WATER AND HUMID AIR**

**Do not get in eyes, on skin, or clothing. Avoid breathing vapors. Use in a dry, closed system.**

**Keep container tightly sealed. Store in cool, dry area away from heat. Wash thoroughly after handling.**

**XI. TRANSPORTATION DATA**

**Domestic:**

DOT Proper Shipping Name: Bromine Solutions (Thionyl Chloride, Sulfur Dioxide, Bromine, Lithium Tetrachloroaluminate Solution)  
DOT Hazard Class: 8, (6.1) PG 1  
DOT Labels: Corrosive, Poison, Inhalation Hazard  
DOT Marking: Bromine Solution (with Lithium Tetrachloroaluminate and Sulfur Dioxide in Thionyl Chloride)  
DOT Placard: Corrosive, Inhalation Hazard  
UN Number: UN 1745  
ERG Guide No: 154

**Emergency Accident:**

**Precautions and Procedures:** Keep away from water, humid air, alkalis, and direct sunlight.  
Keep containers tightly closed.

**Precautions to be Taken in Transportation:** Isolate any damaged containers

**Type Packages:**

Large Quantities: 7 to 14 gallon DOT 5C (1A1, 1B1, 1N1, 1H1, 6HA1 overpacked in 1A2 or 1H2) stainless steel kegs lined with Teflon or Tefzel.