

# MATERIAL SAFETY DATA SHEET

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

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

### 1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): STARBRITE TEAK BRIGHTENER  
PRODUCT #: 81516, 81532, 81500N  
SYNONYMS: Not Applicable  
CHEMICAL NAME/CLASS: Oxalic Acid Solution  
PRODUCT USE: Teak Care  
MANUFACTURER'S NAME: STAR BRITE  
U.S. ADDRESS: 4041 S.W. 47 Avenue  
Ft. Lauderdale, FL 33314  
U.S. EMERGENCY PHONE: Chemtrec  
(800) 424-9300 or (703) 527-3887  
(954) 587-6280  
U.S. INFORMATION PHONE:  
INTERNATIONAL ADDRESS:  
INTERNATIONAL EMERGENCY PHONE:  
INTERNATIONAL BUSINESS PHONE:  
DATE OF PREPARATION: June 3, 2004  
DATE OF REVISION: July 25, 2006

### 2. COMPOSITION and INFORMATION ON INGREDIENTS

**EU LABELING AND CLASSIFICATION:** This product meets the definition of the hazard class of Harmful and Irritant, as defined by the European Economic Community Guidelines.

EU CLASSIFICATION: [Xn] Harmful. [Xi]: Irritant.

EU RISK PHRASES: [R: 20/21/22]: Harmful by inhalation, in contact with skin and if swallowed. [R: 36/38]: Irritating to eyes and skin.

EU SAFETY PHRASES: [S: 2-]: Keep out of the reach of children. (*This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only*). [S: 24/25]: Avoid contact with skin and eyes. [S: 36/37]: Wear suitable protective clothing, gloves and eye/face protection. [S: 46]: If swallowed, seek medical advice immediately and show this container or label.

CHEMICAL NAME	CAS #	EINECS #	% w/v	EU CLASSIFICATION FOR COMPONENTS
Ethylene Glycol <i>n</i> -Butyl Ether (2-Butoxyethanol)	111-76-2	203-905-0	2-6%	HAZARD CLASSIFICATION: Xn (Harmful); Xi (Irritant) RISK PHRASES: R: 20/21/22; R: 36/38
Oxalic Acid	144-62-7	205-634-3	4-10%	HAZARD CLASSIFICATION: Xn (Harmful) RISK PHRASES: R: 21/22
Water and other trace compounds. Each of the other components is present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).			Balance	HAZARD CLASSIFICATION: Not Applicable RISK PHRASES: Not Applicable

See Section 15 for full EU classification information of product and components.

NOTE: ALL Canadian WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR. The MSDS is also prepared to include all European Union required information under EU Directives.

### 3. HAZARD IDENTIFICATION

**EMERGENCY OVERVIEW: Product Description:** This product is a clear liquid with a sweet, pleasant odor. **Health Hazards:** The main hazard associated with over exposure to this product is the potential for moderate to severe irritation of eyes, skin, and other contaminated tissue. **Flammability Hazards:** This solution is not flammable. If involved in a fire, this product will produce oxides of carbon and formic acid. **Reactivity Hazards:** This product is not reactive. **Environmental Hazards:** This material may 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.

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 described on the following page.

### 3. HAZARD IDENTIFICATION (Continued)

**INHALATION:** Inhalation of vapors, mists, or sprays of this product can be moderately irritating to the respiratory system. Depending on the concentration and duration of contact, symptoms of inhalation overexposure can include coughing, sore throat, nasal congestion, and breathing difficulty. The Oxalic Acid component of this component is considered a systemic toxin and can be readily absorbed into the system after inhalation exposure, resulting in headache and nausea. Animal data suggest that adverse effects on the blood (red blood cell fragility, hemoglobinuria) may result from inhalation exposure to the 2-Butoxyethanol component of this product. Chronic inhalation of this product can result in chronic inflammation of upper respiratory tract and permanent damage to lung tissue, resulting in bronchitis or pulmonary edema.

**CONTACT WITH SKIN or EYES:** Skin contact can cause moderate to severe irritation, depending on the duration and concentration of exposure. Symptoms of such overexposure may result in redness and pain. Repeated contact with this product may produce delayed pain in the area of contamination, discoloration of the skin and may cause the fingernails to become brittle. The 2-Butoxyethanol and Oxalic Acid components are both considered severe eye irritants; contact of this product with the eyes 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 ABSORPTION:** The 2-Butoxyethanol component of this product can be absorbed via intact skin. Symptoms of exposure via this route may include adverse central nervous system effects and other symptoms as described under "Inhalation".

**INGESTION:** Ingestion is not anticipated to be a significant route of exposure for any component of this product. If this product is swallowed, symptoms of such exposure may include nausea, vomiting, diarrhea, and a burning sensation in the mouth, throat, and in other tissues of the digestive system. Other symptoms of ingestion may include headache, pain and twitching in muscles or cramps. Severe ingestion exposures may result in bloody vomiting, weak and irregular heartbeat, drop in blood pressure, signs of heart failure, shock, convulsions, kidney damage or renal failure, coma and may possibly 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.



**OTHER HEALTH EFFECTS:** Due to the presence of Oxalic Acid, chronic exposure to this product via ingestion, skin absorption and inhalation may cause formation of stones (calculi) in kidneys and urinary tract, painful abdominal spasms, and painful urination, weight loss.

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

**ACUTE:** The primary acute health effect associated with this product is the potential for moderate to severe irritation of contaminated eyes, skin, or other contaminated tissue. Severe ingestion exposures can be fatal.

**CHRONIC:** Repeated skin contact can result in dermatitis (inflammation of the outer layer of the skin). Chronic exposure via inhalation may cause damage to respiratory system, bronchitis, or pulmonary edema. Chronic exposure via ingestion, inhalation or skin absorption may cause kidney stones and other kidney damage. See Section 11 (Toxicology Information) for additional data.

**TARGET ORGANS:** ACUTE: Skin, eyes, respiratory system, blood system (based on animal evidence). CHRONIC: Skin, respiratory system, kidneys.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
<b>HEALTH HAZARD</b>	(BLUE)	2	
<b>FLAMMABILITY HAZARD</b>	(RED)	0	
<b>PHYSICAL HAZARD</b>	(ORANGE)	0	
PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		SEE SECTION 8
For Routine Industrial Use and Handling Applications			

**See Section 16 for Definition of Ratings**

## 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. 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.

#### 4. FIRST-AID MEASURES (Continued)

**EYE EXPOSURE:** If this product's liquid or vapors enter 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. Remove or cover gross contamination to avoid exposure to rescuers.

**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 or drink several cupfuls of 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 respiratory problems, dermatitis, and other skin disorders can be aggravated by exposure to this product.

**RECOMMENDATIONS TO PHYSICIANS:** Treat symptoms and eliminate overexposure.

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#### 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:**

Water Spray: YES

Carbon Dioxide: YES

Foam: YES

Dry Chemical: YES

Halon: YES

Other: Any "ABC" Class.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** This solution is a primary irritant and presents a contact hazard to firefighters. When involved in a fire, this material may decompose and produce irritating vapors and toxic gases (e.g., carbon monoxides, formic acid).

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

**SPECIAL FIRE-FIGHTING PROCEDURES:** Incipient fire responders should

wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas. If necessary, clean contaminated fire response equipment with an acid neutralizing agent (e.g., sodium bicarbonate) and rinse thoroughly with water before returning such equipment to service.

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#### 6. ACCIDENTAL RELEASE MEASURES

**RELEASE RESPONSE:** In case of a release, clear the affected area and protect people. Uncontrolled releases should be responded to by appropriately trained personnel in proper personal protective equipment, using pre-planned procedures. The proper personal protective equipment for incidental releases (e.g., 32-ounce container) should be rubber gloves and goggles. In the event that a clean up will generate excessive splashes, a face-shield, boots, and chemically-resistant body protection should also be worn. In the event of a non-incidental release (e.g., several 1-gallon containers released in a poorly ventilated area), minimum Personal Protective Equipment should be Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard-hat, and Self-Contained Breathing Apparatus. Absorb spilled liquid with polypads or other suitable absorbent materials. Neutralize contaminate area, equipment, and all residue with sodium bicarbonate, soda ash, or other agents suitable for neutralization of acidic materials. Triple-rinse with water. Decontaminate the area thoroughly. Test area with litmus paper to confirm neutralization is complete. Place all spill residue in an appropriate container and seal. Dispose of in accordance with U.S. Federal, State, and local hazardous waste disposal regulations and those of Canada and its Provinces and EU Member States (see Section 13, Disposal Considerations).

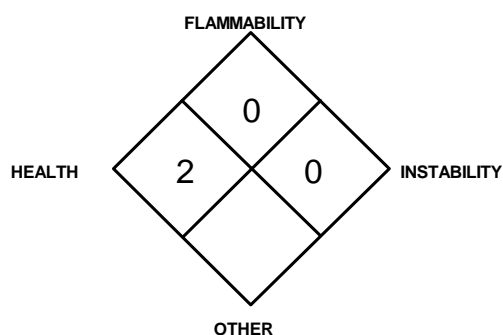
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### PART III *How can I prevent hazardous situations from occurring?*

#### 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.

#### NFPA RATING



**See Section 16 for  
Definition of Ratings**

## 7. HANDLING and STORAGE (Continued)

**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). Material should be stored in secondary containers. Keep container tightly closed when not in use. Storage areas should be made of corrosion-resistant materials. Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged.

**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 and those of EU Member States.

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

**VENTILATION AND ENGINEERING CONTROLS:** Use with adequate ventilation to ensure exposure levels are maintained below the limits below, 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	AIHA WEELs		OTHER
		TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	IDLH mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	mg/m <sup>3</sup>
Ethylene Glycol <i>n</i> -Butyl Ether (2-Butoxyethanol)	111-76-2	97	NE	240 (skin) 125 (Vacated 1989 PEL)	NE	24 (skin)	NE	700 (ppm)	NE	NE	DFG MAKs: TWA = 98 (skin) PEAK = 4•MAK 15 min., average value, 1-hr interval DFG MAK Pregnancy Risk Classification: C Carcinogen: EPA- C, EPA-CBD, TLV-A3
Oxalic Acid	144-62-7	1	2	1	2	1	2	500	NE	NE	NE
Water and other trace compounds. Each of the other components is present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).		None of the other constituents in this mixture contribute significantly to the hazards associated with this component. All pertinent hazard information has been provided in this Material Safety Data Sheet, per the requirements of the U.S. Federal Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards, Canadian Workplace Hazardous Materials Identification System Standards (CPR 4) and European Union Standards (Commission Directive 93/112/EEC).									

NE = Not Established.

See Section 16 for Definitions of Terms Used.

**INTERNATIONAL OCCUPATIONAL EXPOSURE LIMITS:** In addition to the exposure limit values cited above, other exposure limits have been established by various countries for the components of this mixture, as provided below (no listing for a component indicates no values are available):

#### 2-BUTOXYETHANOL:

Australia: TWA = 25 ppm (120 mg/m<sup>3</sup>), Skin, JAN 1993  
 Austria: MAK = 20 ppm (100 mg/m<sup>3</sup>), Skin, JAN 1999  
 Belgium: TWA = 25 ppm (121 mg/m<sup>3</sup>), Skin, JAN 1993  
 Denmark: TWA = 25 ppm (120 mg/m<sup>3</sup>), Skin, JAN 1999  
 Finland: TWA = 25 ppm (120 mg/m<sup>3</sup>), STEL 75 ppm (350 mg/m<sup>3</sup>), Skin, JAN 1999  
 France: VME = 25 ppm (120 mg/m<sup>3</sup>), Skin, JAN 1999  
 Germany: MAK = 20 ppm (100 mg/m<sup>3</sup>), Skin, JAN 1999  
 Hungary: TWA = 100 mg/m<sup>3</sup>, STEL 200 mg/m<sup>3</sup>, Skin, JAN 1993  
 The Netherlands: MAC-TGG = 20 ppm (100 mg/m<sup>3</sup>), STEL = 40 ppm, Skin, JAN 1999  
 Norway: TWA = 20 ppm (100 mg/m<sup>3</sup>), JAN1 999  
 The Philippines: TWA = 50 ppm (240 mg/m<sup>3</sup>), Skin, JAN 1993  
 Poland: MAC(TWA) = 100 mg/m<sup>3</sup>, MAC(STEL) 360 mg/m<sup>3</sup>, JAN 1999  
 Russia: STEL = 5 mg/m<sup>3</sup>, JAN 1993

#### 2-BUTOXYETHANOL (continued):

Sweden: NGV = 10 ppm (50 mg/m<sup>3</sup>), KTV 20 ppm (100 mg/m<sup>3</sup>), Skin, JAN 1999  
 Switzerland: MAK-W = 20 ppm (100 mg/m<sup>3</sup>), KZG-W = 40 ppm (200 mg/m<sup>3</sup>), Skin, JAN 1999  
 Turkey: TWA = 50 ppm (240 mg/m<sup>3</sup>), JAN 1993  
 United Kingdom: TWA = 25 ppm (123 mg/m<sup>3</sup>), Skin, SEP 2000  
 In Argentina, Bulgaria, Colombia, Jordan, Korea, New Zealand, Singapore, Vietnam, New Zealand, Singapore, Vietnam check ACGIH TLV

**OXALIC ACID:**  
 ARAB Republic of Egypt: TWA = 1 mg/m<sup>3</sup>, JAN 1993  
 Australia: TWA = 1 mg/m<sup>3</sup>, STEL = 2 mg/m<sup>3</sup>, JAN 1993  
 Denmark: TWA = 1 mg/m<sup>3</sup>, JAN 1999  
 Finland: TWA = 1 mg/m<sup>3</sup>, STEL = 3 mg/m<sup>3</sup>, JAN1999  
 France: VME = 1 mg/m<sup>3</sup>, JAN 1999  
 Norway: TWA = 0.01 mg(Ag)/m<sup>3</sup>, JAN 1999

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

### INTERNATIONAL OCCUPATIONAL EXPOSURE LIMITS (continued):

#### **OXALIC ACID (continued):**

The Philippines: TWA = 1 mg/m<sup>3</sup>, JAN 1993  
Poland: MAC(TWA) = 1 mg/m<sup>3</sup>, MAC(STEL) = 2 mg/m<sup>3</sup>, JAN 1999  
Sweden: NGV = 1 mg/m<sup>3</sup>, KTV = 2 mg/m<sup>3</sup>, JAN 1999

#### **OXALIC ACID (continued):**

Switzerland: MAK-W = 1 mg/m<sup>3</sup>, JAN 1999  
United Kingdom: TWA = 1 mg/m<sup>3</sup>, STEL = 0.2 mg/m<sup>3</sup>, SEP 2000  
In Argentina, Bulgaria, Colombia, Jordan, Korea, New Zealand, Singapore, Vietnam check ACGIH TLV

**RESPIRATORY PROTECTION:** Maintain airborne contaminant concentrations below exposure limits listed above, if applicable. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, the Canadian CSA Standard Z94.4-93, the European Standard EN149, or Standards of EU member states. 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 components of this product.

#### **2-BUTOXYETHANOL**

##### **CONCENTRATION**

Up to 50 ppm:

Up to 125 ppm:

Up to 250 ppm:

Up to 700 ppm:

Emergency or Planned Entry into Unknown Concentration or IDLH Conditions: SCBA or positive pressure, full-faced SAR with an auxiliary SCBA.

Escape:

##### **OXALIC ACID**

##### **CONCENTRATION**

Up to 25 mg/m<sup>3</sup>:

Up to 50 mg/m<sup>3</sup>:

Up to 500 mg/m<sup>3</sup>:

Emergency or Planned Entry into Unknown Concentration or IDLH Conditions: Positive-pressure, full-facepiece SCBA or positive-pressure, full-facepiece SAR with an auxiliary positive-pressure.

Escape:

##### **RESPIRATORY EQUIPMENT**

Chemical cartridge respirator with an organic vapor cartridge.

Supplied Air Respirator (SAR) operated in a continuous-flow mode, or a Powered Air Purifying Respirator (PAPR) with an organic vapor cartridge.

Full-face chemical cartridge respirator with organic vapor cartridge(s), or gas mask with organic vapor canister, or PAPR with a tight-fitting facepiece and organic vapor cartridge(s), or full-face Self Contained Breathing Apparatus (SCBA), or full-facepiece SAR.

Positive pressure, full-facepiece SAR.

Gas mask with organic vapor canister or escape-type SCBA

##### **RESPIRATORY EQUIPMENT**

Powered Air-Purifying Respirator (PAPR) with dust and mist filter(s), or Supplied Air Respirator (SAR) operated in a continuous-flow mode.

Full-Facepiece Respirator with high-efficiency particulate filter(s), or Full-Facepiece, Self Contained Breathing Apparatus (SCBA), or Full-Facepiece SAR.

Positive pressure, full-facepiece SAR.

**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, Canadian Standards, or the European Standard EN166.

**HAND PROTECTION:** Wear Nitrile rubber, Polyethylene, Viton™ gloves (resistance to breakthrough longer than 8 hours when tested against a similar petroleum substance) 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. If necessary, refer to U.S. OSHA 29 CFR 1910.138, appropriate Standards of Canada, or appropriate Standards of the European Union.

**BODY PROTECTION:** If operations will generate splashes or sprays, use body protection appropriate for task (e.g., coveralls or apron). If necessary, refer to appropriate Standards of Canada or the European Union. 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.

## 9. PHYSICAL and CHEMICAL PROPERTIES

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

**SPECIFIC GRAVITY (water = 1):** 1.01

**SOLUBILITY IN WATER:** Completely soluble.

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

**ODOR THRESHOLD:** 0.1-0.48 ppm (for 2-Butoxyethanol).

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

**APPEARANCE, ODOR and COLOR:** This product is a clear liquid with a sweet, pleasant odor.

**HOW TO DETECT THIS SUBSTANCE (warning properties):** Litmus paper will turn red when in contact with this solution. The odor may also be distinguishing characteristics.

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

**MELTING/FREEZING POINT:** Not determined.

**BOILING POINT:** ~100°C (~212°F)

**pH:** ~1

## 10. STABILITY and REACTIVITY

**STABILITY:** Normally stable.

**DECOMPOSITION PRODUCTS:** Carbon oxides and formic acid.

**MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:** This product is not compatible with the following substances: strong bases, strong oxidizers, silver oxalate, alkali metals, iron and iron compounds and acid chlorides.

**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

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

#### **2-BUTOXYETHANOL:**

Skin Irritancy (rabbit) = 500 mg/open; mild

Eye Irritancy (rabbit) = 100 mg; severe

Eye Irritancy (rabbit) = 100 mg/24 hours; moderate

Mutation in Microorganisms (bacteria, *Salmonella typhimurium*) = 19  $\mu\text{mol}/\text{plate}$

TDLo (oral, rat) = 139 gm/kg/90 days/continuous; Liver: changes in liver weight; Kidney, Urethra, Bladder: changes in bladder weight; Nutritional and Gross Metabolic: weight loss or decreased weight gain

TDLo (oral, rat) = 9324 mg/m<sup>3</sup>/21 days/intermittent; Behavioral: fluid intake; Nutritional and Gross Metabolic: weight loss or decreased weight gain

TDLo (oral, rat) = 1500 mg/kg/12 days/intermittent; Blood: pigmented or nucleated red blood cells, changes in erythrocyte (RBC) count

TDLo (oral, rat) = 13290 mg/kg/6 weeks/intermittent; Liver: changes in liver weight; Blood: changes in erythrocyte (RBC) count; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels phosphatases

TDLo (oral, rat) = 6279 mg/kg/male 13 weeks pre-mating; Reproductive: Paternal Effects: spermatogenesis (incl. genetic material, sperm morphology, motility, and count)

TCLo (oral, rat) = 9440 mg/kg/female 7–14 days after conception; Reproductive: Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants)

TCLo (inhalation, rat) = 200 ppm/6 hours/female 6–15 days after conception; Reproductive: Maternal Effects: uterus, cervix, vagina; post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants); litter size (e.g. # fetuses per litter; measured before birth)

TCLo (inhalation, rat) = 25 ppm/6 hours/female 6–15 days after conception; Reproductive: Specific Developmental Abnormalities: musculoskeletal system

TCLo (inhalation, rat) = 12 mg/kg/4 hours/female 1–19 days after conception; Reproductive: Fertility" post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants)

TCLo (inhalation, rat) = 10 mg/m<sup>3</sup>/24 hours/13 weeks/intermittent; Endocrine: hypoglycemia; Blood: changes in erythrocyte (RBC) count; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels transaminases

TCLo (inhalation, rat) = 1540 mg/m<sup>3</sup>/7 hours/5 weeks/intermittent; Blood: changes in erythrocyte (RBC) count

#### **2-BUTOXYETHANOL (continued):**

TCLo (inhalation, rat) = 432 ppm/7 hours/30 days/intermittent; Kidney, Urethra, Bladder: hematuria; Blood: other changes; Related to Chronic Data: death

TCLo (inhalation, rat) = 245 ppm/6 hours/9 days/intermittent; Liver: changes in liver weight; Blood: pigmented or nucleated red blood cells; Blood: changes in erythrocyte (RBC) count

TDLo (oral, mouse) = 5180 mg/kg/2 weeks/continuous; Endocrine: changes in thymus weight

TDLo (oral, mouse) = 7 gm/kg/female 8–14 days after conception; Reproductive: Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants)

TDLo (oral, mouse) = 9440 mg/kg/female 6–13 days after conception; Reproductive: Fertility: litter size (e.g. # fetuses per litter; measured before birth)

TCLo (inhalation, mouse) = 396 ppm/7 hours/30 days/intermittent; Liver: changes in liver weight; Kidney, Urethra, Bladder: hematuria; Blood: other changes

TCLo (inhalation, mouse) = 401 ppm/7 hours/90 days/intermittent; Liver: changes in liver weight; Kidney, Urethra, Bladder: hematuria; Blood: other changes

TCLo (inhalation, dog) = 415 ppm/7 hours/12 weeks/intermittent; Blood: microcytosis with or without anemia; Kidney, Urethra, Bladder: other changes in urine composition

TCLo (inhalation, dog) = 385 ppm/7 hours/28 days/intermittent; Blood: other changes erythrocyte (RBC) count; Related to Chronic Data: death

TCLo (inhalation, rabbit) = 200 ppm/6 hours/female 6–18 days after conception; Reproductive: Maternal Effects: uterus, cervix, vagina; pre-implantation mortality (e.g. reduction in number of implants per female; total number of implants per corpora lutea)

TCLo (inhalation, rabbit) = 100 ppm/6 hours/female 6–18 days after conception; Reproductive: Specific Developmental Abnormalities: cardiovascular (circulatory) system

TCLo (inhalation, guinea pig) = 376 ppm/7 hours/30 days/intermittent; Lungs, Thorax, or Respiration: chronic pulmonary edema; Kidney, Urethra, Bladder: changes in bladder weight; Nutritional and Gross Metabolic: weight loss or decreased weight gain

TDLo (skin, rabbit) = 4500  $\mu\text{L}/\text{kg}/9$  days/intermittent; Liver: changes in liver weight; Blood: pigmented or nucleated red blood cells; changes in erythrocyte (RBC) count

#### **2-BUTOXYETHANOL (continued):**

TDLo (oral, woman) = 600 mg/kg

TDLo (oral, woman) = 7813  $\mu\text{L}/\text{kg}$ ; Behavioral: coma; Vascular: BP lowering not characterized in autonomic section; Nutritional and Gross Metabolic: metabolic acidosis

TCLo (inhalation, human) = 195 ppm/8 hours; Gastrointestinal tract

TCLo (inhalation, human) = 100 ppm; Nose, Eye, Central nervous system

LD<sub>50</sub> (oral, rat) = 470 mg/kg

LD<sub>50</sub> (oral, mouse) = 1230 mg/kg; Behavioral: altered sleep time (including change in righting reflex), somnolence (general depressed activity); Skin and Appendages: hair

LD<sub>50</sub> (oral, rabbit) = 300 mg/kg

LD<sub>50</sub> (oral, guinea pig) = 1200 mg/kg; Behavioral: general anesthetic; Gastrointestinal: other changes; Kidney, Urethra, Bladder: other changes

LD<sub>50</sub> (intraperitoneal, rat) = 220 mg/kg

LD<sub>50</sub> (intraperitoneal, mouse) = 536 mg/kg

LD<sub>50</sub> (intravenous, rat) = 340 mg/kg

LD<sub>50</sub> (intravenous, rat) = 307 mg/kg

LD<sub>50</sub> (intravenous, mouse) = 1130 mg/kg

LD<sub>50</sub> (intravenous, rabbit) = 252 mg/kg

LD<sub>50</sub> (unreported, mouse) = 1050 mg/kg; Behavioral: somnolence (general depressed activity), excitement; Lungs, Thorax, or Respiration: other changes

LD<sub>50</sub> (skin, rabbit) = 220 mg/kg

LD<sub>50</sub> (skin, guinea pig) = 230  $\mu\text{g}/\text{kg}$

LC<sub>50</sub> (inhalation, rat) = 2900 mg/m<sup>3</sup>

LC<sub>50</sub> (inhalation, rat) = 450 ppm/4 hours; Behavioral: ataxia; Nutritional and Gross Metabolic: weight loss or decreased weight gain

LC<sub>50</sub> (inhalation, mouse) = 700 ppm/7 hours

LDLo (subcutaneous, mouse) = 500 mg/kg

#### **OXALIC ACID:**

Standard Draize Test (Skin-Rabbit, adult) 500 mg/24 hours Mild irritation effects

Standard Irritation Test (Eye effects-Rabbit, adult) 250 mg/24 hours Severe irritation effects

Standard Irritation Test (Eye effects-Rabbit, adult) 100 mg/4 seconds: rns Severe irritation effects

LD<sub>50</sub> (Oral-Rat) 7500 mg/kg

LD<sub>50</sub> (Intraperitoneal-Mouse) 270 mg/kg

LD<sub>50</sub> (Unreported-Rat) 1400 mg/kg

LDLo (Oral-woman) 600 mg/kg; Gastrointestinal: changes in structure or function of esophagus, hypermotility, diarrhea, other changes

LDLo (Oral-Dog) 1 gm/kg

LDLo (Subcutaneous-Cat, adult) 112 mg/kg

LDLo (Subcutaneous-Frog, adult) 757 mg/kg

## 11. TOXICOLOGICAL INFORMATION (Continued)

### TOXICITY DATA (continued):

#### OXALIC ACID (continued):

TDLo (Oral-Mouse) 8400 mg/kg: male 7 day(s) pre-mating female 7 day(s) pre-mating: 21 day(s) after conception: Reproductive: Fertility: other measures of fertility, Effects on Embryo or Fetus: fetotoxicity (except death, e.g., stunted fetus)

#### OXALIC ACID (continued):

TDLo (Oral-Mouse) 8400 mg/kg (male 7 days pre): Reproductive effects

#### OXALIC ACID (continued):

TDLo (Oral-Rat) 175 gm/kg/70 days-continuous: Endocrine: changes in thyroid weight; Musculoskeletal: other changes; Nutritional and Gross Metabolic: weight loss or decreased weight gain

**SUSPECTED CANCER AGENT:** The components of this product are listed as follows by agencies tracking the carcinogenic potential of chemical compounds, as follows:

**2-BUTOXYETHANOL:** EPA-C (Possible Human Carcinogen); EPA-CBD (Cannot Be Determined); TLV-A3 (Confirmed Animal Carcinogen)

The remaining components of this product are not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC (Groups 1 or 2), and CAL/OSHA and therefore are 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 to eyes, skin, and other contaminated tissue.

**SENSITIZATION TO THE PRODUCT:** The components of this product are not known to be skin or respiratory sensitizers.

**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.

There are data on the adverse effects on fertility observed in female mice in a continuous breeding study involving high levels of the 2-Butoxyethanol component of this product. Testicular atrophy and seminiferous tubule degeneration has been observed in rats and mice during studies of the 2-Butoxyethanol component of this product. Data also exist that demonstrate adverse reproductive effects in both females and embryos, from studies involving high levels of Oxalic Acid in mice.

A *mutagen* is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An *embryotoxin* is a chemical which 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 which causes damage to a developing fetus, but the damage does not propagate across generational lines. A *reproductive toxin* is any substance which 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.

**ENVIRONMENTAL STABILITY:** The components of this product are relatively stable under ambient, environmental conditions.

**EFFECT OF MATERIAL ON PLANTS or ANIMALS:** This product may be harmful or fatal to contaminated plant and animal life (especially if large quantities are released).

**EFFECT OF CHEMICAL ON AQUATIC LIFE:** This solution is designed to be toxic to certain forms of marine life; High concentrations of this solution may be detrimental to any aquatic environment. The following ecotoxicity data are available for the components of this product.

#### 2-BUTOXYETHANOL:

EC<sub>0</sub> (bacteria, *Pseudomonas putida*) = 700 mg/L/16 hours  
EC<sub>0</sub> (algae, *Microcystis aeruginosa*) = 35 mg/L/8 days  
EC<sub>0</sub> (green algae, *Scenedesmus quadricauda*) = 900 g/L/7 days  
EC<sub>0</sub> (protozoa, *Entosiphon sulcatum*) = 91 mg/L/72 hours  
EC<sub>0</sub> (protozoa, *Uronema parduczi* Chatton-Lwoff) = 463 mg/L  
LC<sub>50</sub> (brown shrimp, *Crangon crangon*) = 600–1000 mg/L/48 hours  
LC<sub>50</sub> (brown shrimp, *Crangon crangon*) = 550–950 mg/L/96 hours  
LC<sub>50</sub> (goldfish) = 1650 mg/L/24 hours  
LC<sub>50</sub> (guppy, *Poecilia reticulata*) = 983 mg/L/7 days

#### OXALIC ACID:

EC<sub>0</sub> (*Pseudomonas putida*) 16 hours = 1,550 mg/L

#### OXALIC ACID (continued):

EC<sub>0</sub> (*Microcystis aeruginosa* algae) 8 hours = 80 mg/L  
EC<sub>0</sub> (*Scenedesmus quadricauda* green algae) 7 days = 790 mg/L  
EC<sub>0</sub> (*Entosiphon sulcatum* protozoa) 72 hours = 222 mg/L  
Perturbation Level (*Gammarus pulex*) = 25 mg/L  
Perturbation Level (*Vorticella campanula*) = 50 mg/L  
Perturbation Level (*Paramecium caudatum*) = 50 mg/L  
Perturbation Level (*Tubifex tubifex*) = 80 mg/L  
Perturbation Level (*Limnaea ovata*) = 60 mg/L  
Perturbation Level (*Sialis flavilatera*) = 1,000 mg/L  
Period of Survival (goldfish) 0.40–0.5 hour = 1,000 ppm, pH: 2.6  
Period of Survival (goldfish) 4 days = 200 ppm, pH: 5.3

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### 13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: 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.

EPA WASTE NUMBER: Wastes of this product should be tested to see if they are wastes as defined under EPA criteria for D002 listed wastes (Waste Characteristic-Corrosivity).

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### 14. TRANSPORTATION INFORMATION

Call for information

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### 15. REGULATORY INFORMATION

#### **ADDITIONAL U.S. REGULATIONS:**

U.S. SARA REPORTING REQUIREMENTS: The components of this product are not subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

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): Not applicable.

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

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

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): **WARNING!** CAUSES MODERATE TO SEVERE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE 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, CO<sub>2</sub>, or "alcohol" foam. **IN CASE OF SPILL**: Absorb spill with sodium bicarbonate or other acid-neutralizing material 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.

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: The components of this product are not on the CEPA Priority Substances Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS:  
irritation.

**Class D2B**: Chronic Toxic Effects-skin and respiratory



## 15. REGULATORY INFORMATION (Continued)

### EUROPEAN UNION INFORMATION FOR PRODUCT (continued):

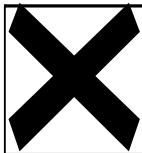
EU LABELING AND CLASSIFICATION: This product meets the following definitions, per the European Union Council Directives.

EU CLASSIFICATION: [Xn] Harmful. [Xi]: Irritant.

EU RISK PHRASES: [R: 20/21/22]: Harmful by inhalation, in contact with skin and if swallowed. [R: 36/38]: Irritating to eyes and skin.

EU SAFETY PHRASES: [S: 1/2-]: Keep out of the reach of children. (*This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only*). [S: 24/25]: Avoid contact with skin and eyes. [S: 36/37]: Wear suitable protective clothing, gloves and eye/face protection. [S: 46]: If swallowed, seek medical advice immediately and show this container or label.

EUROPEAN UNION ANNEX II HAZARD SYMBOL:



EUROPEAN UNION INFORMATION FOR CONSTITUENTS: The following information is available for primary components of this product.

#### **2-Butoxyethanol:**

EU EINECS/ELINCS NUMBER: 203-905-0

EU CLASSIFICATION: [Xn] Harmful; [Xi]: Irritant

EU RISK PHRASES: [R: 20/21/22]: Harmful by inhalation, in contact with skin and if swallowed. [R: 36/38]: Irritating to eyes and skin.

EU SAFETY PHRASES: [S: 2-]: Keep out of the reach of children. (*This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only*). [S: 24/25]: Avoid contact with skin and eyes. [S: 36/37]: Wear suitable protective clothing, gloves and eye/face protection. [S: 46]: If swallowed, seek medical advice immediately and show this container or label.

#### **Oxalic Acid:**

EU EINECS/ELINCS NUMBER: 205-634-3

EU CLASSIFICATION: [Xn] Harmful;

EU RISK PHRASES: [R: 21/22]: Harmful in contact with skin and if swallowed.

EU SAFETY PHRASES: [S: 2-]: Keep out of the reach of children. (*This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only*). [S: 24/25]: Avoid contact with skin and eyes.

## 16. OTHER INFORMATION

### PREPARED BY:

CHEMICAL SAFETY ASSOCIATES, Inc.  
Po Box 36519, La Mesa, CA 91944-3519  
(619) 670-0609

### DATE OF PRINTING:

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## 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.

**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.

#### **EXPOSURE LIMITS IN AIR (continued):**

**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.

## DEFINITIONS OF TERMS (Continued)

### EXPOSURE LIMITS IN AIR (continued):

**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.

**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.

### 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 LD<sub>50</sub> Rat.* < 5000 mg/kg. *Dermal Toxicity LD<sub>50</sub>Rat or Rabbit.* < 2000 mg/kg. *Inhalation Toxicity 4-hrs LC<sub>50</sub> 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 LD<sub>50</sub> Rat.* > 500-5000 mg/kg. *Dermal Toxicity LD<sub>50</sub>Rat or Rabbit.* > 1000-2000 mg/kg. *Inhalation Toxicity LC<sub>50</sub> 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 LD<sub>50</sub> Rat.* > 50-500 mg/kg. *Dermal Toxicity LD<sub>50</sub>Rat or Rabbit.* > 200-1000 mg/kg. *Inhalation Toxicity LC<sub>50</sub> 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 LD<sub>50</sub> Rat.* > 1-50 mg/kg. *Dermal Toxicity LD<sub>50</sub>Rat or Rabbit.* > 20-200 mg/kg. *Inhalation Toxicity LC<sub>50</sub> 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 LD<sub>50</sub> Rat.* ≤ 1 mg/kg. *Dermal Toxicity LD<sub>50</sub>Rat or Rabbit.* ≤ 20 mg/kg. *Inhalation Toxicity LC<sub>50</sub> 4-hrs Rat.* ≤ 0.05 mg/L).

#### 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 IIIB, 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]);

### HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

#### FLAMMABILITY HAZARD (continued):

**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:* Packing 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. *Unstable 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:* Packing 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.);

## DEFINITIONS OF TERMS (Continued)

### HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

#### PHYSICAL HAZARD (continued):

**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.).

### NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

**HEALTH HAZARD:** **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure could cause death or major residual injury).

**FLAMMABILITY HAZARD:** **0** Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand. **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. **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. **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. **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.

**INSTABILITY HAZARD:** **0** Materials that in themselves are normally stable, even under fire conditions. **1** Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures. **2** Materials that readily undergo violent chemical change at elevated temperatures and pressures. **3** 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. **4** Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction 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.

### ECOLOGICAL INFORMATION:

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

### 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: **LD<sub>50</sub>** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC<sub>50</sub>** - 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/m<sup>3</sup>** 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; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **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.

### REGULATORY INFORMATION:

#### U.S. and CANADA:

**ACGIH:** American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.

This section explains the impact of various laws and regulations on the material. **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/NDL**); 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.

#### EUROPEAN and INTERNATIONAL:

**The DFG:** This is the Federal Republic of Germany's Occupation Health Agency, similar to the U.S. OSHA. **EU** is the European Union (formerly known as the **EEC**, European Economic Community). **EINECS:** This is the European Inventory of Now-Existing Chemical Substances. The **ARD** is the European Agreement Concerning the International Carriage of Dangerous Goods by Road and the **RID** are the International Regulations Concerning the Carriage of Dangerous Goods by Rail. **AICS** is the Australian Inventory of Chemical Substances. **MITI** is the Japanese Minister of International Trade and Industry