

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): STAR BRITE ALUMINUM CLEANER
PART NUMBER: 87732C
CHEMICAL NAME/CLASS: Hydrochloric/Phosphoric Acid Solution
PRODUCT USE: Aluminum Cleaner
U.S. MANUFACTURER'S NAME: STAR BRITE DIST.
ADDRESS: 4041 S.W. 47 Avenue
Ft. Lauderdale, FL 33314
PHONE: (954) 587-6280
BUSINESS PHONE: (800) 327-8583
EMERGENCY PHONE: Chemtrec (24 hrs)
1-800-424-9300 (U.S., Canada, Puerto Rico, U.S Virgin Islands)
+ 1-703-527-3887 (Outside North America)
February 15, 2008

DATE OF PREPARATION:

NOTE: ALL United States Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards and Canadian WHMIS [Controlled Products Regulations] required information is included in appropriate sections based on the U.S. ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the countries listed above.

2. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Product Description: This is a clear liquid with a sharp, acrid odor. **Health Hazards:** This product can cause moderate to severe irritation or burns by all routes of exposure. Ingestion may be harmful or fatal. Prolonged or repeated inhalation of mists or sprays may cause lung damage. **Flammability Hazards:** This product is not flammable. If involved in a fire, this product will produce sodium oxides and hydrogen chloride. **Reactivity Hazards:** This product is not reactive. **Environmental Hazards:** This product can be harmful or fatal to contaminated plant, animal, and aquatic life. **Emergency Recommendations:** Emergency responders must wear the personal protective equipment suitable for the situation to which they are responding.

3. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	% w/v
Hydrochloric Acid (22-24%)	7647-01-0	~10%
Phosphoric Acid	7664-38-2	~10%
D.I. Water, buffering agents and other trace components. Each of the buffering agents and other components are present in less than 1% concentration (or 0.1% concentration for carcinogens, reproductive toxins, or respiratory sensitizer)		Balance

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

Contaminated individuals must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Remove or cover gross contamination to avoid exposure to rescuers. Take a copy of label and MSDS to health professional with the contaminated individual.

SKIN EXPOSURE: If this product contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. The contaminated individual must seek immediate medical attention if any adverse health effect occurs.

EYE EXPOSURE: If this product enters the eyes, open the contaminated individual's eyes while under gently running water. Use sufficient force to open eyelids. Have the contaminated individual "roll" eyes. Minimum flushing is for 15 minutes. The contaminated individual must seek immediate medical attention.

INHALATION: If vapors, mists, or sprays of this product are inhaled, remove the contaminated individual to fresh air. If necessary, use artificial respiration to support vital functions.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Have victim rinse mouth with water if conscious. Never induce vomiting or give a diluent (e.g., water) to someone who is unconscious, having convulsions, or unable to swallow. If vomiting occurs, lean patient forward or place on left side (head-down position if possible) to maintain an open airway and prevent aspiration.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Preexisting dermatitis or other skin disorders may be aggravated by exposure to this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): Not applicable. **Upper (UEL):** Not applicable.

FIRE EXTINGUISHING MATERIALS: This product is not flammable.

Fire extinguishers used should be for the surrounding materials.

FIRE EXTINGUISHING MATERIALS NOT TO BE USED: None known.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This product is corrosive and presents a significant contact hazard to firefighters. When involved in a fire, this material may decompose and produce irritating vapors and toxic gases (e.g., sodium oxides and hydrogen chloride).

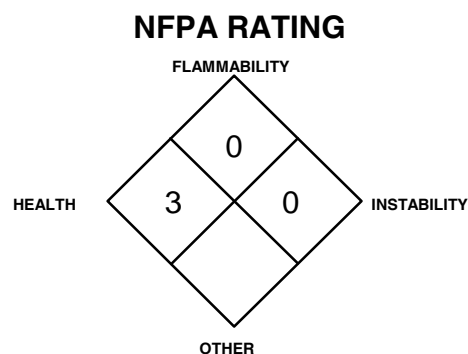
Contact with some metals may generate flammable hydrogen gas.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment.

Chemical resistant clothing may be necessary. Responders must ensure all persons in areas downwind of spill are protected from inhalation of corrosive mist or vapors. Move containers from fire area if it can be done without risk to personnel. Water fog or spray can also be used by trained fire-fighters to disperse this product's vapors and to protect personnel. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas. Rinse contaminated equipment thoroughly with sodium bicarbonate solution (or another neutralizer for acids) before returning such equipment to service.



Hazard Scale: 0 = Minimal 1 = Slight
2 = Moderate 3 = Serious 4 = Severe

6. ACCIDENTAL RELEASE MEASURES

RELEASE RESPONSE: Trained personnel using pre-planned procedures should respond to uncontrolled releases. Proper protective equipment should be used. In case of a spill, clear the affected area and protect people. Eliminate all sources of ignition before cleanup begins. The atmosphere must have levels of components lower than those listed in Section 8, (Exposure Controls and Personal Protective Equipment), if applicable, and have at least 19.5 percent oxygen before personnel can be allowed into the area without Self-Contained Breathing Apparatus.

Small Spills: In the event of an incidental release (e.g., under 1 L), wear apron, gloves and goggles. Absorb releases with polypads or other inert material. Neutralize spill and spill area with material appropriate for basic corrosive material. Place spill and adsorbent materials in appropriate container for disposal, sealing tightly. Remove all residue before decontamination of spill area.

Large Spills: In the event of a non-incidental release, minimum Personal Protective Equipment should be as follows: Level C: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard-hat, and an air-purifying respirator with a high-efficiency particulate filter. Wear Self-Contained Breathing Apparatus when oxygen levels are below 19.5% or are unknown. Dike or otherwise contain spill and absorb spilled liquid with polypads or other appropriate inert material. Neutralize spill and spill area with material appropriate for with sodium bicarbonate, soda ash, or other agents suitable for neutralization of acidic materials. Decontaminate the area thoroughly with flooding quantities of water.

Prevent material from entering sewer or confined spaces. Decontaminate the area thoroughly. Test area with litmus paper to ensure neutralization. Place all spill residue in an appropriate container and seal. If necessary, decontaminate spill-response equipment and spill area with soap and water solution. Do not mix with wastes from other materials. For spills on water, contain, minimize dispersion and collect. Dispose of recovered material and report spill per regulatory requirements. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations).

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing vapors or mists generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Open containers slowly on a stable surface. Empty containers may contain residual amounts of this product; therefore, empty containers should be handled with care. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10, Stability and Reactivity). Storage areas should be made of corrosion resistant materials. Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Material should be stored in secondary containers. Keep container tightly closed when not in use. Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged. Empty containers may contain residual liquid or vapors which are corrosive; therefore, empty containers should be handled with care. Never store food, feed, or drinking water in containers which held this product.

7. HANDLING and STORAGE (Continued)

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely if necessary. Collect all rinsates and dispose of according to applicable U.S. Federal, State, or local procedures and those of Canada and its Provinces.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in this section, if applicable. Ensure eyewash/safety shower stations are available near areas where this product is used.

EXPOSURE LIMITS/GUIDELINES:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELS		NIOSH	OTHER
		TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	IDLH mg/m ³	mg/m ³
Hydrochloric Acid (as hydrogen chloride gas)	7647-01-0	NE	2.98 (ceiling)	NE	7 (ceiling)	NE	7 (ceiling)	50 ppm	DFG MAKs: TWA = 3 PEAK: 2•MAK 15 min. average value, 1-hr interval, 4-per shift DFG MAK Pregnancy Risk Classification: C Carcinogen: IARC-3, TLV-A4
Phosphoric Acid	7664-38-2	1	3	1	3 (vacated 1989 PEL)	1	3	1000	DFG MAKs: TWA = 2 (inhalable fraction) PEAK: 2•MAK 15 min. average value, 1-hr interval, 4-per shift DFG MAK Pregnancy Risk Classification: C

NE = Not Established. See Section 16 for Definitions of Terms Used.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with regulations found in U.S. OSHA 29 CFR Subpart I (beginning at 1910.132), equivalent standards of Canada (including CSA Standard Z94.4-02 and CSA Standard Z94.3-07). Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below exposure limits listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards and Canadian CSA Standard Z94.4-02. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998). The following are NIOSH respiratory protection equipment guidelines for the Hydrochloric and Phosphoric Acid components.

HYDROCHLORIC ACID

CONCENTRATION

Up to 50 ppm:

RESPIRATORY PROTECTION

Any Chemical Cartridge Respirator with cartridge(s), or any Air-Purifying, Full-Facepiece Respirator (gas mask) with a chin-style, front- or back-mounted canister, or any Powered, Air-Purifying Respirator (PAPR) with cartridge(s), or any Supplied-Air Respirator (SAR), or any Self-Contained Breathing Apparatus (SCBA) with a full facepiece.

Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions: Any SCBA that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode, or any SAR that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in pressure-demand or other positive-pressure mode.

Escape:

Any Air-Purifying, Full-Facepiece Respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister, or any appropriate escape-type, SCBA.

PHOSPHORIC ACID

CONCENTRATION

Up to 25 mg/m³:

RESPIRATORY PROTECTION

Any Supplied-Air Respirator (SAR) operated in a continuous-flow mode.

Up to 50 mg/m³:

Any Air-Purifying, Full-Facepiece Respirator with a high-efficiency particulate filter, or any Self-Contained Breathing Apparatus (SCBA) with a full facepiece, or any SAR with a full facepiece.

Up to 1000 mg/m³:

Any SAR that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Emergency or Planned Entry Into Unknown Concentrations or IDLH Conditions: Any SCBA that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode, or any SAR that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in pressure-demand or other positive-pressure mode

Escape:

Any Air-Purifying, Full-Facepiece Respirator with a high-efficiency particulate filter, or any appropriate escape-type, SCBA.

EYE PROTECTION: Splash goggles or safety glasses. Face-shields should be worn if operations will generate splashes or sprays. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or the Canadian CSA Standard Z94.3-07.

HAND PROTECTION: Wear Nitrile rubber, Polyethylene, Viton™ gloves for routine industrial use. Natural rubber and butyl rubber gloves are not recommended. Resistance of specific materials can vary from product to product. Evaluate resistance under conditions of use and maintain clothing carefully. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS. Wash hands before putting on gloves and after removing gloves. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

BODY PROTECTION: If operations will generate splashes or sprays, use body protection appropriate for task (e.g., coveralls or apron). If necessary, refer to the OSHA Technical Manual (Section VII: Personal Protective Equipment) or appropriate Standards of Canada. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136 and the Canadian CSA Standard Z195-M1984, *Protective Footwear*.

9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): Not determined.

SPECIFIC GRAVITY (water = 1): 1.045

SOLUBILITY IN WATER: Completely soluble.

VAPOR PRESSURE, mm Hg @ 20°C (68°F): Not determined.

ODOR THRESHOLD: 1-5 ppm (for Hydrochloric Acid).

COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not available.

APPEARANCE, ODOR and COLOR: This is a clear liquid with a sharp, acrid odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): Litmus paper will turn red when in contact with this solution. The color and odor may also be distinguishing characteristics to identify the product in event of accidental release.

EVAPORATION RATE (n-BuAc = 1): Similar to water.

MELTING/FREEZING POINT: Not determined.

BOILING POINT: 107°C (225°F)

pH: < 2

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Thermal: Hydrogen chloride, carbon oxides, phosphorous oxides. Hydrolysis: None known.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product is not compatible with the following substances: bases, amines, alkali metals, most metals, aldehydes, epoxides, reducing agents, oxidizing agents, acetylides, borides, carbides, silicides, cyanides, sulfides, and phosphides. This product is also not compatible with water reactive materials.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid exposure or contact to extreme temperatures and incompatible chemicals.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of occupational overexposure are inhalation and contact with skin and eyes. The symptoms of overexposure to this product are as follows:

INHALATION: Inhalation of vapors, mists, or sprays of this product can be moderately to severely irritating or cause burns to the respiratory system, depending on the concentration and duration of contact. Symptoms of exposure may include breathing difficulty, irritation of the mucus membranes, coughing, nasal congestion, and a sore throat. Damage to the tissues of the respiratory system may also occur, especially after prolonged exposures or exposures to high concentrations of this solution. Severe inhalation over-exposures can lead to chemical pneumonitis, pulmonary edema, and death. Chronic inhalation exposures may result in dental erosion, perforation of the nasal septum and reduced lung capacity.

CONTACT WITH SKIN or EYES: This product can be moderately to severely irritating to contaminated eyes. Symptoms of eye contact can include pain, redness, and watering. Prolonged eye contact may result in tissue damage and blindness. Skin contact can result in moderate to severe irritation or burns. Chronic, low-level exposure can cause dermatitis, dry, red and itchy or scaly skin.

SKIN ABSORPTION: Skin absorption is not a significant route of overexposure for any component of this product.

INGESTION: Ingestion is not anticipated to be a likely route of occupational exposure to this product. If ingestion does occur, severe irritation and burns of the mouth, throat, esophagus, and other tissues of the digestive system will occur immediately. Symptoms of such over-exposure can include nausea, vomiting, diarrhea. Ingestion of large volumes of this product may be fatal.

INJECTION: Injection of this product (as may occur if skin is punctured by a contaminated object) can result in pain, redness, and local swelling.



HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD	(BLUE)	3
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FLAMMABILITY HAZARD	(RED)	0
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PHYSICAL HAZARD	(ORANGE)	0
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PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		SEE SECTION 8

For Routine Industrial Use and Handling Applications

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate
3 = Serious 4 = Severe * = Chronic hazard

11. TOXICOLOGICAL INFORMATION (Continued)

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. In the event of overexposure, the following symptoms may be observed:

ACUTE: This product can cause moderate to severe irritation or burns by all routes of exposure. Ingestion may be fatal.

CHRONIC: Repeated skin contact can result in dermatitis (inflammation of the outer layer of the skin). Chronic inhalation of low concentrations of this product may result in reduced lung capacity, which could be permanent, dental erosion and perforation of the nasal septum.

TARGET ORGANS: ACUTE: Skin, eyes, respiratory system. Chronic: Skin, respiratory system.

TOXICITY DATA: The specific toxicology data available for components greater than 1% in concentration are as follows.

HYDROCHLORIC ACID:

Standard Draize Test (Skin-Human) 4%/24 hours: Mild
LCLo (Inhalation-Human) 1300 ppm/30 minutes
LCLo (Inhalation-Human) 3000 ppm/5 minutes
LCLo (Inhalation-Human) 75 mg/m³
TCLo (Inhalation-Human) 50 mg/m³: Lungs, Thorax, or Respiration: cough, respiratory depression
LDLo (Oral-Man) 2857 µg/kg: Vascular: BP lowering not characterized in autonomic section; Lungs, Thorax, or Respiration: respiratory depression; Gastrointestinal: changes in structure or function of esophagus
LDLo (Oral-Woman) 420 µL/kg: Behavioral: excitement; Cardiac: pulse rate; Kidney/Ureter/Bladder: hematuria
LDLo (Unreported-Man) 81 mg/kg
TDLo (Subcutaneous-Human) 0.043 mL/kg: Vascular: acute arterial occlusion; Musculoskeletal: other changes
Rinsed with Water (Eye-Rabbit) 5 mg/30 seconds: Mild
LC₅₀ (Inhalation-Rat) 3124 ppm/1 hour: Sense Organs and Special Senses (Olfaction): effect, not otherwise specified; Sense Organs and Special Senses (Eye): iritis
LC₅₀ (Inhalation-Rat) 45,000 mg/m³/5 minutes: Lungs, Thorax, or Respiration: acute pulmonary edema
LC₅₀ (Inhalation-Rat) 8300 mg/m³/30 minutes: Lungs, Thorax, or Respiration: acute pulmonary edema
LC₅₀ (Inhalation-Rat) 7004 mg/m³/30 minutes: Lungs, Thorax, or Respiration: acute pulmonary edema
LC₅₀ (Inhalation-Rat) 60,938 mg/m³/5 minutes: Lungs, Thorax, or Respiration: acute pulmonary edema
LC₅₀ (Inhalation-Rat) 3700 ppm/30 minutes
LC₅₀ (Inhalation-Mouse) 2644 ppm/30 minutes

HYDROCHLORIC ACID (continued):

LC₅₀ (Inhalation-Mouse) 1108 ppm/1 hour: Sense Organs and Special Senses (Eye): effect, not otherwise specified; Lungs, Thorax, or Respiration: respiratory stimulation Skin and Appendages: dermatitis, other (after systemic exposure)
LC₅₀ (Inhalation-Mouse) 8300 mg/m³/30 minutes: Lungs, Thorax, or Respiration: acute pulmonary edema
LC₅₀ (Inhalation-Mouse) 3940 mg/m³/30 minutes: Lungs, Thorax, or Respiration: acute pulmonary edema
LC₅₀ (Inhalation-Mouse) 2,487 mg/m³/5 minutes: Lungs, Thorax, or Respiration: acute pulmonary edema
LC₅₀ (Inhalation-Mammal-Species Unspecified) 0.1 gm/m³
LD₅₀ (Oral-Rabbit) 900 mg/kg
LD₅₀ (Intraperitoneal-Rat) 40,142 µg/kg
LD (Intratracheal-Hamster) 146 mg/kg: Lungs, Thorax, or Respiration: structural or functional change in trachea or bronchi; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation
LCLo (Inhalation-Rabbit) 4413 ppm/30 minutes: Lungs, Thorax, or Respiration: acute pulmonary edema, other changes; Liver: fatty liver degeneration
LCLo (Inhalation-Rabbit) 5066 mg/m³/90 minutes
LCLo (Inhalation-Rabbit) 6400 mg/m³/90 minutes: Lungs, Thorax, or Respiration: acute pulmonary edema
LCLo (Inhalation-Guinea Pig) 4413 ppm/30 minutes: Lungs, Thorax, or Respiration: acute pulmonary edema, other changes; Liver: other changes
LCLo (Inhalation-Guinea Pig) 5066 mg/m³/90 minutes
LCLo (Inhalation-Guinea Pig) 6400 mg/m³/90 minutes: Lungs, Thorax, or Respiration: acute pulmonary edema

HYDROCHLORIC ACID (continued):

TCLo (Inhalation-Rat) 450 mg/m³/1 hour: female 1 day(s) pre-mating: Reproductive: Effects on Embryo or Fetus: fetotoxicity (except death, e.g., stunted fetus); Specific Developmental Abnormalities: homeostasis
Sex Chromosome Loss and Non-Disjunction (Oral-*Drosophila melanogaster*) 100 ppm
Cytogenetic Analysis (Parenteral-grasshopper) 20 mg
Cytogenetic Analysis (Hamster-Lung) 30 mmol/L
Cytogenetic Analysis (Hamster-Ovary) 8 mmol/L

PHOSPHORIC ACID:

Standard Draize Test (Skin-Rabbit) 595 mg/24 hours: Severe
Standard Draize Test (Eye-Rabbit) 119 mg: Severe
LDLo (Unreported-Human) 220 mg/kg
LD₅₀ (Oral-Rat) 1530 mg/kg: Behavioral: somnolence (general depressed activity); Kidney/Ureter/Bladder: hematuria; Skin and Appendages: hair
LD₅₀ (Oral-Rat) 1.25 gm/kg: Lungs, Thorax, or Respiration: acute pulmonary edema; Liver: changes in liver weight
LD₅₀ (Oral-Mouse) 1.25 gm/kg: Lungs, Thorax, or

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate

3 = Serious 4 = Severe * = Chronic hazard

Respiration: acute pulmonary edema; Liver: changes in liver weight

LD₅₀ (Skin-Rabbit) 2740 mg/kg: Behavioral: somnolence (general depressed activity), excitement

LC₅₀ (Inhalation-Rat) > 850 mg/m³/1 hour

LC₅₀ (Inhalation-Rat) 25.5 mg/m³: Lungs, Thorax, or Respiration: acute pulmonary edema; Liver: changes in liver weight

LC₅₀ (Inhalation-Mouse) 25.5 mg/m³: Lungs, Thorax, or Respiration: acute pulmonary edema; Liver: changes in liver weight

CARCINOGENIC POTENTIAL OF COMPONENTS: The components of this product are listed by agencies tracking the carcinogenic potential of chemical compounds, as follows:

HYDROCHLORIC ACID (as hydrogen chloride gas): ACGIH TLV-A4 (Not Classifiable as a Human Carcinogen); IARC-3 (Unclassifiable as to Carcinogenicity in Humans)

The remaining components of this product are not found on the following lists: U.S. EPA, U.S. NTP, U.S. OSHA, U.S. NIOSH, GERMAN MAK, IARC, or ACGIH and therefore is neither considered to be nor suspected to be cancer causing agents by these agencies.

IRRITANCY OF PRODUCT: This product can be moderately to severely irritating or cause burns by all routes of exposure.

SENSITIZATION TO THE PRODUCT: The components of this product are not known to be human skin or respiratory sensitizers. Hydrochloric Acid and Phosphoric Acid are not considered to be occupational sensitizers. There are a few case reports of individuals, often with pre-existing asthmatic conditions, who have developed asthma following exposure to highly corrosive materials such as Hydrochloric Acid and Phosphoric Acid. These cases are believed to be reactive airways dysfunction syndrome (RADS), which is airways hypersensitivity caused by very high, usually one-time exposure to a highly irritating compounds.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: The components of this product are not reported to cause mutagenic effects in humans.

Embryotoxicity: The components of this product are not reported to cause embryotoxic effects in humans.

Teratogenicity: The components of this product are not reported to cause teratogenic effects in humans.

Reproductive Toxicity: The components of this product are not reported to cause adverse reproductive effects in humans.

A **mutagen** is a chemical that causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An **embryotoxin** is a chemical that causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A **teratogen** is a chemical that causes damage to a developing fetus, but the damage does not propagate across generational lines. A **reproductive toxin** is any substance that interferes in any way with the reproductive process.

BIOLOGICAL EXPOSURE INDICES: Currently, there are no Biological Exposure Indices (BEIs) determined for the components of this product.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY: This product has not been tested for mobility in soil. It is expected to be highly mobile as an aqueous solution. The following information is available for some components of this product.

HYDROCHLORIC ACID:

Soil Adsorption/Mobility: When anhydrous hydrogen chloride is spilled onto the soil, extensive evaporation will occur. Therefore, with regard to infiltration into the soil, only Hydrochloric Acid is considered. However, when Hydrochloric Acid is spilled onto soil, it will begin to infiltrate. The presence of water in the soil will influence the rate of chemical movement in the soil. During transport through the soil, Hydrochloric Acid will dissolve some of the soil material, in particular those of a carbonate base. The acid will be neutralized to some degree. However, significant amounts of acid are expected to remain for transport.

PHOSPHORIC ACID:

Soil Adsorption/Mobility: When spilled onto soil, Phosphoric Acid will infiltrate downward, the rate being greater with lower concentration because of reduced viscosity. During transport through the soil, phosphoric acid will dissolve some of the soil material, in particular, carbonate-based materials. The acid will be neutralized to some degree with adsorption of the proton and phosphate ions also possible. However, significant amounts of acid will remain for transport down toward the groundwater table. Upon reaching the groundwater table, the acid will continue to move in the direction of groundwater flow. A contaminated plume will be produced with dilution and dispersion serving to reduce the acid concentration.

PERSISTENCE AND BIODEGRADABILITY: This product has not been tested for persistence and biodegradability. The following information is available for some components of this product.

HYDROCHLORIC ACID:

Persistence and Biodegradability: Hydrogen chloride in water dissociates almost completely, with the hydrogen ion captured by the water molecules to form the hydronium ion.

PHOSPHORIC ACID:

Aquatic Fate: While acidity may be reduced readily by natural water hardness minerals, the phosphate may persist indefinitely.

BIO-ACCUMULATION POTENTIAL: This product has not been tested for bio-accumulation potential. The following information is available for some components of this product.

HYDROCHLORIC ACID:

Bioconcentration: No information is available on the bioconcentration of Hydrochloric Acid.

ECOTOXICITY: This product has not been tested for aquatic or animal toxicity. All release to terrestrial, atmospheric and aquatic environments should be avoided. The following aquatic toxicity data are available for some components of this product.

HYDROCHLORIC ACID:

TLm Gambusia affinis (mosquito fish) 96 hours = 282 ppm (fresh water)

/Conditions of bioassay not specified

Lethal (*Lepomis macrochirus* bluegill sunfish) 48 hours = 3.6 mg/L/Conditions of bioassay not specified

LC₁₀₀ (Trout) 24 hours = 10 mg/L/Conditions of bioassay not specified

LC₅₀ (Shrimp) 48 hours = 100 to 330 ppm (salt water) /Conditions of bioassay not specified

LC₅₀ (Starfish) 48 hours = 100 to 330 mg/L/Conditions of bioassay not specified

HYDROCHLORIC ACID (continued):

LC₅₀ (Cockle) 48 hours = 330 to 1,000 mg/L/Conditions of bioassay not specified

LC₅₀ Carassius auratus (goldfish) 178 mg/L (1 to 2 hr survival time) /Conditions of bioassay not specified

LC₅₀ (Shore crab) 48 hours = 240 mg/L/Conditions of bioassay not specified

LC₅₀ (*Lepomis macrochirus* bluegill sunfish) 96 hours = at pH between 3.5 and 3.0 /hydrogen ion concentration/Conditions of bioassay not specified

PHOSPHORIC ACID:

TLm (mosquito fish) = 138 mg/L 24-96 hours in turbid water at 22-24°C (conditions of bioassay not specified)

OTHER ADVERSE EFFECTS: The components of this product are not listed as having ozone depletion potential.

ENVIRONMENTAL EXPOSURE CONTROLS: Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHODS: It is the responsibility of the generator to determine at the time of disposal whether the product meets the criteria of a hazardous waste per regulations of the area in which the waste is generated and/or disposed of. Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority. Shipment of wastes must be done with appropriately permitted and registered transporters.

DISPOSAL CONTAINERS: Waste materials must be placed in and shipped in appropriate 5-gallon or 55-gallon poly or metal waste pails or drums. Permeable cardboard containers are not appropriate and should not be used. Ensure that any required marking or labeling of the containers be done to all applicable regulations.

PRECAUTIONS TO BE FOLLOWED DURING WASTE HANDLING: Wear proper protective equipment when handling waste materials. Dispose of in accordance with applicable Federal, State, and local procedures and standards

EPA WASTE NUMBER: Wastes of this product should be tested for D002 (Characteristic/Corrosivity).

14. TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS: This product is hazardous as defined by 49 CFR 172.101 of the U.S. DOT regulations.

PROPER SHIPPING NAME:

Corrosive liquid, acidic, inorganic, n.o.s. (hydrochloric acid, phosphoric acid)

HAZARD CLASS NUMBER and DESCRIPTION:

8 (Corrosive)

UN IDENTIFICATION NUMBER:

UN 3264

PACKING GROUP:

III

DOT LABEL(S) REQUIRED:

Class 8 (Corrosive)

EMERGENCY RESPONSE GUIDEBOOK NUMBER, 2004:

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MARINE POLLUTANT: The components of this product are not designated by the Department of Transportation to be Marine Pollutants (49 CFR 172.101, Appendix B).

Small Quantity Exception (49 CFR 173.4): Small quantities of Class 8 material are not subjected to other requirements of the Hazardous Materials Regulations (Subchapter C) when the maximum quantity per inner receptacle is limited to 30 mL (liquids). Refer to 49 CFR 173.4 for specific information in packaging small quantity materials.

Limited Quantity Exceptions [49 CFR 173.154(b)(2)]: Limited quantities for Class 8, Packing Group III materials have inner packaging not over 4.0 L [1 gal] (liquids) net capacity each, packed in strong outer packaging.

14. TRANSPORTATION INFORMATION (Continued)

U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS (continued):

FOR QUANTITIES OF 1.3 GALLON (4 LITERS) OR BELOW:

PROPER SHIPPING NAME: Consumer Commodity
HAZARD CLASS NUMBER and DESCRIPTION: ORM-D
UN IDENTIFICATION NUMBER: None
PACKING GROUP: None
DOT LABEL(S) REQUIRED: None

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is classified as Dangerous Goods under regulations of Transport Canada. The use of the above U.S. DOT information from the U.S. 49 CFR regulations is allowed for shipments that originate in the U.S. For shipments via ground vehicle or rail that originate in Canada, the following information is applicable.

PROPER SHIPPING NAME: Corrosive liquid, acidic, inorganic, n.o.s. (hydrochloric acid, phosphoric acid)
HAZARD CLASS NUMBER and DESCRIPTION: 8 (Corrosive)
UN IDENTIFICATION NUMBER: UN 3264
PACKING GROUP: III
HAZARD LABEL(S) REQUIRED: Class 8 (Corrosive)
SPECIAL PROVISIONS: 16
EXPLOSIVE LIMIT & LIMITED QUANTITY INDEX: 5
ERAP INDEX: None
PASSENGER CARRYING SHIP INDEX: None
PASSENGER CARRYING ROAD OR RAIL VEHICLE INDEX: 5
MARINE POLLUTANT: The components of this product are not classified as a Marine Pollutant under Transport Canada regulations.

INTERNATIONAL AIRLINE TRANSPORTATION ASSOCIATION: This product is classified as Dangerous Goods per rules of IATA.

UN IDENTIFICATION NUMBER: UN 3264
PROPER SHIPPING NAME: Corrosive liquid, acidic, inorganic, n.o.s. (hydrochloric acid, phosphoric acid)
HAZARD CLASS NUMBER and DESCRIPTION: 8 (Corrosive)
PACKING GROUP: III
HAZARD LABEL(S) REQUIRED: Class 8 (Corrosive)
PASSENGER & CARGO AIRCRAFT LIMITED QUANTITY PACKING INSTRUCTION: Y818
PASSENGER & CARGO AIRCRAFT LIMITED QUANTITY MAXIMUM NET QUANTITY/PKG: 1 L
PASSENGER & CARGO AIRCRAFT PACKING INSTRUCTION: 818
PASSENGER & CARGO AIRCRAFT MAXIMUM NET QUANTITY/PKG: 5 L
CARGO AIRCRAFT ONLY PACKING INSTRUCTION: 820
CARGO AIRCRAFT ONLY MAXIMUM NET QUANTITY/PKG: 60 L
SPECIAL PROVISIONS: A3
ERG CODE: 8L

INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION: This product is classified as Dangerous Goods by the International Maritime Organization.

UN IDENTIFICATION NUMBER: UN 3264
PROPER SHIPPING NAME: Corrosive liquid, acidic, inorganic, n.o.s. (hydrochloric acid, phosphoric acid)
HAZARD CLASS NUMBER and DESCRIPTION: 8 (Corrosive)
PACKING GROUP: III
SPECIAL PROVISIONS: 223, 274, 944
HAZARD LABEL(S) REQUIRED: Class 8 (Corrosive)
LIMITED QUANTITIES: 5 L
PACKING INSTRUCTION: P001, LP001
EmS: F-A, S-B
STOWAGE AND SEGREGATION: Category A. Clear of living quarters.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The components of this product are subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows.

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Hydrochloric Acid (aerosol forms only)	No	No	Yes

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for any component of this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs. (4,540 kg) therefore applies, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Hydrochloric Acid = 5000 lb (2270); Phosphoric Acid = 5000 lb (2270 kg).

U.S. TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory.

15. REGULATORY INFORMATION (Continued)

ADDITIONAL U.S. REGULATIONS (continued):

OTHER U.S. FEDERAL REGULATIONS: Components of this product have requirements under other U.S. Federal regulations, as follows:

HYDROCHLORIC ACID:

THE CLEAN AIR ACT: Hydrochloric Acid is listed as a Hazardous Air Pollutant (HAP) generally known or suspected to cause serious health problems. The Clean Air Act, as amended in 1990, directs EPA to set standards requiring major sources to sharply reduce routine emissions of toxic pollutants. EPA is required to establish and phase in specific performance based standards for all air emission sources that emit one or more of the listed pollutants. Hydrochloric Acid is included on this list. Hydrochloric Acid is also designated as a Hazardous Substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges of this Hydrochloric Acid.

CLEAN WATER ACT: Hydrochloric Acid is designated as a hazardous substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): No component of this product is on the California Proposition 65 lists.

LABELING (Precautionary Statements) ANSI LABELING (Z129.1): **DANGER! CORROSIVE. CAN CAUSE BURNS BY ALL ROUTES OF EXPOSURE. EYE CONTACT MAY CAUSE BLINDNESS. HARMFUL OR FATAL IF SWALLOWED.** Avoid contact with skin or eyes. Avoid breathing vapors or mists. Do not taste or swallow. Wash thoroughly after handling. Wear gloves and goggles. Wear appropriate body protection and face-shield if operations will involve splashes or sprays.

FIRST-AID: In case of contact with skin or eyes, flush immediately with plenty of water for at least 15 minutes. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention. **IN CASE OF FIRE:** Use water fog, dry chemical, CO₂, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with inert material, neutralize with citric acid or other suitable material for basic chemicals and place in suitable container. Consult Material Safety Data Sheet for additional information.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDL INVENTORY STATUS: The components of this product are listed on the DSL Inventory.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: The Hydrochloric Acid component of this product is on the CEPA Priority Substances Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: **Class D1B:** Poisonous and infectious material - Immediate and serious effects-Very toxic; **Class E:** Corrosive



16. OTHER INFORMATION

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2/15/08: Up-date of entire MSDS for most current information in all sections

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Star Brite assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, Star brite assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number that uniquely identifies each constituent.

EXPOSURE LIMITS IN AIR:

CEILING LEVEL: The concentration that shall not be exceeded during any part of the working exposure.

DFG MAK Germ Cell Mutagen Categories: 1: Germ cell mutagens which have been shown to increase the mutant frequency in the progeny of exposed humans. 2: Germ cell mutagens which have been shown to increase the mutant frequency in the progeny of exposed mammals. 3A: Substances which have been shown to induce genetic damage in germ cells of human of animals, or which produce mutagenic effects in somatic cells of mammals *in vivo* and have been shown to reach the germ cells in an active form. 3B: Substances which are suspected of being germ cell mutagens because of their genotoxic effects in mammalian somatic cell *in vivo*; in exceptional cases, substances for which there are no *in vivo* data, but which are clearly mutagenic *in vitro* and structurally related to known *in vivo* mutagens. 4: Not applicable (Category 4 carcinogenic substances are those with non-genotoxic mechanisms of action. By definition, germ cell mutagens are genotoxic. Therefore, a Category 4 for germ cell mutagens cannot apply. At some time in the future, it is conceivable that a Category 4 could be established for genotoxic substances with primary targets other than DNA [e.g. purely aneugenic substances] if research results make this seem sensible.) 5: Germ cell mutagens, the potency of which is considered to be so low that, provided the MAK value is observed, their contribution to genetic risk for humans is expected not to be significant.

DFG MAK Pregnancy Risk Group Classification: Group A: A risk of damage to the developing embryo or fetus has been unequivocally demonstrated. Exposure of pregnant women can cause damage of the developing organism, even when MAK and BAT (Biological Tolerance Value for Working Materials) values are observed. **Group B:** Currently available information indicates a risk of damage to the developing embryo or fetus must be considered to be probable. Damage to the developing organism cannot be excluded when pregnant women are exposed, even when MAK and BAT values are observed. **Group C:** There is no reason to fear a risk of damage to the developing embryo or fetus when MAK and BAT values are observed. **Group D:** Classification in one of the groups A-C is not yet possible because, although the data available may indicate a trend, **Group D:** Classification in one of the groups A-C is not yet possible because, although the data available may indicate a trend.

IDLH-Immediately Dangerous to Life and Health: This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury.

LOQ: Limit of Quantitation.

MAK: Federal Republic of Germany Maximum Concentration Values in the workplace.

NE: Not Established. When no exposure guidelines are established, an entry of NE is made for reference.

NIC: Notice of Intended Change.

NIOSH CEILING: The exposure that shall not be exceeded during any part of the workday. If instantaneous monitoring is not feasible, the ceiling shall be assumed as a 15-minute TWA exposure (unless otherwise specified) that shall not be exceeded at any time during a workday.

NIOSH RELS: NIOSH's Recommended Exposure Limits.

PEL-Permissible Exposure Limit: OSHA's Permissible Exposure Limits. This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL that was vacated by Court Order.

SKIN: Used when there is a danger of cutaneous absorption.

STEL-Short Term Exposure Limit: Short Term Exposure Limit, usually a 15-minute time-weighted average (TWA) exposure that should not be exceeded at any time during a workday, even if the 8-hr TWA is within the TLV-TWA, PEL-TWA or REL-TWA.

TLV-Threshold Limit Value: An airborne concentration of a substance that represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour.

TWA-Time Weighted Average: Time Weighted Average exposure concentration for a conventional 8-hr (TLV, PEL) or up to a 10-hr (REL) workday and a 40-hr workweek.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS:

This rating system was developed by the National Paint and Coating Association and has been adopted by industry to identify the degree of chemical hazards.

HEALTH HAZARD:

0 (Minimal Hazard): No significant health risk, irritation of skin or eyes not anticipated. *Skin Irritation:* Essentially non-irritating. PII or Draize = "0". *Eye Irritation:* Essentially non-irritating, or minimal effects which clear in < 24 hours [e.g. mechanical irritation]. Draize = "0". *Oral Toxicity LD₅₀ Rat:* < 5000 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* < 2000 mg/kg. *Inhalation Toxicity 4-hrs LC₅₀ Rat:* < 20 mg/L.; 1 (Slight Hazard): Minor reversible injury may occur; slightly or mildly irritating. *Skin Irritation:* Slightly or mildly irritating. *Eye Irritation:* Slightly or mildly irritating. *Oral Toxicity LD₅₀ Rat:* > 500-5000 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* > 1000-2000 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 2-20 mg/L.; 2 (Moderate Hazard): Temporary or transitory injury may occur. *Skin Irritation:* Moderately irritating; primary irritant; sensitizer. PII or Draize > 0, < 5. *Eye Irritation:* Moderately to severely irritating and/or corrosive; reversible corneal opacity; corneal involvement or irritation clearing in 8-21 days. Draize > 0, < 25. *Oral Toxicity LD₅₀ Rat:* > 50-500 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* > 200-1000 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 0.5-2 mg/L.). 3 (Serious Hazard): Major injury likely unless prompt action is taken and medical treatment is given; high level of toxicity; corrosive. *Skin Irritation:* Severely irritating and/or corrosive; may destroy dermal tissue, cause skin burns, dermal necrosis. PII or Draize > 5-8 with destruction of tissue. *Eye Irritation:* Corrosive, irreversible destruction of ocular tissue; corneal involvement or irritation persisting for more than 21 days. Draize > 80 with effects irreversible in 21 days. *Oral Toxicity LD₅₀ Rat:* > 1-50 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* > 20-200 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 0.05-0.5 mg/L.; 4 (Severe Hazard): Life-threatening; major or permanent damage may result from single or repeated exposure. *Skin Irritation:* Not appropriate. Do not rate as a "4", based on skin irritation alone. *Eye Irritation:* Not appropriate. Do not rate as a "4", based on eye irritation alone. *Oral Toxicity LD₅₀ Rat:* ≤ 1 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* ≤ 20 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* ≤ 0.05 mg/L).

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

FLAMMABILITY HAZARD:

0 (Minimal Hazard-Materials that will not burn in air when exposure to a temperature of 815.5°C [1500°F] for a period of 5 minutes.); 1 (Slight Hazard-Materials that must be pre-heated before ignition can occur. Material require considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur. Including: Materials that will burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less; Liquids, solids and semisolids having a flash point at or above 93.3°C [200°F] (e.g. OSHA Class III, or; Most ordinary combustible materials [e.g. wood, paper, etc.]; 2 (Moderate Hazard-Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not, under normal conditions, form hazardous atmospheres in air, but under high ambient temperatures or moderate heating may release vapor in sufficient quantities to produce hazardous atmospheres in air. Including: Liquids having a flash-point at or above 37.8°C [100°F]; Solid materials in the form of course dusts that may burn rapidly but that generally do not form explosive atmospheres; Solid materials in a fibrous or shredded form that may burn rapidly and create flash fire hazards (e.g. cotton, sisal, hemp; Solids and semisolids that readily give off flammable vapors.); 3 (Serious Hazard-Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures, or, unaffected by ambient temperature, are readily ignited under almost all conditions, including: Liquids having a flash point below 22.8°C [73°F] and having a boiling point at or above 38°C [100°F] and below 37.8°C [100°F] [e.g. OSHA Class IB and IC]; Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air [e.g., dusts of combustible solids, mists or droplets of flammable liquids]; Materials that burn extremely rapidly, usually by reason of self-contained oxygen [e.g. dry nitrocellulose and many organic peroxides]); 4 (Severe Hazard-Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and which will burn readily, including: Flammable gases; Flammable cryogenic materials; Any liquid or gaseous material that is liquid while under pressure and has a flash point below 22.8°C [73°F] and a boiling point below 37.8°C [100°F] [e.g. OSHA Class IA; Material that ignite spontaneously when exposed to air at a temperature of 54.4°C [130°F] or below [e.g. pyrophoric].

PHYSICAL HAZARD:

0 (Water Reactivity: Materials that do not react with water. Organic Peroxides: Materials that are normally stable, even under fire conditions and will not react with water. Explosives: Substances that are Non-Explosive. Unstable Compressed Gases: No Rating. Pyrophorics: No Rating. Oxidizers: No "0" rating allowed. Unstable Reactives: Substances that will not polymerize, decompose, condense or self-react.); 1 (Water Reactivity: Materials that change or decompose upon exposure to moisture. Organic Peroxides: Materials that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. Explosives: Division 1.5 & 1.6 substances that are very insensitive explosives or that do not have a mass explosion hazard. Compressed Gases: Pressure below OSHA definition. Pyrophorics: No Rating. Oxidizers: Packaging Group III; Solids: any material that in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65%)/cellulose mixture and the criteria for Packing Group I and II are not met. Unstable Reactives: Substances that may decompose, condense or self-react, but only under conditions of high temperature and/or pressure and have little or no potential to cause significant heat generation or explosive hazard. Substances that readily undergo hazardous polymerization in the absence of inhibitors.); 2 (Water Reactivity: Materials that may react violently with water. Organic Peroxides: Materials that, in themselves, are normally unstable and will readily undergo violent chemical change, but will not detonate. These materials may also react violently with water. Explosives: Division 1.4 – Explosive substances where the explosive effect are largely confined to the package and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. Compressed Gases: Pressurized and meet OSHA definition but < 514.7 psi absolute at 21.1°C (70°F) [500 psig]. Pyrophorics: No Rating. Oxidizers: Packaging Group II Solids: any material that, either in concentration tested, exhibits a mean burning time of less than or equal to the mean burning time of a 2:3 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise of a 1:1 aqueous sodium chlorate solution (40%)/cellulose mixture and the criteria for Packing Group I are not met. Reactives: Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure, but have a low potential for significant heat generation or explosion. Substances that readily form peroxides upon exposure to air or oxygen at room temperature); 3 (Water Reactivity: Materials that may form explosive reactions with water. Organic Peroxides: Materials that are capable of detonation or explosive reaction, but require a strong initiating source, or must be heated under confinement before initiation; or materials that react explosively with water. Explosives: Division 1.2 – Explosive substances that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but do not have a mass explosion hazard. Compressed Gases: Pressure ≥ 514.7 psi absolute at 21.1°C (70°F) [500 psig]. Pyrophorics: No Rating. Oxidizers: Packaging Group I Solids: any material that, in either concentration tested, exhibits a mean burning time less than the mean burning time of a 3:2 potassium bromate/cellulose mixture. Liquids: Any material that spontaneously ignites when mixed with cellulose in a 1:1 ratio, or which exhibits a mean pressure rise time less than the pressure rise time of a 1:1 perchloric acid (50%)/cellulose mixture. Unstable Reactives: Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a moderate potential to cause significant heat generation or explosion.); 4 (Water Reactivity: Materials that react explosively with water without requiring heat or confinement. Organic Peroxides: Materials that are readily capable of detonation or explosive decomposition at normal temperature and pressures. Explosives: Division 1.1 & 1.2-explosive substances that have a mass explosion hazard or have a projection hazard. A mass explosion is one that affects almost the entire load instantaneously. Compressed Gases: No Rating. Pyrophorics: Add to the definition of Flammability "4". Oxidizers: No "4" rating. Unstable Reactives: Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a high potential to cause significant heat generation or explosion.).

DEFINITIONS OF TERMS (Continue)

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

HEALTH HAZARD: 0 (materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 10,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 200 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 2000 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 2000 mg/kg. Materials that are essentially non-irritating to the respiratory tract, eyes and skin. **1** (materials that, under emergency conditions, can cause significant irritation): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 5,000 ppm but less than or equal to 10,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 10 mg/L but less than or equal to 200 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 1000 mg/kg but less than or equal to 2000 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 500 mg/kg but less than or equal to 2000 mg/kg. Materials that cause slight to moderate irritation to the respiratory tract, eyes and skin. **2** (materials that, under emergency conditions, can cause temporary incapacitation or residual injury): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 3,000 ppm but less than or equal to 5,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 2 mg/L but less than or equal to 10 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 200 mg/kg but less than or equal to 1000 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 5000 ppm and that does not meet the criteria for either degree of hazard 3 or degree of hazard 4. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause severe tissue damage, depending on duration of exposure. Materials that are respiratory irritants. Materials that cause severe, but reversible irritation to the eyes or are lachrymators. Materials that are primary skin irritants or sensitizers. **3** (materials that, under emergency conditions, can cause serious or permanent injury): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 1,000 ppm but less than or equal to 3,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 0.5 mg/L but less than or equal to 2 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 40 mg/kg but less than or equal to 200 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 5 mg/kg but less than or equal to 50 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause frostbite and irreversible tissue damage. Materials that are respiratory irritants. Cryogenic gases that cause frostbite and irreversible tissue damage. Materials that are corrosive to the respiratory tract. Materials that are corrosive to the eyes or cause irreversible corneal opacity. Materials that are corrosive to the skin. **4** (materials that, under emergency conditions, can be lethal): Gases and vapors whose LC₅₀ for acute inhalation toxicity less than or equal to 1,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is less than or equal to 0.5 mg/L. Materials whose LD₅₀ for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LD₅₀ for acute oral toxicity is less than or equal to 5 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 1000 ppm.

FLAMMABILITY HAZARD: 0 Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand: Materials that will not burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. **1** Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur: Materials that will burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. Liquids, solids and semisolids having a flash point at or above 93.4°C (200°F) (i.e. Class IIIB liquids). Liquids with a flash point greater than 35°C (95°F) that do not sustain combustion when tested using the *Method of Testing for Sustained Combustibility*, per 49 CFR 173, Appendix H or the UN *Recommendation on the Transport of Dangerous Goods, Model Regulations* (current edition) and the related *Manual of Tests and Criteria* (current edition). Liquids with a flash point greater than 35°C (95°F) in a water-miscible solution or dispersion with a water non-combustible liquid/solid content of more than 85 percent by weight. Liquids that have no fire point when tested by ASTM D 92 Standard Test Method for Flash and Fire Points by Cleveland Open Cup, up to a boiling point of the liquid or up to a temperature at which the sample being tested shows an obvious physical change. Combustible pellets with a representative diameter of greater than 2 mm (10 mesh). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. Most ordinary combustible materials. **2** Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air: Liquids having a flash point at or above 37.8°C (100°F) and below 93.4°C (200°F) (i.e. Class II and Class IIIA liquids.) Solid materials in the form of powders or coarse dusts of representative diameter between 420 microns (40 mesh) and 2 mm (10 mesh) that burn rapidly but that generally do not form explosive mixtures in air. Solid materials in fibrous or shredded form that burn rapidly and create flash fire hazards, such as cotton, sisal and hemp. Solids and semisolids that readily give off flammable vapors. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. **3** Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions: Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 37.8°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (73°F) and below 37.8°C (100°F) (i.e. Class IB and IC liquids). Materials that, on account of their physical form or environmental conditions, can form explosive mixtures with air and are readily dispersed in air. Flammable or combustible dusts with a representative diameter less than 420 microns (40 mesh). Materials that burn with extreme rapidity, usually by reason of self-contained oxygen (e.g. dry nitrocellulose and many organic peroxides). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued): 4 Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and will burn readily: Flammable gases. Flammable cryogenic materials. Any liquid or gaseous materials that is liquid while under pressure and has a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F) (i.e. Class IA liquids). Materials that ignite when exposed to air. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

INSTABILITY HAZARD: 0 Materials that in themselves are normally stable, even under fire conditions: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) below 0.01 W/mL. Materials that do not exhibit an exotherm at temperatures less than or equal to 500°C (932°F) when tested by differential scanning calorimetry. **1** Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 0.01 W/mL and below 10 W/mL. **2** Materials that readily undergo violent chemical change at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 10 W/mL and below 100W/mL. Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before initiation: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 100 W/mL and below 1000 W/mL. Materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures. **4** Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) of 1000 W/mL or greater. Materials that are sensitive to localized thermal or mechanical shock at normal temperatures and pressures.

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (NFPA). **Flash Point** - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. **Autoignition Temperature**: The minimum temperature required to initiate combustion in air with no other source of ignition. **LEL** - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. **UEL** - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TD₀**, **LDLo**, and **LDo**, or **TC**, **TC₀**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information**: The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information**: **BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

ECOLOGICAL INFORMATION:

EC is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifetimes which consume contaminated plant or animal matter. **TL_m** = median threshold limit; Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

U.S. and CANADA:

This section explains the impact of various laws and regulations on the material. **ACGIH**: American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **EPA** is the U.S. Environmental Protection Agency. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act (**SARA**); the Canadian Domestic/Non-Domestic Substances List (**DSL/NDSL**); the U.S. Toxic Substance Control Act (**TSCA**); Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA** or **Superfund**); and various state regulations. This section also includes information on the precautionary warnings which appear on the material's package label. **OSHA** - U.S. Occupational Safety and Health Administration.