MATERIAL SAFETY DATA SHEET

Illumina, Inc.

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, European Union, Australian NOHSC, and Japanese Industrial Standards

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

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): **TruSeq RNA and DNA Sample Prep Kit**
DOCUMENT NUMBER: 15018479
U.N. NUMBER: Not Applicable
U.N. DANGEROUS GOODS CLASS/SUBSIDIARY RISK: Not Applicable
HAZCHEM CODE (AUSTRALIA): Not applicable
POISONS SCHEDULE NUMBER (AUSTRALIA): Not Applicable
PRODUCT USE: DNA Sequencing
U.S. SUPPLIER/MANUFACTURER'S NAME: **ILLUMINA, Inc.**
Address: 9885 Towne Centre Drive
San Diego, CA 92121-1975
Business Phone: +1-800-809-ILMN (toll-free)
+1-800-809-4566 (toll-free)
+1-858-202-4566 (outside North America)
AUSTRALIAN SUPPLIER/DISTRIBUTOR'S NAME:
Address:

Business Phone:
EUROPEAN SUPPLIER/ DISTRIBUTOR'S NAME:
Address:

Business Phone:
EMERGENCY PHONE: 1-858-202-4566 (North America)
+1-858-202-4566 (outside North America)
EMAIL ADDRESS/COMPETENT PERSON FOR MSDS: techsupport@illumina.com
DATE OF PREPARATION: September 9, 2010
DATE OF REVISION: New

NOTE: ALL United States Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards, Canadian WHMIS [Controlled Products Regulations], European Union [Regulation (EC) 1907/2006 Annex II], Australian [NOHSC:2011 (2003)], and Japanese Industrial Standard (JIS Z 7250: 2005) 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

This Material Safety Data sheet describes the TruSeq RNA and DNA Sample Prep Kit. This product consists of forty-one solutions. This Material Safety Data Sheet provides complete information on all the components described in the following tables. Unless otherwise specified, the information in each section of this document is pertinent to each solution. The solutions of this product are mixtures (preparations) of chemical compounds.

EU/AUSTRALIAN LABELING AND CLASSIFICATION: The following classification is self-classification, based on possible skin contact of product in the workplace and European Union Council Directive 67/548/EEC and subsequent Directives and by the Australian National Occupational Health and Safety Commission [NOHSC(1008:2004)].

All Component Solutions:

Classification: Not applicable. Risk Phrases: Not applicable. Symbol: Not applicable.

See Section 16 for full text of Risk Phrases

EMERGENCY OVERVIEW: Product Description: These solutions are clear, colorless, odorless liquids. **Health Hazards:** The chief hazard in event of overexposure is the potential for irritation of contaminated skin or eyes. **Flammability Hazards:** These solutions present no significant fire hazards. **Reactivity Hazards:** These solutions are not reactive. **Environmental Hazards:** Negligible. **Emergency Recommendations:** Emergency responders must wear personal protective equipment suitable for the situation to which they are responding.

3. COMPOSITION AND INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	EINECS#	ENCS#	% v/v	CLASSIFICATION, RISK PHRASES, SYMBOL LETTERS
COMPONENT 1: Code LP#-ATL					
Aliphatic Triol	Proprietary			1–5	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Glycol Compound	Proprietary			15–25	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents 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 16 for full text of Ingredient Risk Phrases

3. COMPOSITION AND INFORMATION ON INGREDIENTS (Continued)

CHEMICAL NAME	CAS #	EINECS#	ENCS#	% v/v	CLASSIFICATION, RISK PHRASES, SYMBOL LETTERS
COMPONENT 2: Code LP#-ERP					
Aliphatic Triol	Proprietary			1–5	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Carbohydrate Compound	Proprietary			7–13	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents 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.
COMPONENT 3: Code LP#-LIG					
Aliphatic alcohol	Proprietary			30–60	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents 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.
COMPONENT 4: Code LP#-STL					
Aminoacetic Acid	Proprietary			10–30	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents 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.
COMPONENT 5: Code LP#-RSB					
Water and other constituents. Each of the other constituents 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.
COMPONENT 6: Code LP#-CTE					
Potassium Salt	Proprietary			1–5	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Aliphatic alcohol	Proprietary			30–60	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents 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.
COMPONENT 7: Code LP#-CTL					
Aliphatic alcohol	Proprietary			30–60	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents 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.
COMPONENT 8: Code LP#-CTA					
Aliphatic alcohol	Proprietary			30–60	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents 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.
COMPONENT 9: Code LP#-PPC					
Water and other constituents. Each of the other constituents 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.
COMPONENT 10: Code LP#-PMM					
Chloride Salt	Proprietary			1–5	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents 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.
COMPONENTS 11–22: Codes LP#-AD001 to LP#-AD012					
Water and other constituents. Each of the other constituents 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.
COMPONENT 23: Code LP#-ELB					
Water and other constituents. Each of the other constituents 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.
COMPONENT 24: Code LP#-SSM					
Aliphatic Triol	Proprietary			5–10	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents 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 16 for full text of Ingredient Risk Phrases

3. COMPOSITION AND INFORMATION ON INGREDIENTS (Continued)

CHEMICAL NAME	CAS #	EINECS#	ENCS#	% v/v	CLASSIFICATION, RISK PHRASES, SYMBOL LETTERS
COMPONENT 25: Code LP#-FSM					
Chloride Salt	Proprietary			1–5	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Aliphatic Triol	Proprietary			1–5	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents 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.
COMPONENT 26: Code LP#-EPF					
Chloride Salt	Proprietary			1–5	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Aliphatic Triol	Proprietary			1–5	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents 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.
COMPONENT 27: Code LP#-BWB					
Water and other constituents. Each of the other constituents 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.
COMPONENT 28: Code LP#-BBB					
Lithium Salt	Proprietary			3–7	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents 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.
COMPONENT 29: Code LP#-RPB					
Lithium Salt	Proprietary			3–7	HAZARD CLASSIFICATION: Not applicable. RISK PHRASES: Not applicable.
Water and other constituents. Each of the other constituents 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.
COMPONENTS 30–41: Codes LP#-AR001 to LP#-AR012					
Water and other constituents. Each of the other constituents 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 16 for full text of Ingredient Risk Phrases

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

4. FIRST-AID MEASURES

Contaminated individuals must seek medical attention if any adverse effect occurs. 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 physician or health professional with the contaminated individual.

SKIN EXPOSURE: If this product contaminates the skin, begin decontamination with copious amounts of running water. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Contaminated clothing must be removed and laundered before re-use. The contaminated individual must seek medical attention if any adverse effect develops after the area is flushed.

EYE EXPOSURE: If this product contaminates the eyes, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have the contaminated individual "roll" eyes. Minimum flushing is for 20 minutes. The contaminated individual must seek medical attention if adverse effects occur after flushing.

INHALATION: If vapors, mists or sprays from this product are inhaled, remove contaminated individual to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if adverse effect continues after removal to fresh air.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. DO NOT INDUCE VOMITING unless directed by medical personnel. Have contaminated individual rinse mouth with water. Never induce vomiting or give diluents (milk or 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. If contaminated individual is convulsing, maintain an open airway and obtain immediate medical attention.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing dermatitis and other skin conditions may be aggravated by overexposure to components of this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

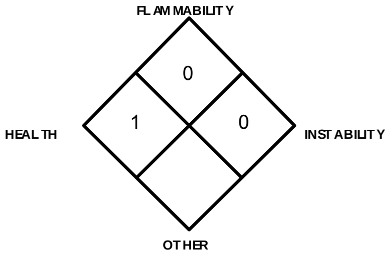
FLASH POINT: Not flammable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %): Not applicable.

5. FIRE-FIGHTING MEASURES (Continued)

NFPA RATING



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

FIRE EXTINGUISHING MATERIALS: In the event of a fire, use suppression methods for surrounding materials (e.g., water spray, dry chemical, carbon dioxide, foam, Halon, any "ABC" class extinguisher).

FIRE EXTINGUISHING MATERIALS NOT TO BE USED: None known.

UNUSUAL FIRE AND EXPLOSION HAZARDS: _When involved in a fire, this product's components will decompose and produce irritating vapors and toxic gases (including carbon oxides, dimethyl amine, hydrogen sulfide, phosphine, cyanides, hydrogen chloride, and phosphorous, sodium and nitrogen oxides).

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Move containers from fire area if it can be done without risk to personnel. Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Chemical resistant clothing may be necessary. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK 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. Avoid generating airborne dusts, mists, or sprays. The atmosphere must have levels of constituents 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 (SCBA).

Small Spills: Lightweight gloves, a lab coat, and eye protection should be worn. Absorb spilled liquid with paper towels. Wipe up spilled solid using non-combustible material. Wash contaminated area with soap and water, absorb with paper towels, and rinse with water.

Large Spills: Minimum Personal Protective Equipment should be **Level C: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard hat, and Air-Purifying respirator with organic vapor cartridge. Self-Contained Breathing Apparatus must be selected if release occurs in confined or poorly ventilated areas or in situations in which the level of oxygen is below 19.5%.** Absorb spilled liquid with polypads or other suitable absorbent materials. Dike or otherwise contain spill and remove with vacuum truck or pump to storage/salvage vessels. Wipe up spilled solid using non-combustible material. Decontaminate the area thoroughly. Prevent material from entering sewer or confined spaces, waterways, soil or public waters. Monitor area and confirm levels are bellow exposure limits given in Section 8 (Exposure Controls-Personal Protection), if applicable, before non-response personnel are allowed into the spill area.

Place all spill residue in a double plastic bag or other containment and seal. Decontaminate the area thoroughly. Do not mix with wastes from other materials. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations). For spills on water, contain, minimize dispersion and collect. Dispose of recovered material and report spill per regulatory requirements.

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

7. HANDLING and STORAGE

SAFE WORK AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product's components ON YOU or IN YOU. Wash thoroughly after handling this product's components. Avoid splashing or spraying this product's components. Do not eat or drink while handling this product's components.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Avoid breathing dusts, vapors, or mists generated by this product's components. Ensure containers of this product's components are properly labeled. Open containers slowly on a stable surface. Store vials as directed in the product insert. Store away from incompatible materials. Material should be stored in secondary containers, as appropriate. Storage areas should be made of fire resistant materials. Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Have appropriate extinguishing equipment in the storage area (i.e., sprinkler system, portable fire extinguishers). Keep vials tightly closed when not in use. Inspect vials containing this product's components for leaks or damage.

SPECIFIC USE(S): This product is for use in laboratory biological research. Follow all industry standards for use.

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, as applicable. Collect all rinsates and dispose of according to applicable Federal, State, and local procedures standards.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION, ENGINEERING, AND OCCUPATIONAL EXPOSURE CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below, if applicable. If necessary, refer to Australian National Code of Practice for the Control of Workplace Hazardous Substances [NOHSC: 2007 (1994)] for further information.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

VENTILATION, ENGINEERING, AND OCCUPATIONAL EXPOSURE CONTROLS (continued): As with all products that contain chemicals, ensure proper decontamination equipment (e.g., eyewash/safety shower stations) are available near areas where this product is used as necessary.

EXPOSURE LIMITS/GUIDELINES:

NOTE: Solutions not specifically listed are primarily water and trace constituents; no exposure limits are applicable.

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
COMPONENT 1: Code LP#-ATL									
Aliphatic Triol	77-86-1	NE	NE	NE	NE	NE	NE	NE	NE
Glycol Compound	25322-68-3	NE	NE	NE	NE	NE	NE	NE	NE
COMPONENT 2: Code LP#-ERP									
Aliphatic Triol	77-86-1	NE	NE	NE	NE	NE	NE	NE	NE
Carbohydrate Compound	57-50-1	10	NE	15 (total dust), 5 (resp. fraction)	NE	10 (total dust), 5 (resp. fraction)	NE	NE	NE
COMPONENT 3: Code LP#-LIG									
Aliphatic alcohol	56-81-5	10 (mist)	NE	15 (total dust) 5 (resp. frac.) Vacated 1989 PEL: 10 (total)	NE	NE	NE	NE	DFG MAKs: TWA = 50 (inhalable fraction) PEAK = 2•MAK 15 min. average value, 1-hr interval, 4 per shift Pregnancy Risk Group C
COMPONENT 4: Code LP#-STL									
Aminoacetic Acid	60-00-4	NE	NE	NE	NE	NE	NE	NE	NE
COMPONENT 6: Code LP#-CTE									
Potassium Salt	7778-77-0	NE	NE	NE	NE	NE	NE	NE	NE
Aliphatic alcohol	56-81-5	10 (mist)	NE	15 (total dust) 5 (resp. frac.) Vacated 1989 PEL: 10 (total)	NE	NE	NE	NE	DFG MAKs: TWA = 50 (inhalable fraction) PEAK = 2•MAK 15 min. average value, 1-hr interval, 4 per shift Pregnancy Risk Group C
COMPONENT 7: Code LP#-CTL									
Aliphatic alcohol	56-81-5	10 (mist)	NE	15 (total dust) 5 (resp. frac.) Vacated 1989 PEL: 10 (total)	NE	NE	NE	NE	DFG MAKs: TWA = 50 (inhalable fraction) PEAK = 2•MAK 15 min. average value, 1-hr interval, 4 per shift Pregnancy Risk Group C
COMPONENT 8: Code LP#-CTA									
Aliphatic alcohol	56-81-5	10 (mist)	NE	15 (total dust) 5 (resp. frac.) Vacated 1989 PEL: 10 (total)	NE	NE	NE	NE	DFG MAKs: TWA = 50 (inhalable fraction) PEAK = 2•MAK 15 min. average value, 1-hr interval, 4 per shift Pregnancy Risk Group C
COMPONENT 10: Code LP#-PMM									
Chloride Salt	7447-40-7	NE	NE	NE	NE	NE	NE	NE	NE
COMPONENT 24: Code LP#-SSM									
Aliphatic Triol	77-86-1	NE	NE	NE	NE	NE	NE	NE	NE
COMPONENT 25: Code LP#-FSM									
Chloride Salt	7447-40-7	NE	NE	NE	NE	NE	NE	NE	NE
Aliphatic Triol	77-86-1	NE	NE	NE	NE	NE	NE	NE	NE
COMPONENT 26: Code LP#-EPF									
Chloride Salt	7447-40-7	NE	NE	NE	NE	NE	NE	NE	NE
Aliphatic Triol	77-86-1	NE	NE	NE	NE	NE	NE	NE	NE
COMPONENT 28: Code LP#-BBB									
Lithium Salt	7447-41-8	NE	NE	NE	NE	NE	NE	NE	NE

NE = Not Established. DSEN = May Cause Dermal Sensitization See Section 16 for Definitions of Other Terms Used

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

EXPOSURE LIMITS/GUIDELINES (continued):

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
COMPONENT 29: Code LP#-RPB									
Lithium Salt	7447-41-8	NE	NE	NE	NE	NE	NE	NE	NE

NE = Not Established. DSEN = May Cause Dermal Sensitization See Section 16 for Definitions of Other Terms Used

INTERNATIONAL OCCUPATIONAL EXPOSURE LIMITS: In addition to the exposure limit values cited in this section, other exposure limits have been established by various countries for the components of this product. The exposure limits given may not be the most current; individual country authorities should be contacted to check on more current limits.

ALIPHATIC ALCOHOL:
Belgium: TWA = 10 mg/m^3, MAR 2002
Finland: TWA = 20 mg/m^3, SEP 2009
France: VME = 10 mg/m^3, FEB 2006
Korea: TWA = 10 mg/m^3 (mist), 2006
Mexico: TWA = 10 mg/m^3 (inhalable), 2004
The Netherlands: MAC-TGG = 10 mg/m^3, 2003
New Zealand: TWA = 10 mg/m^3 (mist), JAN 2002
Switzerland: MAK-W = 50 mg/m^3, KZG-W = 100 mg/m^3, DEC 2006
United Kingdom: TWA = 10 mg/m^3, 2005
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV

GLYCOL:
The Netherlands: MAC-TGG = 1000 mg/m^3, 2003
Denmark: TWA = 1000 mg/m^3, OCT 2002
Germany: MAK = 1000 mg/m^3 (inhalable), 2005

CHLORIDE SALT:
Russia: STEL = 5 mg/m^3, JUN 2003

POTASSIUM SALT:
Russia: STEL = 10 mg/m^3, JUN 2003

CARBOHYDRATE COMPOUND:
Belgium: TWA = 10 mg/m^3, MAR 2002
France: VME = 10 mg/m^3, FEB 2006

CARBOHYDRATE COMPOUND (continued):
Korea: TWA = 10 mg/m^3, 2006
Mexico: TWA = 10 mg/m^3; STEL = 20 mg/m^3, 2004
The Netherlands: MAC-TGG = 10 mg/m^3, 2003
New Zealand: TWA = 10 mg/m^3 (inspirable dust), JAN 2002
United Kingdom: TWA = 10 mg/m^3; STEL = 20 mg/m^3, 2005
In Argentina, Bulgaria, Colombia, Jordan, Singapore, Singapore, Vietnam check ACGIH TLV

ALIPHATIC TRIOL:
Russia: STEL = 5 mg/m^3, JUN 2003

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132), equivalent standards of Canada (including CSA Standard Z94.4-02 and CSA Standard Z94.3-07), standards of EU member states (including EN 529:2005 for respiratory PPE, CEN/TR 15419:2006 for hand/body protection, and CR 13464:1999 for face/eye protection), standards of Australia (including AS/NZS 1715:1994 for respiratory PPE, AS/NZS 4501.2:2006 for protective clothing, AS/NZS 2161.1:2000 for glove selection, and AS/NZS 1336:1997 for eye protection), or standards of Japan (including JIS T 8116:2005 for glove selection, JIS T 8150:2006 for respiratory PPE, JIS T 8147:2003 for eye protectors, and JIS T 8030:2005 for protective clothing). Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Respiratory protection is not generally needed when using this product. Maintain airborne contaminant concentrations below limits listed above. In instances where inhalable mists or sprays of product may be generated and respiratory protection is necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-02, European Standard EN 529:2005, EU member state standards, Australian Standard 1716-Respiratory Protective Devices and Australian Standard 1715-Selection, Use, and Maintenance of Respiratory Protective Devices, or Japanese Standard JIS T 8150:2006. 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, SAR with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998).

EYE PROTECTION: Depending on the use of this product, splash goggles or safety glasses may be worn. Use goggles or safety glasses for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS. If necessary, refer to U.S. OSHA 29 CFR 1910.133, Canadian CSA Standard Z94.3-07, European Standard CR 13464:1999, Australian Standard 1337-Eye Protection for Industrial Applications and Australian Standard 1336-Recommended Practices for Eye Protection in the Industrial Environment, or Japanese Standard JIS T 8147:2003.

HAND PROTECTION: Wear butyl rubber, neoprene, or nitrile rubber or latex gloves for routine use. If necessary, refer to U.S. OSHA 29 CFR 1910.138, appropriate standards of Canada, the Australian Standard 2161-Industrial Safety Gloves and Mittens, European Standard CEN/TR 15419:2006, or Japanese Standard JIS T 8116:2005.

BODY PROTECTION: Use body protection appropriate for task, such as a lab coat. If necessary, use body protection appropriate for task (e.g., Tyvek suit, rubber apron). If necessary, refer to OSHA Technical Manual (Section VII: Personal Protective Equipment), appropriate Canadian Standards, the European Standard CEN/TR 15419:2006, Australian Standard 3765-Clothing for Protection Against Hazardous Chemicals, or Japanese Standard JIS T 8030:2005. 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 Z195-02, *Protective Footwear*.

9. PHYSICAL and CHEMICAL PROPERTIES

APPEARANCE, ODOR and COLOR: These solutions are clear, colorless, odorless liquids.

HOW TO DETECT THESE SUBSTANCES: There are no unusual warning properties associated with these components.

pH: 6–10

9. PHYSICAL and CHEMICAL PROPERTIES (Continued)

FLASH POINT: Not applicable.
EXPLOSIVE PROPERTIES: Not explosive
VAPOR PRESSURE: Not established.
SOLUBILITY: Miscible in some organic solvents.
BOILING POINT: Not established.
VISCOSITY: Not established.
EVAPORATION RATE (*n*-BuAc = 1): Similar to water.
FLAMMABILITY: Not flammable.
OXIDIZING PROPERTIES: Not oxidizers.
SPECIFIC GRAVITY: Not established.
SOLUBILITY IN WATER: Completely soluble.
MELTING/FREEZING POINT: Not established.
RELATIVE VAPOR DENSITY (air = 1): Not established.
ODOR THRESHOLD: Not established.
COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not established.

10. STABILITY AND REACTIVITY

DECOMPOSITION CONDITIONS/STABILITY: Stable.

DECOMPOSITION PRODUCTS:

Combustion: Carbon oxides, dimethyl amine, hydrogen sulfide, phosphine, cyanides, hydrogen chloride, and phosphorous, sodium and nitrogen oxides.

Hydrolysis: None known.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong oxidizers, strong acids, some metals and substances which are incompatible with water.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Mixing with incompatible chemicals.

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

11. TOXICOLOGICAL INFORMATION

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: No adverse health effects should occur from routine, occupational use of this product's solutions in the manner specified by the manufacturer's instructions. The potential health effects of this product's solutions, via route of exposure, are described below.

INHALATION: Inhalation of vapors, mists, or sprays of these solutions may slightly irritate the nose, throat, and lungs. Symptoms are generally alleviated upon breathing fresh air.

CONTACT WITH SKIN or EYES: Contact with the skin or eyes may cause mild irritation, which is alleviated upon rinsing.

SKIN ABSORPTION: No constituents in these components are known to be absorbed via intact skin.

INGESTION: Ingestion is not anticipated to be a significant route of exposure for the product's components. If these solutions are swallowed they may cause gastric distress. Large doses may cause nausea, vomiting, and diarrhea.

INJECTION: Accidental injection of this product's solutions, via laceration or puncture by a contaminated object, may cause local reddening, tissue swelling, and discomfort in addition to the wound.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms.

ACUTE: Beyond mild irritation of the skin or eyes, contact with these components does not usually cause acute health effects.

CHRONIC: These components are not known to cause any significant chronic health effects.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD	(BLUE)	1
FLAMMABILITY HAZARD	(RED)	0
PHYSICAL HAZARD	(YELLOW)	0

PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		SEE SECTION 8

For Routine Use and Handling Applications

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

TARGET ORGANS:

ACUTE: Eyes, gastrointestinal tract.

CHRONIC: None known.

TOXICITY DATA: The following information is available for the constituents in components of this product present in greater that 1 percent concentration and listed in Section 3 (Composition and Information on Ingredients).

AMINOACETIC ACID:
LD$_{50}$ (oral, rat) = 1658 mg/kg
LD$_{50}$ (skin, rat) > 2000 mg/kg
LD$_{50}$ (intraperitoneal, rat) = 397 mg/kg
LD$_{50}$ (oral, mouse) = 30 mg/kg
LD$_{50}$ (intraperitoneal, mouse) = 250 mg/kg
LD$_{50}$ (intravenous, mouse) = 28500 μg/kg
TDLo (oral, rat) = 7632 mg/kg/ female 7–14 day after conception; Reproductive: Specific Developmental Abnormalities: eye/ear, craniofacial, musculoskeletal system

AMINOACETIC ACID (continued):
TDLo (oral, rat) = 7632 mg/kg/ female 7–14 day after conception; Reproductive: Specific Developmental Abnormalities - cardiovascular, respiratory system, urogenital system
TDLo (oral, rat) = 7632 mg/kg/ female 7–14 day after conception; Reproductive: Fertility: post-implantation mortality, fetotoxicity
TDLo (subcutaneous, rat) = 3 g/kg/ female 7–14 day after conception; Reproductive: Fertility: post-implantation mortality; fetotoxicity

AMINOACETIC ACID (continued):
DNA Inhibition (rat cells, not otherwise specified) = 600 μmol/L
Micronucleus Test (intraperitoneal, mouse) = 186 mg/kg
Micronucleus Test (oral, mouse) = 15 mg/kg
DNA Damage (lymphocyte, mouse) = 40500 μmol/L
Cytogenetic Analysis (intraperitoneal, mouse) = 50 mmol/L
Mutation in Mammalian Somatic Cells (lymphocyte, mouse) = 25200 μmol/L

11. TOXICOLOGICAL INFORMATION (Continued)

TOXICITY DATA (continued):

AMINOACETIC ACID (continued):

Unscheduled DNA Synthesis (embryo, hamster) = 100 µmol/L

DNA Inhibition (fibroblast, hamster) = 500 µg/L

Sister Chromatid Exchange (embryo, hamster) = 30 µmol/L

DNA Inhibition (kidney, rabbit) = 250 µmol/L

ALIPHATIC ALCOHOL:

Skin Irritancy (rabbit) = 500 mg/24 hours; mild

Eye Irritancy (rabbit) = 126 mg; mild

Eye Irritancy (rabbit) = 500 mg/24 hours; mild

LD_{50} (oral, rat) = 12600 mg/kg; general anesthetic, muscle weakness, Liver: other changes

LC_{50} (inhalation, rat) > 570 mg/m^3/1 hour

LD_{50} (intraperitoneal, rat) = 4420 mg/kg; toxic psychosis; Cardiac; other changes; Kidney, Urethra, Bladder: other changes

LD_{50} (subcutaneous, rat) = 100 mg/kg

LD_{50} (intravenous, rat) = 5566 mg/kg

LD_{50} (oral, mouse) = 4090 mg/kg

LD_{50} (intraperitoneal, mouse) = 8700 mg/kg

LD_{50} (subcutaneous, mouse) = 91 mg/kg

LD_{50} (intravenous, mouse) = 4250 mg/kg

LD_{50} (oral, rabbit) = 27 g/kg

LD_{50} (skin, rabbit) > 10 g/kg

LD_{50} (intravenous, rabbit) = 53 g/kg

LD_{50} (oral, guinea pig) = 7750 mg/kg

TDLo (oral, rat) = 16800 mg/kg/28 days/continuous; Endocrine: changes in adrenal weight

TDLo (oral, rat) = 96 g/kg/30 days/intermittent; Blood: changes in leukocyte (WBC) count, changes in serum composition (e.g. TP, bilirubin, cholesterol); Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: true cholinesterase

TDLo (oral, rat) = 100 mg/kg/male 1 day pre-mating; Reproductive: Fertility: post-implantation mortality

TDLo (intratesticular, rat) = 280 mg/kg/male 2 days pre-mating; Reproductive: Paternal Effects: spermatogenesis, testes, epididymis, sperm duct

TDLo (intratesticular, rat) = 1600 mg/kg/male 1 day pre-mating; Reproductive: male fertility index

TDLo (intratesticular, rat) = 862 mg/kg/male 1 day pre-mating; Reproductive: Paternal Effects: spermatogenesis

TDLo (intratesticular, monkey) = 119 mg/kg/male 1 day pre-mating; Reproductive: Paternal Effects: spermatogenesis, testes, epididymis, sperm duct

TDLo (oral, mouse) = 560 g/kg/8 weeks/continuous; Lungs, Thorax, or Respiration: structural or functional change in trachea or bronchi

DNA Inhibition (human, lymphocyte) = 200 mmol/L

Cytogenetic Analysis (oral, rat) = 1 g/kg

LITHIUM SALT:

Skin Irritancy (rabbit) = 500 mg/24 hours; Severe

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

Gene Conversion and Mitotic Recombination (*Saccharomyces cerevisiae*) = 9 mmol/L

Sex chromosome loss and nondisjunction (*Yeast, Saccharomyces cerevisiae*) = 3 mmol/L

DNA Inhibition (HeLa cell, human) = 70 mmol/L

DNA Inhibition (lymphocyte, human) = 50 mg/L

Cytogenetic Analysis (lymphocyte, human) = 50 mg/L

Cytogenetic Analysis (oral, mouse) = 212 µg/kg/3 days/intermittent.

Sister Chromatid Exchange (oral, mouse) = 21 mg/kg/3 days/intermittent

LDLo (oral, human) = 200 mg/kg/3 days

TDLo (oral, human) = 243 mg/kg/13 days; Central nervous system effects, Gastrointestinal tract effects

TDLo (oral, rat) = 712 mg/kg/1 week/continuous; Behavioral: fluid intake; Nutritional and Gross Metabolic: weight loss or decreased weight gain

TDLo (oral, rat) = 66 gm/kg/female 1–21 days after conception/lactating female 21 days post-birth; Reproductive: Specific Developmental Abnormalities: Central Nervous System; Effects on Newborn: biochemical and metabolic, physical

TDLo (intraperitoneal, rat) = 1 g/kg/female 7–11 days post; Teratogenic effects

TDLo (intraperitoneal, rat) = 500 mg/kg/10 days/intermittent; Liver: changes in liver weight; Kidney, Urethra, Bladder: urine volume increased; Endocrine: changes in spleen weight

TDLo (intraperitoneal, rat) = 41360 mg/kg/male 1 day pre-mating; Reproductive: Fertility: mating performance (e.g. # sperm positive females per # females mated; # copulations per # estrus cycles)

TDLo (intraperitoneal, rat) = 809 mg/kg/female 9–16 days after conception; Reproductive: Specific Developmental Abnormalities: eye/ear, craniofacial (including nose and tongue), Effects on Embryo or Fetus: other effects to embryo

LITHIUM SALT (continued):

TDLo (intraperitoneal, rat) = 1250 mg/kg/female 7–11 days after conception; Reproductive: Fertility: litter size (e.g. # fetuses per litter; measured before birth)

TDLo (intraperitoneal, rat) = 979 mg/kg: female 7–16 days after conception; Reproductive: Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants)

TDLo (subcutaneous, rat) = 678 mg/kg/8 days/intermittent; Behavioral: fluid intake; Kidney, Urethra, Bladder: urine volume increased; other changes in urine composition

TDLo (subcutaneous, rat) = 28 mg/kg/male 14 days pre-mating; Reproductive: Paternal Effects: other effects on male; Endocrine: changes in luteinizing hormone, androgenic

TDLo (subcutaneous, rat) = 42 mg/kg/male 21 days pre-mating; Reproductive: Paternal Effects: spermatogenesis (incl. genetic material, sperm morphology, motility, and count)

TDLo (oral, mouse) = 475 mg/kg/male 7 days pre-mating/female 7 days pre-mating, 21 days post-birth; Reproductive: Effects on Newborn: growth statistics (e.g. %, reduced weight gain); biochemical and metabolic; physical

TDLo (intraperitoneal, mouse) = 320 mg/kg/female 6–7 days post; Reproductive effects

TDLo (intraperitoneal, mouse) = 882 mg/kg/7 days/intermittent; Neoplastic effects

TDLo (subcutaneous, mouse) = 5440 mg/kg/17 days/intermittent; Kidney, Urethra, Bladder: other changes in urine composition; Nutritional and Gross Metabolic: weight loss or decreased weight gain; Related to Chronic Data: death

TDLo (subcutaneous, mouse) = 1240 mg/kg/female 12–13 days after conception; Reproductive: Specific Developmental Abnormalities: craniofacial (including nose and tongue)

TDLo (oral, dog) = 4200 mg/kg/42 days/intermittent; Behavioral: coma; Nutritional and Gross Metabolic: weight loss or decreased weight gain; Related to Chronic Data: death

LD_{50} (oral, rat) = 526 mg/kg

LD_{50} (intraperitoneal, rat) = 514 mg/kg

LD_{50} (subcutaneous, rat) = 499 mg/kg

LD_{50} (intracerebral, rat) = 4800 mg/kg

LD_{50} (oral, mouse) = 1165 mg/kg

LD_{50} (intraperitoneal, mouse) = 600 mg/kg

LD_{50} (intravenous, mouse) = 363 mg/kg

LD_{50} (subcutaneous, mouse) = 828 mg/kg

LD_{50} (subcutaneous, mouse) = 738 mg/kg; Behavioral: tremor; Musculoskeletal: other changes

LD_{50} (intracerebral, mouse) = 14040 µg/kg; Sense Organs and Special Senses (Eye): ptosis; Behavioral: somnolence (general depressed activity)

LD_{50} (oral, rabbit) = 850 mg/kg

LDLo (subcutaneous, rabbit) = 531 mg/kg

LDLo (intravenous, dog) = 500 mg/kg; Behavioral: food intake (animal); Gastrointestinal: changes in structure or function of salivary glands; Musculoskeletal: other changes

LD_{50} (intraperitoneal, cat) = 492 mg/kg

LDLo (subcutaneous, cat) = 450 mg/kg

LDLo (subcutaneous, guinea pig) = 620 mg/kg

LD_{50} (oral, quail) = 422 mg/kg

LDLo (subcutaneous, pigeon) = 513 mg/kg

LD_{50} (oral, wild bird species) = 422 mg/kg

LDLo (subcutaneous, frog) = 885 mg/kg

CHLORIDE SALT:

TDLo (Oral-Man) 214.29 mg/kg: Gastrointestinal: hypermotility, diarrhea, nausea or vomiting

LDLo (Oral-Infant) 938 mg/kg/2 days: Lungs, Thorax, or Respiration: cyanosis, other changes; Nutritional and Gross Metabolic: changes in potassium

LDLo (Oral-Man) 20 mg/kg: Cardiac: arrhythmias (including changes in conduction); Gastrointestinal: nausea or vomiting; Blood: change in clotting factors

TDLo (Oral-Man) 60 mg/kg/ days: Gastrointestinal: nausea or vomiting; Blood: change in clotting factors

Standard Draize Test (Eye-Rabbit) 500 mg/24 hours: Mild

LD_{50} (Oral-Rat) 2600 mg/kg

LD_{50} (Oral-Mouse) 1500 mg/kg

LD_{50} (Intraperitoneal-Rat) 660 mg/kg

LD_{50} (Intraperitoneal-Mouse) 620 mg/kg

LD_{50} (Intravenous-Rat) 142 mg/kg

LD_{50} (Intravenous-Rat) 142 mg/kg: Behavioral: convulsions or effect on seizure threshold; Lungs, Thorax, or Respiration: dyspnea

LD_{50} (Intravenous-Mouse) 117 mg/kg

CHLORIDE SALT (continued):

LDLo (Oral-Guinea Pig) 2500 mg/kg: Behavioral: changes in motor activity (specific assay), coma; Lungs, Thorax, or Respiration: other changes

LDLo (Intraperitoneal-Guinea Pig) 900 mg/kg: Behavioral: changes in motor activity (specific assay), coma Lungs, Thorax, or Respiration: other changes

LDLo (Subcutaneous-Guinea Pig) 2550 mg/kg

LDLo (Subcutaneous-Pigeon) 2210 mg/kg

LDLo (Subcutaneous-Frog) 2120 mg/kg

LDLo (Intravenous-Guinea Pig) 77 mg/kg

LDLo (Parenteral-Guinea Pig) 40 mg/kg

LDLo (Intraarterial-Guinea Pig) 130 mg/kg

TDLo (Oral-Rat) 75.6 gm/kg/6 weeks-continuous: Kidney/Ureter/Bladder: urine volume increased

TDLo (Oral-Rat) 983 gm/kg/78 weeks-continuous: Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis)

TDLo (Oral-Rat) 1536 gm/kg/130 weeks-continuous: Endocrine: adrenal cortex hyperplasia

TDLo (Intracerebral-Rat) 272.7 mg/kg: Biochemical: Neurotransmitters or modulators (putative): dopamine in striatum

DNA Damage (Human-Leukocyte) 1 mmol/L/2 hours

Mutation in Microorganisms (Bacteria-*Salmonella typhimurium*) 100 µg/plate

Mutation in Microorganisms (Yeast-*Saccharomyces cerevisiae*) 2500 mmol/L

Mutation in Microorganisms (Mouse-Lymphocyte) 2048 mg/L

Gene Conversion and Mitotic Recombination (Yeast-*Saccharomyces cerevisiae*) 400 mmol/L

Sex Chromosome Loss and Non-Disjunction (Yeast-*Saccharomyces cerevisiae*) 300 mmol/L

Unscheduled DNA Synthesis (Oral-Rat) 1500 µg/kg

Cytogenetic Analysis (Hamster-Lung) 12 gm/L

Cytogenetic Analysis (Hamster-Ovary) 140 mmol/L

DNA Damage (Hamster-Ovary) 260 mmol/L

Sister Chromatid Exchange (Hamster-Ovary) 180 mmol/L

POTASSIUM SALT:

LDLo (oral, rat) = 4640 mg/kg: Behavioral: somnolence (general depressed activity); Gastrointestinal: other changes

LD_{50} (skin, rabbit) > 4640 mg/kg

CARBOHYDRATE COMPOUND:

LD_{50} (oral, rat) = 29,700 mg/kg; Behavioral: somnolence (general depressed activity); Lungs, Thorax, or Respiration: cyanosis; Gastrointestinal: hypermotility, diarrhea

LD_{50} (intraperitoneal, mouse) = 14,000 mg/kg

LDLo (oral, mammal) = 40 g/kg; Behavioral: somnolence (general depressed activity); Lungs, Thorax, or Respiration: respiratory stimulation; Gastrointestinal: hypermotility, diarrhea

TDLo (oral, rat) = 1548 g/kg/female 21 days pre-mating/female 1–22 days after conception; Reproductive: Specific Developmental Abnormalities: Central Nervous System

TDLo (oral, rat) = 683 g/kg/female 1–21 days after conception; Reproductive: Specific Developmental Abnormalities: hepatobiliary system; Reproductive: Effects on Newborn: growth statistics (e.g.%, reduced weight gain)

TDLo (oral, rat) = 683 g/kg/lactating female 21 days post-birth; Reproductive: Effects on Newborn: growth statistics (e.g.%, reduced weight gain)

TDLo (oral, mammal) = 54,810 mg/kg/female 15–35 days after conception; Reproductive: Effects on Embryo or Fetus: fetotoxicity (except death, e.g., stunted fetus)

Mutation in Microorganisms (bacteria, *Salmonella typhimurium*) = 600 µg/plate

DNA Repair (yeast, *Saccharomyces cerevisiae*) = 300 mg/L

Cytogenetic Analysis (lung, hamster) = 10 g/L

Cytogenetic Analysis (ovary, hamster) = 275 mmol/L

ALIPHATIC TRIOL:

Standard Draize Test (Skin-Rat) 100 mg

Standard Draize Test (Skin-Rabbit) 25%: Moderate

Standard Draize Test (Eye-Rabbit) 500 mg: Severe

LD_{50} (Oral-Rat) > 3000 mg/kg

LD_{50} (Oral-Mouse) 5500 mg/kg

LD_{50} (Intravenous-Rat) 1800 mg/kg

LD_{50} (Intravenous-Rat) 3.28 gm/kg: Liver: hepatitis (hepatocellular necrosis), diffuse; Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis)

LD_{50} (Intravenous-Mouse) 1210 mg/kg

11. TOXICOLOGICAL INFORMATION (Continued)

TOXICITY DATA (continued):

ALIPHATIC TRIOL:

LD_{50} (Intravenous-Mouse) 6100 mg/kg: Behavioral: muscle weakness; Lungs, Thorax, or Respiration: respiratory depression

LD_{50} (Intraperitoneal-Mouse) 3350 mg/kg

LDLo (Oral-Mouse) 1 gm/kg: Behavioral: somnolence (general depressed activity), muscle weakness, coma

TDLo (Oral-Rat) 3000 mg/kg: Kidney/Ureter/Bladder: urine volume increased

ALIPHATIC TRIOL (continued):

TDLo (Oral-Rat) 12,000 mg/kg: female 14 day(s) pre-mating: 4 day(s) post-birth: Reproductive: Maternal Effects: other effects; Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants); Sense Organs and Special Senses (Ear): effect, not otherwise specified

TDLo (Oral-Mouse) 3000 mg/kg: Kidney/Ureter/Bladder: urine volume increased

TDLo (Intravenous-Rat) 6000 mg/kg/20 days-intermittent: Gastrointestinal: ulceration or bleeding from stomach; Kidney/Ureter/Bladder: changes in both tubules and glomeruli

ALIPHATIC TRIOL (continued):

TDLo (Intravenous-Rabbit) 500 mg/kg: Lungs, Thorax, or Respiration: dyspnea

TDLo (Intravenous-Rabbit) 10,000 mg/kg/4 weeks-intermittent: Sense Organs and Special Senses (Ear): effect, not otherwise specified; Blood: changes in leukocyte (WBC) count; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TDLo (Intravenous-Dog) 125 mg/kg: Lungs, Thorax, or Respiration: dyspnea

CARCINOGENIC POTENTIAL OF COMPONENTS: The constituents in the solutions 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 are neither considered to be nor suspected to be cancer causing agents by these agencies.

IRRITANCY OF PRODUCT: Contact with the skin or eyes may cause mild irritation, which is alleviated upon rinsing.

SENSITIZATION TO THE PRODUCT: These solutions are not known to cause skin or respiratory sensitization.

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

Mutagenicity: The constituents in the solutions in this product are not reported to produce mutagenic effects in humans. Animal mutation data are available for the Carbohydrate Compound constituent in this product's solutions; these data were obtained during clinical studies on specific animal tissues exposed to high doses of this compound.

Embryotoxicity: The constituents in the solutions in this product are not reported to cause human embryotoxic effects.

Teratogenicity: The constituents in the solutions in this product are reported to cause teratogenic effects in humans. Clinical studies on test animals exposed to relatively high doses of the Carbohydrate Compound constituent in this product's solutions, indicate teratogenic effects.

Reproductive Toxicity: The constituents in the solutions in 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 generation 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 constituents in this product's solutions.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY: This product has not been tested for mobility in soil. The following information is available for some constituents.

AMINOACETIC ACID:

The Koc of Aminoacetic Acid is estimated as 98, using a water solubility of 1,000 mg/L at 25°C and a regression-derived equation. According to a classification scheme, this estimated Koc value suggests that Aminoacetic Acid is expected to have high mobility in soil. The pKa of Aminoacetic Acid is 0.26, indicating that this compound will primarily exist in the dissociated form in the environment and anions generally do not adsorb more strongly to organic carbon and clay than their neutral counterparts.

ALIPHATIC ALCOHOL:

Based on an experimental log octanol/water partition coefficient of -1.76 and its water solubility, 1,220,000 mg/L at 5°C, soil adsorption coefficients for Aliphatic alcohol can be estimated at 3 and 2, respectively, using regression-derived equations. The magnitude of these values indicate that Aliphatic alcohol will display very high mobility in soil.

LITHIUM SALT:

Log Kow = -2.66; Water solubility = 1 g/ 1.3 mL (cold water), 1 g/ 0.8 mL (boiling water)

GLYCOL COMPOUND:

Solubility: Readily soluble in water.

ALIPHATIC TRIOL: Water solubility = 55–80 g/ 100 mL (20°C)

PERSISTENCE AND BIODEGRADABILITY: This product has not been tested for persistence or biodegradability. It is expected that the constituents of this product will slowly degrade in the environment and form a variety of organic and inorganic materials; however, no specific information is known. Data for some constituents of this product are available as follows:

AMINOACETIC ACID:

If released to air, a vapor pressure of 2X10-12 mm Hg at 25°C indicates Aminoacetic Acid will exist solely in the particulate phase in the ambient atmosphere. Particulate-phase Aminoacetic Acid will be removed from the atmosphere by wet and dry deposition. The potential for direct photolysis may exist based upon the UV absorption of Aminoacetic Acid in surface waters, where it is complexed with iron(III); a half-life of 11.3 minutes was been reported. If released to soil, Aminoacetic Acid is expected to have high mobility based upon an estimated Koc of 98. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 7.7X10-16 atm-cu m/mole. The pKa of Aminoacetic Acid is 0.26, indicating that this compound will primarily exist in the dissociated form in the environment and anions generally do not adsorb more strongly to organic carbon and clay than their neutral counterparts. If released into water, Aminoacetic Acid is not expected to adsorb to suspended solids and sediment based upon the estimated Koc. Volatilization from water surfaces is not expected to be an important fate process based upon this compound's estimated Henry's Law constant. Since Aminoacetic Acid will exist almost entirely in the ionized form at pH values of 5 to 9, volatilization from water surfaces is not expected to be an important fate process. Hydrolysis is not expected to be an important environmental fate process since this compound lacks functional groups that hydrolyze under environmental conditions.

ALIPHATIC ALCOHOL:

If released to soil, Aliphatic alcohol is expected to undergo rapid biodegradation under aerobic conditions. It is expected to display very high mobility in soil and it is not expected to significantly volatilize to the atmosphere. If released to water, Aliphatic alcohol is expected to rapidly degrade under aerobic conditions. Biodegradation in seawater and under anaerobic conditions is also expected. Aliphatic alcohol is not expected to bioconcentrate is fish and aquatic organisms nor is it expected to adsorb to sediment and suspended organic matter. Volatilization to the atmosphere is expected to be slower then for water itself. If released to the atmosphere, Aliphatic alcohol may undergo a gas-phase oxidation with photochemically produced hydroxyl radicals with a half-life of 33 hrs. It may also undergo atmospheric removal by wet deposition processes.

GLYCOL COMPOUND:

Solubility: Readily soluble in water.

Degradation: This compound is chemically identical to the natural amino acid L-Serine and can therefore be degraded microbiologically.

12. ECOLOGICAL INFORMATION (Continued)

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

AMINOACETIC ACID:

An estimated BCF of 13 was calculated for Aminoacetic Acid, using a water solubility of 1,000 mg/L and a regression-derived equation. According to a classification scheme, this BCF suggests the potential for bioconcentration in aquatic organisms is low.

ALIPHATIC ALCOHOL:

Based on an experimental log octanol/water partition coefficient of -1.76 and its water solubility, 1,220,000 mg/L at 5°C, bioconcentration factors for Aliphatic alcohol can be estimated at 3 and 0.2, respectively, using regression-derived equations. The magnitude of these values indicate that bioconcentration of Aliphatic alcohol in fish and aquatic organisms will not be significant. Log K_{OW} = -1.76.

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

AMINOACETIC ACID:

Toxicity Threshold]Cell Multiplication Inhibition Test] (*Entosiphon sulcatum* protozoa) 36 mg/L
Toxicity Threshold]Cell Multiplication Inhibition Test] (*Uronema parduczi* Chatton-Lwoff protozoa) 17 mg/L
Toxicity Threshold]Cell Multiplication Inhibition Test] (*Scenedesmus quadricauda* green algae) 11 mg/L
Toxicity Threshold]Cell Multiplication Inhibition Test] (*Microcystis aeruginosa* algae) 76 mg/L
Toxicity Threshold]Cell Multiplication Inhibition Test] (*Pseudomonas putida* bacteria) 105 mg/L
LC_{50} (*Lepomis macrochirus* bluegill 96 hours = 159 mg/L
NOEL (*Lepomis macrochirus* bluegill 96 hours = 100 mg/L

ALIPHATIC ALCOHOL:

EC_{0} (*Pseudomonas putida* bacteria) 16 hours = >10,000 mg/L
EC_{0} (*Microcystis aeruginosa* algae) 8 days = 2,900 mg/L
EC_{0} (*Scenedesmus quadricauda* green algae) 7 days = > 10,000 mg/L
EC_{0} (*Entosiphon sulcatum* protozoa) 72 hours = 3,200 mg/L
EC_{0} (*Uronema parduczi* Chatton-Lwoff protozoa) = > 10,000 mg/L
LC_{50} (goldfish) 24 hours = > 5,000 mg/L

LITHIUM SALT:

Toxicity Critical Limit (fish: unspecified species) = 100 mg/L
Mortality (goldfish) 22-27 hours = 3750 mg/L
LC (Fish: unspecified species) 24 hours = 2600 mg/L
Total Mortality (pike-perch fry) several hours = 50 μg/L

GLYCOL COMPOUND:

Toxic to fishes

CHLORIDE SALT:

EC_{50} (*Daphnia magna* Water flea) 24 hours = 15.12 mM; Conditions: freshwater; static; Effect: intoxication, immobile
LC_{50} (*Ceriodaphnia dubia* Water flea) 48 hours = 630,000 μg/L (95% confidence limit: 580,000 to 670,000 μg/L), Conditions: freshwater; static
LC_{50} (*Ceriodaphnia dubia* Water flea) 48 hours = 630,000 μg/L (95% confidence limit: 580,000 to 630,000 μg/L), Conditions: freshwater; static
LC_{50} (*Chironomus riparius* Midge); 96 hours = 4.81 g/L (95% confidence limit: 3.93 to 5.68 g/L), Conditions: freshwater; /conditions of bioassay not specified
LC_{50} (*Chironomus* tentans Midge, size 1.56 mm, 1st instar); 96 hours = 1,250,000 μg/L, Conditions: freshwater; static
LC_{50} (*Chironomus* tentans Midge, size 4.42 mm, 2nd-3rd instar) 96 hours = 1,770,000 μg/L (95% confidence limit: 590000 to 5,260,000 1,250,000 μg/L g/L); Conditions: freshwater; static
LC_{50} (*Chironomus* tentans Midge, size 6.07 mm, 3rd instar) 96 hours = 2,890,000 μg/L (95% confidence limit: 2,390,000 to 3,500,000 μg/L); Conditions: freshwater; static

CHLORIDE SALT (continued):

LC_{50} (*Chironomus* tentans Midge, size 5.86 mm, 3rd instar) 96 hours = 3,170,000 μg/L (95% confidence limit: 2,290,000 to 4,400,000 μg/L); Conditions: freshwater; static
LC_{50} (*Chironomus* tentans Midge, size 5.78 mm, 3rd instar) 96 hours = 5,000,000 μg/L (95% confidence limit: 4,160,000 to 6,010,000 μg/L); Conditions: freshwater; static
LC_{50} (*Chironomus* tentans Midge, size 5.01 mm, 3rd instar) 96 hours = 5,110,000 μg/L (95% confidence limit: 4,180,000 to 6,240,000 μg/L); Conditions: freshwater; static
LC_{50} (*Chironomus* tentans Midge, size 9.41 mm) 96 hours = 5,300,000 μg/L (95% confidence limit: 4,330,000 to 6,520,000 μg/L); Conditions: freshwater; static
LC_{50} (*Chironomus* tentans Midge, size 8.67 mm) 96 hours = 5,360,000 μg/L (95% confidence limit: 4,430,000 to 6,490,000 μg/L); Conditions: freshwater; static
LC_{50} (*Chironomus* tentans Midge, size 10.87 mm, 3rd-4th instar) 96 hours = 6,190,000 μg/L (95% confidence limit: 5,370,000 to 7,130,000 μg/L); Conditions: freshwater; static
LC_{50} (*Chironomus* tentans Midge, size 9.42 mm, 3rd-4th instar) 96 hours = 6,200,000 μg/L (95% confidence limit: 4,800,000 to 7,890,000 μg/L); Conditions: freshwater; static
LC_{50} (*Chironomus* tentans Midge, size 7.84 mm, 3rd instar) 96 hours = 6,280,000 μg/L (95% confidence limit: 5,260,000 to 7,500,000 μg/L); Conditions: freshwater; static
LC_{50} (*Chironomus* tentans Midge, size 10.43 mm, 3rd instar) 96 hours = 6,830,000 μg/L (95% confidence limit: 6,380,000 to 7,310,000 μg/L); Conditions: freshwater; static
LC_{50} (*Daphnia magna* Water flea) 96 hours = 29 mg/L; Conditions: freshwater; static
LC_{50} (*Daphnia magna* Water flea) 72 hours = 117 mg/L; Conditions: freshwater; static
EC_{50} (*Daphnia magna* Water flea) 24 hours = 7350 μmol/L; Conditions: freshwater; /conditions of bioassay not specified/; Effect: intoxication, immobile
EC_{50} (*Daphnia magna* Water flea) 48 hours = 141,460 μg/L (95% confidence limit: 95300 to 170700 μg/L); Conditions: freshwater; static, Effect: intoxication, immobile
EC_{50} (*Daphnia magna* Water flea 24 hours = 327,940 μg/L (95% confidence limit: 248,600 to 407,200 μg/L); Conditions: freshwater; static; Effect: intoxication, immobile
LC_{50} (*Daphnia magna* Water flea, 4th instar or adult) 24 hours = 343,000 μg/L; Conditions: freshwater; static
LC_{50} (*Daphnia magna* Water flea, 4th instar or adult) 48 hours = 357,000 μg/L; Conditions: freshwater; static; Concentration

CHLORIDE SALT (continued):

LC_{50} (*Daphnia magna* Water flea, < 24 hr) 48 hours = 660,000 μg/L (95% confidence limit: 440,000 to 880,000 μg/L); Conditions: freshwater; static
LC_{50} (*Daphnia magna* Water flea, < 24) 24 hours = 740,000 μg/L (95% confidence limit: 580,000 to 880,000 μg/L); Conditions: freshwater; static
LC_{50} (*Hyalella azteca* Scud) 96 hours = 0.41 g/L (95% confidence limit: 0.35 to 0.49 g/L); Conditions: freshwater; flow-through
LC_{50} (*Hyalella azteca* Scud) 48 hours = 0.54 g/L; Conditions: freshwater; flow-through
LC_{50} (*Hyalella azteca* Scud, size 1.85 mm) 96 hours = 0.54 g/L (95% confidence limit: 0.47 to 0.61 g/L); Conditions: freshwater; flow-through
LC_{50} (*Hyalella azteca* Scud) 72 hours = 0.63 g/L; Conditions: freshwater; flow-through
LC_{50} (*Hyalella azteca* Scud) 96 hours = 134,000 μg/L; Conditions: freshwater; renewal; formulated product
LC_{50} (*Hyalella azteca* Scud) 96 hours = 141,900 μg/L (95% confidence limit: 100,700 to 199,800 μg/L); Conditions: freshwater; static
LC_{50} (*Gambusia affinis* Western mosquitofish, female) 96 hours = 435,000 μg/L; Conditions: freshwater; static
LC_{50} (*Gambusia affinis* Western mosquitofish, female) 48 hours = 1,990,000 μg/L; Conditions: freshwater; static
LC_{50} (*Gambusia affinis* Western mosquitofish, female) 24 hours = 4,700,000 μg/L; Conditions: freshwater; static
LC_{50} (*Lepomis macrochirus* Bluegill, size 5.3-7.2 cm, wt 3.5-3.9 g) 96 hours = 2,010,000 μg/L; Conditions: freshwater; static; Effect: mortality, survival
LC_{50} (*Oncorhynchus mykiss* Rainbow trout, donaldson trout, size 5.0-6.0 cm) 24 hours = 1191000 μg/L (95% confidence limit: 923,000 to 1,536,000 μg/L); Conditions: freshwater; static
LC_{50} (*Oncorhynchus mykiss* Rainbow trout, donaldson trout, wt 0.8-1.2 g) 48 hours = 1,610,000 μg/L (95% confidence limit: 1,223,000 to 2,119,000 μg/L); Conditions: freshwater; static
LC_{50} (*Pimephales promelas* Fathead minnow) 96 hours = 880,000 μg/L (95% confidence limit: 750,000 to 1,020,000 μg/L) 880,000 μg/L (95% confidence limit: 750,000 to 1,020,000 μg/L); Conditions: freshwater; static
LC_{50} (*Pimephales promelas* Fathead minnow) 48 hours = 910,000 μg/L (95% confidence limit: 750,000 to 1,090,000 μg/L); Conditions: freshwater; static
LC_{50} (*Pimephales promelas* Fathead minnow) 24 hours = 950,000 μg/L (95% confidence limit: 750,000 to 1,090,000 μg/L); Conditions: freshwater; static
LC_{50} (*Pimephales promelas* Fathead minnow, size 1.5-2.5 cm) 24 hours = 2,465,000 μg/L (95% confidence limit: 2,133,000 to 2,850,000 μg/L); Conditions: freshwater; static
LC_{50} (*Eisenia andrei* Earthworm, adult) direct application using artificial soil, 14 days = 5595.0 mg/kg soil (5338.4-5863.9 mg/kg soil)

OTHER ADVERSE EFFECTS: This product does not contain any constituents with known 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.

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13. DISPOSAL CONSIDERATIONS

DISPOSAL METHODS: Do NOT dispose of any solution of this product by pouring down the drain. 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.

13. DISPOSAL CONSIDERATIONS (Continued)

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.

U.S. EPA WASTE NUMBER: Not applicable.

EWC WASTE CODE: Wastes from research, diagnoses, treatment, or preventions of disease involving animals: chemicals other than containing dangerous substances: 18-02-06

14. TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS: This product is NOT classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is NOT classified as Dangerous Goods, per regulations of Transport Canada.

INTERNATIONAL AIR TRANSPORT ASSOCIATION/ICAO (IATA/ICAO): This product is NOT classified as dangerous goods, per rules of IATA.

INTERNATIONAL MARITIME ORGANIZATION (IMO): This product is NOT dangerous goods, per the rules of IMO.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This product is NOT classified by the United Nations Economic Commission for Europe to be dangerous goods.

AUSTRALIAN FEDERAL OFFICE OF ROAD SAFETY CODE FOR THE TRANSPORTATION OF DANGEROUS GOODS BY ROAD OR RAIL: This product in NOT dangerous goods, per regulations of the Office of Road Safety.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The constituents in this product's solutions are not subject to Sections 302, 304, and 313 reporting requirements under the Superfund Amendment and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for the constituents in this product's solutions. The default Federal MSDS submission and inventory requirement filing.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

U.S. TSCA INVENTORY STATUS: This product is regulated by the Food and Drug Administration; it is exempt from the requirements of TSCA.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

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

ANSI LABELING (Z129.1; Provided to Summarize Occupational Hazard Information): **CAUTION!** MAY CAUSE SKIN AND EYE IRRITATION. MAY CAUSE DISCOMFORT IF SWALLOWED OR INHALED. Do not taste or swallow. Avoid skin or eye contact. Avoid prolonged or repeated skin contact. Avoid breathing mists or sprays. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves and goggles. FIRST-AID: In case of contact, immediately flush skin or eyes with plenty of water. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention if necessary. IN CASE OF FIRE: Use water fog, dry chemical, CO_2, or "alcohol" foam. IN CASE OF SPILL: Absorb spill with polypads and place in suitable container. Consult Material Safety Data Sheet for additional information.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: The constituents in this product's solutions are listed on the DSL Inventory or are exempt.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITY SUBSTANCES LISTS: The constituents in this product's solutions are not on the CEPA Priority Substances Lists.

CANADIAN WHMIS CLASSIFICATION AND SYMBOLS: Not applicable.

ADDITIONAL EUROPEAN UNION REGULATIONS:

LABELING AND CLASSIFICATION: The following classification is self-classification, based on possible skin contact of product in the workplace and European Union Council Directive 67/548/EEC and subsequent Directives.

All Component Solutions:

Classification: Not applicable.	Risk Phrases: Not applicable.
Safety Phrases: Not applicable.	Hazard Symbol: Not applicable.

LABELING AND CLASSIFICATION FOR CONSTITUENTS:

ALL CONSTITUENTS:

Official classifications for these substances have not been published in Commission Directives 93/72EEC, 94/69/EC, 96/56/EC, or 98/98/EC.

15. REGULATORY INFORMATION (Continued)

ADDITIONAL AUSTRALIAN REGULATIONS:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: The constituents in the solutions of this product are on the AICS. Hydrates of listed compounds and biological materials are exempt from listing. Any chemical not included in AICS is regarded as a new industrial chemical unless it is outside the scope of the Industrial Chemicals (Notification and Assessment) Act 1989 OR is otherwise exempt from notification. New industrial chemicals must be notified and assessed before being manufactured or imported into Australia.

HAZARDOUS SUBSTANCES INFORMATION SYSTEM (HSIS): The constituents in this product's solutions are not listed in the HSIS.

LABELING AND CLASSIFICATION: The following classification is self-classification, based on possible skin contact of product in the workplace and the Australian National Occupational Health and Safety Commission [NOHSC(1008:2004)].

All Component Solutions:

Classification: Not applicable.
Risk Phrases: Not applicable.
Safety Phrases: Not applicable.
Hazard Symbol: Not applicable.

POISONS SCHEDULE NUMBER: Schedule 6 (Denaturation Solution)

ADDITIONAL LABELING: Not applicable.

ADDITIONAL JAPANESE REGULATIONS:

JAPANESE ENCS: The constituents in this product's solutions are on the ENCS Inventory as indicated in composition tables in Section 3 (Composition and Information on Ingredients).

POISONOUS AND DELETERIOUS SUBSTANCES CONTROL LAW: No constituent in this product's solutions is listed as a Deleterious Substance under the Poisonous and Deleterious Substances Control Law.

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16. OTHER INFORMATION

PREPARED BY:
CHEMICAL SAFETY ASSOCIATES, Inc.
PO Box 1961, Hilo, HI 96721
800/441-3365 • 808/969-4846

REVISION INFORMATION: New.

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 MAKs: Federal Republic of Germany Maximum Concentration Values in the workplace. Exposure limits are given as TWA (Time-Weighted Average) or PEAK (short-term exposure) values.

DFG MAK Germ Cell Mutagen Categories: 1: Germ cell mutagens that have been shown to increase the mutant frequency in the progeny of exposed humans. **2:** Germ cell mutagens that have been shown to increase the mutant frequency in the progeny of exposed mammals. **3A:** Substances that 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 that 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 that 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 lead to 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, they are not sufficient for final evaluation.

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.

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: 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 a there is a danger of cutaneous absorption.

STEL: 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 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. Mechanical irritation may occur. PII or Draize = 0. *Eye Irritation*: Essentially non-irritating, minimal effects clearing in < 24 hours. Mechanical irritation may occur. Draize = 0. *Oral Toxicity LD_{50} Rat*: > 5000 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: > 2000 mg/kg. *Inhalation Toxicity 4-hrs LC_{50} Rat*: > 20 mg/L. **1** Slight Hazard: Minor reversible injury may occur; may irritate the stomach if swallowed; may defat the skin and exacerbate existing dermatitis. *Skin Irritation*: Slightly or mildly irritating. PII or Draize > 0 < 5. *Eye Irritation*: Slightly to mildly irritating, but reversible within 7 days. Draize > 0 ≤ 25. *Oral Toxicity LD_{50} Rat*: > 500–5000 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: > 1000–2000 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: > 2–20 mg/L. **2** Moderate Hazard: Temporary or transitory injury may occur; prolonged exposure may affect the CNS. *Skin Irritation*: Moderately irritating; primary irritant; sensitizer. PII or Draize ≥ 5, with no destruction of dermal tissue. *Eye Irritation*: Moderately to severely irritating; reversible corneal opacity; corneal involvement or irritation clearing in 8–21 days. Draize = 26–100, with reversible effects. *Oral Toxicity LD_{50} Rat*: > 50–500 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: > 200–1000 mg/kg. *Inhalation Toxicity LC_{50} 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 cause destruction of dermal tissue, skin burns, and 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_{50} Rat*: > 1–50 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: > 20–200 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: > 0.05–0.5 mg/L. **4** Severe Hazard: Life-threatening; major or permanent damage may result from single or repeated exposures; extremely toxic; irreversible injury may result from brief contact. *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.

DEFINITIONS OF TERMS (Continued)

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

HEALTH HAZARD (continued): **4 (continued)** *Oral Toxicity LD_{50} Rat*: ≤ 1 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: ≤ 20 mg/kg. *Inhalation Toxicity LC_{50} 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 requires considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur. This usually includes the following: 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) (i.e. OSHA Class IIIB); and 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 with air. This usually includes the following: 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); and Solids and semisolids (e.g. viscous and slow flowing as asphalt) 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. This usually includes the following: Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 38°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (100°F) (i.e. 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); and 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 that will burn readily. This usually includes the following: 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) (i.e. OSHA Class IA); and Materials that ignite spontaneously when exposed to air at a temperature of 54.4°C (130°F) or below (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. *Compressed Gases*: No Rating. *Pyrophorics*: No Rating. *Oxidizers*: No 0 rating. *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 violently. *Explosives*: Division 1.5 & 1.6 explosives. 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 oxidizers; 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 explosion 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 explosives. Explosive substances where the explosive effects 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 oxidizers. 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 (or low risk) 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 1.3 explosives. 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 oxidizers. 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.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

PHYSICAL HAZARD (continued): **3 (continued):** *Unstable Reactives*: Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure and have a moderate potential (or moderate risk) 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 explosives. 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 (or high risk) to cause significant heat generation or explosion.

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 with an LC_{50} for acute inhalation toxicity greater than 10,000 ppm. Dusts and mists with an LC_{50} for acute inhalation toxicity greater than 200 mg/L. Materials with an LD_{50} for acute dermal toxicity greater than 2000 mg/kg. Materials with an LD_{50} for acute oral toxicity greater than 2000 mg/kg. Materials essentially non-irritating to the respiratory tract, eyes, and skin. **1** Materials that, under emergency conditions, can cause significant irritation. Gases and vapors with an LC_{50} for acute inhalation toxicity greater than 5,000 ppm but less than or equal to 10,000 ppm. Dusts and mists with an LC_{50} for acute inhalation toxicity greater than 10 mg/L but less than or equal to 200 mg/L. Materials with an LD_{50} for acute dermal toxicity greater than 1000 mg/kg but less than or equal to 2000 mg/kg. Materials that slightly to moderately irritate the respiratory tract, eyes and skin. Materials with an LD_{50} for acute oral toxicity greater than 500 mg/kg but less than or equal to 2000 mg/kg. **2** Materials that, under emergency conditions, can cause temporary incapacitation or residual injury. Gases with an LC_{50} for acute inhalation toxicity greater than 3,000 ppm but less than or equal to 5,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC_{50} for acute inhalation toxicity, if its LC_{50} 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. Dusts and mists with an LC_{50} for acute inhalation toxicity greater than 2 mg/L but less than or equal to 10 mg/L. Materials with an LD_{50} for acute dermal toxicity greater than 200 mg/kg but less than or equal to 1000 mg/kg. 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. Materials whose LD_{50} for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg. **3** Materials that, under emergency conditions, can cause serious or permanent injury. Gases with an LC_{50} for acute inhalation toxicity greater than 1,000 ppm but less than or equal to 3,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater its LC_{50} for acute inhalation toxicity, if its LC_{50} is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4. Dusts and mists with an LC_{50} for acute inhalation toxicity greater than 0.5 mg/L but less than or equal to 2 mg/L. Materials with an LD_{50} for acute dermal toxicity greater than 40 mg/kg but less than or equal to 200 mg/kg. Materials that are corrosive to the respiratory tract. Materials that are corrosive to the eyes or cause irreversible corneal opacity. Materials corrosive to the skin. Cryogenic gases that cause frostbite and irreversible tissue damage. Compressed liquefied gases with boiling points below -55°C (-66.5°F) that cause frostbite and irreversible tissue damage. Materials with an LD_{50} for acute oral toxicity greater than 5 mg/kg but less than or equal to 50 mg/kg. **4** Materials that, under emergency conditions, can be lethal. Gases with an LC_{50} for acute inhalation toxicity less than or equal to 1,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than ten times its LC_{50} for acute inhalation toxicity, if its LC_{50} is less than or equal to 1000 ppm. Dusts and mists whose LC_{50} for acute inhalation toxicity is less than or equal to 0.5 mg/L. Materials whose LD_{50} for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LD_{50} for acute oral toxicity is less than or equal to 5 mg/kg.

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 according with Annex D of NFPA 704. **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 according with Annex D of NFPA 704. 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 *Recommendations 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% 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 the 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). Most ordinary combustible materials. Solids containing greater than 0.5% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. **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 with air.

DEFINITIONS OF TERMS (Continued)

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued): **2 (continued)** 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% 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 (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 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% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. **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% 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 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 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 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. **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. 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 are sensitive to localized thermal or mechanical shock 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.

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 vapor to form an ignitable mixture with air near the surface of the liquid or within the test vessel used. Autoignition Temperature: Minimum temperature of a solid, liquid, or gas required to initiate or cause self-sustained combustion in air with no other source of ignition. LEL: Lowest concentration of a flammable vapor or gas/air mixture that will ignite and burn with a flame. UEL: Highest concentration of a flammable vapor or gas/air mixture that will ignite and burn with a flame.

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. LD_{50}: Lethal Dose (solids & liquids) that kills 50% of the exposed animals. LC_{50}: Lethal Concentration (gases) that kills 50% of the exposed animals. ppm: Concentration expressed in parts of material per million parts of air or water. mg/m^3: 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. TDLo: Lowest dose to cause a symptom. TCLo: Lowest concentration to cause a symptom. TDo, LDLo, and LDo, or TC, TCo, LCLo, and LCo: Lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** IARC: International Agency for Research on Cancer. NTP: National Toxicology Program. RTECS: Registry of Toxic Effects of Chemical Substances. 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: Effect concentration in water. BCF: Bioconcentration Factor, which is used to determine if a substance will concentrate in life forms that consume contaminated plant or animal matter. TLm: Median threshold limit. $\log K_{OW}$ or $\log K_{OC}$: Coefficient of Oil/Water Distribution 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. EPA: U.S. Environmental Protection Agency. ACGIH: American Conference of Governmental Industrial Hygienists, a professional association that establishes exposure limits. OSHA: U.S. Occupational Safety and Health Administration. NIOSH: National Institute of Occupational Safety and Health, which is the research arm of OSHA. WHMIS: Canadian Workplace Hazardous Materials Information System. DOT: U.S. Department of Transportation. TC: Transport Canada. SARA: Superfund Amendments and Reauthorization Act. DSL/NDSL: Canadian Domestic/Non-Domestic Substances List. TSCA: U.S. Toxic Substance Control Act. CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act. Marine Pollutant status according to the DOT; CERCLA or Superfund; and various state regulations. This section also includes information on the precautionary warnings that appear on the material's package label.

EUROPE:

EU: European Union (formerly known as the EEC, European Economic Community). EINECS: European Inventory of Now-Existing Chemical Substances. ARD: European Agreement Concerning the International Carriage of Dangerous Goods by Road. RID: International Regulations Concerning the Carriage of Dangerous Goods by Rail.

AUSTRALIA:

AICS: Australian Inventory of Chemical Substances. NOHSC: National Occupational Health & Safety Code.

JAPAN:

METI: Ministry of Economy, Trade and Industry.