

# MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, European Union Standards, Australian WorkSafe, and the Japanese Industrial Standard JIS Z 7250: 2000

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

### 1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): Dr. Benson's Natural Mix  
SYNONYMS: Dr. Benson's Miracle Mix  
CHEMICAL NAME/CLASS: Aliphatic Amide/Potassium Phosphate Solution  
FORMULA: Not Applicable  
CODE NUMBERS:  
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: Fertilizer  
SUPPLIER/MANUFACTURER'S NAME: Dr. Benson's Natural Mix  
ADDRESS: 4012 Rainbow Boulevard, PMB 452  
Las Vegas, NV 89103  
EMERGENCY PHONE: 1-702-768-2084  
INFORMATION NUMBER: 1-702-768-2084  
SUPPLIER/IMPORTER'S NAME (AUSTRALIA):  
ADDRESS:  
EMERGENCY PHONE:  
BUSINESS PHONE:  
DATE OF PREPARATION: November 10, 2005

### 2. COMPOSITION AND INFORMATION ON INGREDIENTS

EU LABELING AND CLASSIFICATION: (See Section 15 for definition of risk phrases, safety phrases and symbols.)  
The following is a self-classification, based on currently known properties of this material.

**EU CLASSIFICATION AND SYMBOLS:** This product does not meet the definition of any hazard class as defined by the European Union Council Directive 67/548/EEC.

**EU RISK PHRASES:** Not applicable.

Chemical Name	Chemical Formula	CAS #	European EINECS #	Japanese ENC #	Korean ECL#	% Composition	EU Classification For Components
Aliphatic Amide			Proprietary			10.90%	HAZARD CLASSIFICATION: Not applicable RISK PHRASES: Not Applicable
Potassium Salt			Proprietary			5.455	HAZARD CLASSIFICATION: Not applicable RISK PHRASES: Not Applicable
Organic Acid			Proprietary			1.09%	HAZARD CLASSIFICATION: Not applicable RISK PHRASES: Not Applicable
Organic Sodium Salt			Proprietary			0.55%	HAZARD CLASSIFICATION: Not applicable RISK PHRASES: Not Applicable
Water	H <sub>2</sub> O	7732-18-5	231-791-2	NE	NE	Balance	HAZARD CLASSIFICATION: Not applicable RISK PHRASES: Not Applicable

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

**NOTE:** ALL Canadian WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR. The MSDS is also prepared to include all European Union required information under EU Directives, Australian Worksafe regulations and the Japanese Industrial Standard JIS Z 9250: 2000.

### 3. HAZARD IDENTIFICATION

EU LABELING AND CLASSIFICATION: (See Section 15 for definition of risk phrases, safety phrases and symbols.)  
The following is a self-classification, based on currently known properties of this material.

**EU CLASSIFICATION AND SYMBOLS:** This product does not meet the definition of any hazard class as defined by the European Union Council Directive 67/548/EEC.

**EU RISK PHRASES:** Not applicable.

**EMERGENCY OVERVIEW: Product Description:** This product is a light green to light brown liquid with a mild organic odor. **Health Hazards:** This product presents a slight health hazard (in terms of irritation of contaminated skin, eyes, or mucous membranes). **Flammability Hazards:** This product presents no significant flammability hazards. **Reactivity Hazards:** This product presents no significant reactivity hazards. **Environmental Hazards:** This product is a fertilizer. Releases of large quantities into an area can substantially alter the nutrient composition affect terrestrial plant life. **Emergency Response Procedures:** Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The chief routes of overexposure to this product are via inhalation of mists or sprays generated by this product and contact with skin or eyes. The symptoms of overexposure, via route of entry, are as follows:

INHALATION: Inhalation of sprays, aerosols, or mists of this solution may irritate the nose, throat and exposed mucous membranes. Symptoms of such exposure may include coughing, sneezing, and sore throat. Symptoms are generally alleviated when overexposure ends.

### 3. HAZARD IDENTIFICATION (Continued)

**CONTACT WITH SKIN or EYES:** Skin contact may irritate and redden exposed tissue. The Organic Acid component of this solution is a potential allergen. Prolonged or repeated skin contact may cause allergy-like symptoms (e.g., dermatitis). Contact with eyes will cause tearing, pain, redness, and irritation.

**SKIN ABSORPTION:** Skin absorption is not anticipated to be a significant route of overexposure to this product.

**INGESTION:** Though not a likely route of occupational exposure, ingestion will irritate the throat, esophagus, and other tissues of the digestive system. Symptoms of such exposure would include coughing, nausea, vomiting, and diarrhea.

**INJECTION:** Injection of this product, via puncture with a contaminated object, will cause irritation, redness, and swelling around the site of injection.

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

**ACUTE:** Symptoms of short-term exposures would include pain, redness, and irritation of exposed tissue. Severe inhalation or ingestion overexposure may be harmful.

**CHRONIC:** Prolonged or repeated overexposures to this product via skin contact may cause dermatitis and other allergy-like skin reactions. Refer to Section 11 (Toxicological Information) of this MSDS for additional information.

**TARGET ORGANS:** ACUTE: Skin, eyes. CHRONIC: Skin.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
<b>HEALTH HAZARD</b>	(BLUE)	1	
<b>FLAMMABILITY HAZARD</b>	(RED)	0	
<b>PHYSICAL HAZARD</b>	(YELLOW)	0	
<b>PROTECTIVE EQUIPMENT</b>			
EYES	RESPIRATORY	HANDS	BODY
See Section 8			
For Routine Industrial Use and Handling Applications			

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

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

### 4. FIRST-AID MEASURES

Victims must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and MSDS to physician or health professional with victim.

**SKIN EXPOSURE:** If the product contaminates the skin, immediately decontaminate the affected area with running water. Minimum flushing is for 15 minutes. If necessary, remove exposed or contaminated clothing, taking care not to contaminate eyes. Seek medical attention if irritation persists.

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

**INHALATION:** If vapors, mists or sprays of this product are inhaled, remove the victim to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers. Seek medical attention if irritation persists.

**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 victim rinse mouth with water if conscious. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If vomiting occurs naturally, position head lower than chest area in order to prevent aspiration into the lungs.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** Preexisting respiratory problems, dermatitis, other skin disorders, and conditions involving the Target Organs (See Section 3, Hazard Identification) may be aggravated by exposure to this product.

**RECOMMENDATIONS TO PHYSICIANS:** Treat symptoms and eliminate overexposure. The following evaluations may be useful: lung function tests, chest x-rays.

### 5. FIRE-FIGHTING MEASURES

**FLASH POINT:** Not applicable.

**AUTOIGNITION TEMPERATURE:** Not applicable.

**FLAMMABLE LIMITS (in air by volume, %):**

Lower (LEL): Not applicable.

Upper (UEL): Not applicable.

**FIRE EXTINGUISHING MATERIALS:**

Water Spray: YES

Foam: YES

Halon: YES

Carbon Dioxide: YES

Dry Chemical: YES

Other: Any "ABC" Class.

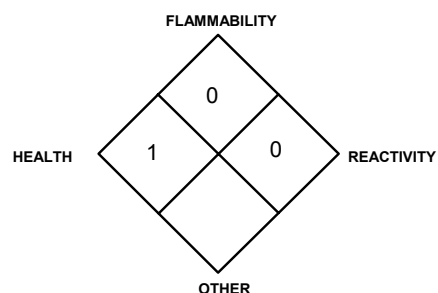
**UNUSUAL FIRE AND EXPLOSION HAZARDS:** When involved in a fire and exposed to extremely high temperatures, the components of this product will decompose to produce irritating vapors and toxic gases (e.g., phosphorous oxides, phosphine, carbon monoxide, ammonia, and carbon dioxide).

**EXPLOSION SENSITIVITY TO MECHANICAL IMPACT:** Not applicable.

**EXPLOSION SENSITIVITY TO STATIC DISCHARGE:** Not applicable.

**SPECIAL FIRE-FIGHTING PROCEDURES:** Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

#### NFPA RATING



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

### 6. ACCIDENTAL RELEASE MEASURES

**RELEASE RESPONSE:** In case of a release, clear the affected area and protect people. Appropriately trained personnel in proper personal protective equipment, using pre-planned procedures, should respond to uncontrolled releases. In terms of small, incidental releases (e.g., 1 gallon from a leaking container), the minimum personal protective equipment should be as follows: gloves, goggles, and appropriate body protection (e.g., boots, Tyvek suit).

## 6. ACCIDENTAL RELEASE MEASURES (Continued)

**RELEASE RESPONSE (continued):** For large releases (e.g. 55-gallon drum), the 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 an Air-Purifying respirator with a high-efficiency particulate filter. In the event of a spill in which excessive amounts of mists are generated or one in which the level of oxygen is below 19.5% or is unknown, the minimum equipment should be Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard hat, and Self-Contained Breathing Apparatus. If necessary, dike the spill to prevent releases from contaminating environmentally sensitive areas. Absorb spilled liquid with polypads or other suitable absorbent materials. Rinse area thoroughly with water. Decontaminate the area thoroughly. Place all spill residues in an appropriate container and seal. Reuse this product, or dispose of it in accordance with U.S. Federal, State, and local hazardous waste disposal regulations, those of Canada, EU Member States, Australia and those of Japan (see Section 13, Disposal Considerations).

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

### 7. HANDLING and STORAGE

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

**STORAGE AND HANDLING PRACTICES-NON-BULK CONTAINERS:** All employees who handle this material should be trained to handle it safely. Open containers and drums slowly on a stable surface. Open drum bunks carefully, to relieve any pressure buildup, which may have developed during storage. All containers of this product must be properly labeled. Empty containers may contain residual amounts of this product; therefore, empty containers should be handled with care. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10, Stability and Reactivity). Material should be stored in secondary containers or in a diked area as appropriate. Keep container tightly closed when not in use. Inspect all incoming containers before storage to ensure that containers are properly labeled and are not damaged.

**STORAGE AND HANDLING PRACTICES-BULK CONTAINERS:** Bulk containers (e.g., 250-gallon "mini-bulk" tanks) holding this product should be loaded and unloaded in strict accordance with container manufacturer's recommendation and all established onsite safety procedures. Appropriate personal protective equipment must be used (see Section 8, Engineering Controls and Personal Protection). All transfer and dilution equipment must be inspected prior to each use. Transfer and dilution operations must be attended at all times. Hoses must be verified to be clean and free of incompatible chemicals prior to connection to the tank. Valves and hoses must be verified to be in the correct positions prior to starting transfer and dilution operations.

**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 U.S. Federal, State, and local hazardous waste disposal regulations, those of Canada, EU Member States and those of Japan.

### 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

**VENTILATION AND ENGINEERING CONTROLS:** Use with adequate ventilation to prevent inhalation of sprays or mists. All operations should be directed at minimizing the generation of aerosols, sprays, or mists. Eyewash stations/safety showers should be near areas where this product is used or sprayed.

#### EXPOSURE LIMITS:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR									
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELS		NIOSH	AIHA WEELs		OTHER
		TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	IDLH mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	mg/m <sup>3</sup>
Organic Acid	Proprietary	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Organic Sodium Salt	Proprietary	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Potassium Salt	Proprietary	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Aliphatic Amide	Proprietary	NE	NE	NE	NE	NE	NE	NE	10	NE	NE

NE = Not Established.

**INTERNATIONAL EXPOSURE LIMITS:** Currently, there are no international exposure limits in place for the components of this product.

*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, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection). Please reference applicable regulations and standards for relevant details.*

**RESPIRATORY PROTECTION:** No special respiratory protection is required under normal circumstances of use. Maintain component levels below 50% of the TLVs of components (see above) and oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection when component levels exceed 50% of the TLV, oxygen levels are below 19.5%, or during emergency response to a release of this product. During an emergency situation, before entering the area, check the concentration of components and Oxygen. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, the Canadian CSA Standard Z94.4-93, applicable standards of Canadian Provinces, the European Standard EN149, or applicable standards of EU member states, or the Australian Standard 1716-Respiratory Protective Devices, the Australian Standard 1715-Selection, Use, and Maintenance of Respiratory Protective Devices, as well as requirements of Japan.. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998).

**EYE PROTECTION:** Splash goggles or safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133, appropriate Canadian Standards or by the European Standard EN166, the Australian Standard 1337-Eye Protection for Industrial Applications and Australian Standard 1336-Recommended Practices for Eye Protection in the Industrial Environment, as well as requirements of Japan for further information.

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

**HAND PROTECTION:** Wear latex or neoprene gloves for routine industrial use. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS. If necessary, refer to U.S. OSHA 29 CFR 1910.138, and the European Standard DIN EN 374, appropriate Standards of Canada, the Australian Standard 2161-Industrial Safety Gloves and Mittens, and applicable Standards of Japan, for further information.

**BODY PROTECTION:** Use body protection appropriate for task (e.g., coveralls or rubber apron). If necessary, refer appropriate Standards of Canada, the European Economic Community the to Australian Standard 3765-Clothing for Protection Against Hazardous Chemicals, or Japan for further information. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136.

## 9. PHYSICAL and CHEMICAL PROPERTIES

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

**EVAPORATION RATE (n-BuAc = 1):** Not established.

**DENSITY:** Not established.

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

**SOLUBILITY IN WATER:** Completely soluble.

**BOILING POINT:** Not established.

**VAPOR PRESSURE, mm Hg:** Not established.

**pH:** 6.5

**ODOR THRESHOLD:** Not established.

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

**APPEARANCE AND COLOR:** This product is a light green to light brown liquid with a mild organic odor.

**HOW TO DETECT THIS SUBSTANCE (warning properties):** The appearance and odor may act as distinguishing characteristics for this product if accidentally released.

## 10. STABILITY and REACTIVITY

**STABILITY:** Stable.

**DECOMPOSITION PRODUCTS:** When exposed to extremely high temperatures, the components of this product may decompose to produce irritating vapors and toxic gases (e.g., phosphorous oxides, phosphine, carbon monoxide, ammonia, and carbon dioxide).

**MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:** Strong oxidizing agents, sodium hypochlorite, calcium hypochlorite, phosphorus pentachloride, sodium nitrite, potassium nitrite, chromyl chloride, nitrosyl perchlorate, gallium perchlorate, titanium tetrachloride, and water-reactive materials.

**HAZARDOUS POLYMERIZATION:** Will not occur.

**CONDITIONS TO AVOID:** Exposure to extreme temperatures and incompatible materials.

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

## 11. TOXICOLOGICAL INFORMATION

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

### ORGANIC SODIUM SALT:

LD<sub>50</sub> (Oral-Rat) > 5 gm/kg

LD<sub>50</sub> (Intravenous-Rat) 1 gm/kg

LD<sub>50</sub> (Intravenous-Rabbit) 100 mg/kg

LD<sub>50</sub> (Intraperitoneal-Cat) 250 mg/kg

LD (Intraperitoneal-Rat) > 1 gm/kg

LDLo (Intraperitoneal-Mouse) 500 mg/kg:

Blood: hemorrhage

TDLo (Oral-Rat) 100 mg/kg: Biochemical:

Metabolism (Intermediary): lipids including transport

TDLo (Oral-Rat) 22 mg/kg: Endocrine: other changes

### ORGANIC ACID:

LD<sub>50</sub> (oral, rat) = 3 g/kg

LD<sub>50</sub> (intraperitoneal, rat) = 883 mg/kg

LD<sub>50</sub> (intraperitoneal, rat) = 290 mg/kg

LD<sub>50</sub> (subcutaneous, rat) = 5500 mg/kg

LD<sub>50</sub> (oral, mouse) = 5040 mg/kg

LD<sub>50</sub> (intraperitoneal, mouse) = 903 mg/kg

LD<sub>50</sub> (subcutaneous, mouse) = 2700 mg/kg

LD<sub>50</sub> (intravenous, mouse) = 42 mg/kg:

Behavioral: convulsions or effect on seizure threshold, Lungs, Thorax, or Respiration: cyanosis, Gastrointestinal: changes in structure or function of salivary glands

LDLo (oral, rabbit) = 7000 mg/kg:

Behavioral: tremor, convulsions or effect on seizure threshold, muscle contraction or spasticity

LD<sub>50</sub> (intravenous, rabbit) = 330 mg/kg:

Behavioral: convulsions or effect on seizure threshold, Lungs, Thorax, or Respiration: cyanosis, Gastrointestinal: changes in structure or function of salivary glands

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

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

Eye Irritancy (rabbit) = 750 µg/24 hours; severe

Eye Irritancy (rabbit) = 750 mg/24 hours; severe

### POTASSIUM SALT:

Currently, there are no toxicology data available for this compound.

### ALIPHATIC AMIDE:

Standard Draize Test (skin, human) = 22 mg/3 days-intermittent: Mild

### ALIPHATIC AMIDE (continued):

TDLo (intraplacental, woman) = 1600 mg/kg:

female 16 week(s) after conception:

Reproductive: Fertility: abortion

TDLo (intraplacental, human) = 1400 mg/kg:

female 16 week(s) after conception:

Reproductive: Fertility: abortion

LD<sub>50</sub> (oral, rat) = 8471 mg/kg

LD<sub>50</sub> (intraperitoneal, rat) > 5 g/kg

LD<sub>50</sub> (subcutaneous, rat) = 8200 mg/kg:

Behavioral: altered sleep time (including change in righting reflex), changes in motor activity (specific assay); Behavioral: antipsychotic

LD<sub>50</sub> (intravenous, rat) = 5300 mg/kg:

Behavioral: altered sleep time (including change in righting reflex), changes in motor activity (specific assay), antipsychotic

LD<sub>50</sub> (intratracheal, rat) = 567 mg/kg:

Behavioral: convulsions or effect on seizure threshold; Lungs, Thorax, or Respiration: dyspnea; Blood: methemoglobinemia-carboxyhemoglobin

LD<sub>50</sub> (oral, mouse) = 11 g/kg

LD<sub>50</sub> (subcutaneous, mouse) = 9200 mg/kg:

Behavioral: altered sleep time (including change in righting reflex), changes in motor activity (specific assay), antipsychotic

LD<sub>50</sub> (intravenous, mouse) = 4600 mg/kg:

Behavioral: altered sleep time (including change in righting reflex), changes in motor activity (specific assay), antipsychotic

LDLo (intraperitoneal, mouse) = 6608

mg/kg: Behavioral: convulsions or effect on seizure threshold, coma

LDLo (subcutaneous, dog) = 3 g/kg

LDLo (intravenous, dog) = 3 g/kg

LDLo (intravenous, rabbit) = 4800 mg/kg

LDLo (oral, rabbit) = 10 g/kg: Brain and

Coverings: other degenerative changes; Lungs, Thorax, or Respiration: structural or functional change in trachea or bronchi; Blood: hemorrhage

LDLo (subcutaneous, rabbit) = 3 g/kg

LDLo (oral, domestic mammal) = 511 mg/kg:

Behavioral: tetany; Lungs, Thorax, or Respiration: dyspnea; Gastrointestinal: changes in structure or function of salivary glands

### ALIPHATIC AMIDE (continued):

LDLo (subcutaneous, pigeon) = 14,800 mg/kg

LDLo (subcutaneous, frog) = 600 mg/kg

TCLo (inhalation, rat) = 288 mg/m<sup>3</sup>/17

weeks-intermittent: Kidney, Ureter, Bladder other changes in urine composition; Blood: other changes; Nutritional and Gross Metabolic: changes in chlorine

TDLo (oral, rat) = 3024 mg/kg/4 weeks-continuous: Liver: changes in liver weight; Endocrine: changes in thymus weight; Related to Chronic Data: changes in testicular weight

TDLo (skin, rat) = 37,800 mg/kg/25 weeks-continuous: Brain and Coverings: changes in brain weight; Related to Chronic Data: changes in prostate weight

TDLo (oral, rat) = 821 g/kg/1 year-continuous: Tumorigenic: neoplastic by

RTECS criteria; Blood: tumors; Blood: lymphoma, including Hodgkin's disease

TDLo (oral, mouse) = 394 g/kg/1 year-

continuous: Tumorigenic: carcinogenic by RTECS criteria; Blood: tumors; Blood: lymphoma, including Hodgkin's disease

TDLo (oral, cattle) = 200 mg(N)/kg:

Behavioral: tremor, muscle weakness; Gastrointestinal: alteration in gastric secretion

TDLo (intrauterine, monkey) = 6 g/kg:

female 18 week(s) after conception: Reproductive: Fertility: abortion

DNA Inhibition (lymphocyte, human) = 600 mmol/L

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

Cytogenetic Analysis (oral, mouse) = 100 g/kg/5 days-continuous

Cytogenetic Analysis (fibroblast, hamster) = 16 g/L/24 hours

Cytogenetic Analysis (lung, hamster) = 13 g/L

DNA Damage (lymphocyte, mouse) = 628 mmol/L

DNA Damage (fibroblast, hamster) = 8 mol/L

Mutation in Mammalian Somatic Cells (lymphocyte, mouse) = 265 mmol/L

## 11. TOXICOLOGICAL INFORMATION (Continued)

**SUSPECTED CANCER AGENT:** The components of this product are not found on the following lists: U.S. FEDERAL OSHA Z LIST, NTP, IARC, and CAL/OSHA and therefore are neither considered to be nor suspected to be cancer-causing agents by these agencies

**IRRITANCY OF PRODUCT:** This product can be irritating to contaminated tissue upon prolonged or repeated exposure.

**SENSITIZATION TO THE PRODUCT:** The Organic Acid component of this product is a potential skin sensitizer. Prolonged or repeated skin contact can cause allergy-like skin reactions (e.g., dermatitis, rashes).

**REPRODUCTIVE TOXICITY INFORMATION:** Listed below is information concerning the effects of the components this gas mixture on the human reproductive system.

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

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

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

**Reproductive Toxicity:** The components of this product are not reported to cause 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 (BEIs):** Currently, there are no Biological Exposure Indices (BEIs) determined for the components of this product.

## 12. ECOLOGICAL INFORMATION

WORK PRACTICES MUST PREVENT UNINTENTIONAL, ENVIRONMENTAL RELEASES.

**ENVIRONMENTAL STABILITY:** The components of this solution are relatively stable, but will decompose over time to generate other inorganic compounds. The following environmental data are available for the components of this product:

**ORGANIC ACID:** Water Solubility = 59.2% (20°C); 84% (100°C). Biological Oxygen Demand (BOD): 40%, 5 days; 60%, 10-20 days. Organic Acid biodegrades quite rapidly. It is dangerous to aquatic life in high concentrations. Lowers pH in water but does not dissociate to any great extent.

### ALIPHATIC AMIDE:

**Aquatic Fate:** Based on a classification scheme, a Koc value of 8, indicates that Aliphatic Amide is not expected to adsorb to suspended solids and sediment. Volatilization from water surfaces is not expected based upon an estimated Henry's Law constant of  $1.74 \times 10^{-12}$  atm-cu m/mole determined from its vapor pressure,  $1.20 \times 10^{-5}$  mm Hg, and water solubility,  $5.45 \times 10^{+5}$  mg/L. According to a classification scheme, BCF values of 1 and < 10 suggest the potential for bioconcentration in aquatic organisms is low.

**Atmospheric Fate:** According to a model of gas/particle partitioning of semi-volatile organic compounds in the atmosphere), Aliphatic Amide, which has a vapor pressure of  $1.2 \times 10^{-5}$  mm Hg at 25°C, will exist in both the vapor and particulate phases in the ambient atmosphere. Vapor-phase Aliphatic Amide is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 9.6 days, calculated from its rate constant of  $4.00 \times 10^{-11}$  cu cm/molecule-sec at 25°C. Particulate-phase Aliphatic Amide may be removed from the air by wet and dry deposition.

**EFFECT OF MATERIAL ON PLANTS or ANIMALS:** This solution may irritate contaminated animals. This product is a fertilizer. Releases of large quantities into an area can substantially alter the nutrient composition affect terrestrial plant life.

**EFFECT OF CHEMICAL ON AQUATIC LIFE:** This product is a fertilizer. Releases of large quantities into a body of water can substantially alter the nutrient composition affect aquatic plant and animal life. The following aquatic toxicity information is available for the components of this product.

### ORGANIC ACID:

EC<sub>0</sub> (*Pseudomonas putida* bacteria) 16 hours = > 10,000 mg/L  
EC<sub>0</sub> (*Microcystis aeruginosa* algae) 8 days = 80 mg/L  
EC<sub>0</sub> (*Scenedesmus quadricauda* green algae) 7 days = 640 mg/L  
EC<sub>0</sub> (*Entosiphon sulcatum* protozoa) 72 hours = 485 mg/L  
EC<sub>0</sub> (*Uronema parduczi* Chatton-Lwoff protozoa) = 622 mg/L  
LD<sub>0</sub> (*Daphnia magna* giant water flea) = 80 mg/L, long-time exposure in soft water  
LD<sub>0</sub> (goldfish) 625 mg/L, long-time exposure in hard water  
LD<sub>100</sub> (*Daphnia magna* giant water flea) = 120 mg/l long-time exposure in soft water  
LD<sub>100</sub> (goldfish) 894 mg/L, long-time exposure in hard water  
Toxic (*Daphnia* water flea) = 100 mg/L

### ORGANIC ACID (continued):

Toxic (goldfish) 4 hours = 894 ppm fresh water  
Period of survival at pH 4.0 (goldfish) 48 hours = 894 mg/L  
Period of survival at pH 4.5 (goldfish) = 625 mg/L  
TLm (shore crab) 48 hours = 160 ppm salt water

### ALIPHATIC AMIDE:

Toxicity Threshold (*Scenedesmus quadricauda* green algae) > 10,000 mg/l, toxic effect: multiplication inhibition of cell. /Time not specified  
Toxicity Threshold (*Entosiphon sulcatum* protozoa) > 29 mg/L, toxic effect: inhibition of cell multiplication./Time not specified  
Toxicity Threshold (*Pseudomonas putida*) > 10,000 mg/L toxic effect: inhibition of cell multiplication. /Time not specified

**MOBILITY:** Based on a classification scheme, a Koc value of 8 indicates that Aliphatic Amide is expected to have very high mobility in soil. Volatilization of Aliphatic Amide from moist soil surfaces is not expected to be an important fate process given an estimated Henry's Law constant of  $1.74 \times 10^{-12}$  atm-cu m/mole determined from its vapor pressure,  $1.20 \times 10^{-5}$  mm Hg, and water solubility,  $5.45 \times 10^{+5}$  mg/L. Aliphatic Amide is not expected to volatilize from dry soil surfaces based upon its vapor pressure. In a study examining the fate of soil-applied Aliphatic Amide, a major part (e.g., 22–49%) of the applied Aliphatic Amide was lost in gaseous form (e.g., ammonia or N<sub>2</sub>O). Although soil adsorption studies have demonstrated that Aliphatic Amide adsorbs very weakly to soil; only a minor part was leached out of soil (< 1%) in this study. Roughly one third (e.g., 26–43%), however, was incorporated into soil organic matter.

**PERSISTENCE AND BIODEGRADABILITY:** Persistence: Various field and laboratory studies have demonstrated that Aliphatic Amide degrades rapidly in most soils. Biodegradation: The Organic Acid biodegrades quite rapidly. Aliphatic Amide is rapidly hydrolyzed to ammonium ions through soil Aliphatic Amidase activity, which produces volatile gases, i.e., ammonia and carbon dioxide. In a variety of soils, the hydrolysis may near completion within 24 hours. However, the rate of hydrolysis can be much slower depending upon the soil type, moisture content, and Aliphatic Amide formulation. For example, increasing the pellet size of Aliphatic Amide fertilizers can decrease the rate of Aliphatic Amide decomposition from days to weeks. Aliphatic Amide is rapidly hydrolyzed to ammonia and carbon dioxide in environmental systems by the extra-cellular enzyme, Aliphatic Amidase, which originates from microorganisms and plant roots. The degradation of Aliphatic Amide was examined in a river die-away study using various river waters and test conditions. At 20°C, degradation of Aliphatic Amide was complete within 6–14 days of incubation, while at lower temperatures (e.g., 4–12°C) little or no degradation occurred in 10–14 days. Abiotic hydrolysis of Aliphatic Amide occurs very slowly in relation to biotic hydrolysis.

## 12. ECOLOGICAL INFORMATION (Continued)

POTENTIAL TO BIOACCUMULATE: In a 6 to 72 hours bioaccumulation study using carp (*Cyprinus carpio*), the concentration of Aliphatic Amide was found to be equally distributed between tissue and water during all time periods; thus, the BCF would be 1 for this species. In 3-day static-system tests using golden ide fish (*Leuciscus idus melanotus*), the BCF of Aliphatic Amide was < 10. According to a classification scheme, these BCF values suggest the potential for bioconcentration in aquatic organisms is low.

OZONE-DEPLETION POTENTIAL: Components are not Class I or Class II ozone depleting chemicals (40 CFR Part 82).

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## 13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority. For further information, refer to Section 16 (Other Information).

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## 14. TRANSPORTATION INFORMATION

U.S. DOT TRANSPORTATION OF HAZAROUS MATERIALS: This product is not hazardous as defined by 49 CFR 172.101 by the U.S. Department of Transportation.

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

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): This product is not classified as Dangerous Goods, per the International Air Transport Association.

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): This product is not classified as Dangerous Goods, per the International Maritime Organization.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This product is not classified by the 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 is not classified as Dangerous Goods, per regulations of the Federal Office of Road Safety.

JAPAN SHIP SAFETY LAW, PORT REGULATION LAW): This product is not regulated according to Japan Ship Safety Law.

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## 15. REGULATORY INFORMATION

### ADDITIONAL U.S. REGULATIONS:

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

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

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

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

**OTHER U.S. FEDERAL REGULATIONS:** Not applicable.

**CLEAN AIR ACT SECTION 111 VOLATILE ORGANIC COMPOUNDS:** Not applicable.

**CLEAN WATER ACT SECTIONS 301, 307, AND 311:** Not applicable.

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

### ADDITIONAL CANADIAN REGULATIONS:

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

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

**GREENHOUSE GASES KYOTO PROTOCOL:** Not applicable.

**CANADIAN WHMIS REGULATIONS:** This product is not categorized as a Controlled Product, per the Controlled Product Regulations.

**CANADIAN WHMIS SYMBOLS:** Not applicable.

### EUROPEAN UNION REGULATIONS:

**EU LABELING AND CLASSIFICATION:** The following is a self-classification, based on currently known properties of this material.

**EU CLASSIFICATION:** This product does not meet the definition of any hazard class as defined by the European Union Council Directive 67/548/EEC.

**EU RISK PHRASES:** Not applicable.

**EU SAFETY PHRASES:** Not applicable.

**EUROPEAN UNION ANNEX II HAZARD SYMBOL:** Not applicable.

### **EU LABELING AND CLASSIFICATION FOR COMPONENTS:**

#### **Organic Acid:**

EINECS/ELINCS NUMBER: Proprietary

HAZARD CLASSIFICATION: An official classification for this substance has not been published in Commission Directives.

#### **Organic Sodium Salt:**

EINECS/ELINCS NUMBER: Proprietary

HAZARD CLASSIFICATION: An official classification for this substance has not been published in Commission Directives.

## 15. REGULATORY INFORMATION (Continued)

### EU LABELING AND CLASSIFICATION FOR COMPONENTS (continued):

**Potassium Salt:**

EINECS/ELINCS NUMBER: Proprietary

HAZARD CLASSIFICATION: An official classification for this substance has not been published in Commission Directives.

**Aliphatic Amide:**

EINECS/ELINCS NUMBER: Proprietary

HAZARD CLASSIFICATION: An official classification for this substance has not been published in Commission Directives.

### AUSTRALIAN INFORMATION FOR PRODUCT:

**AUSTRALIAN NATIONAL POLLUTANT INVENTORY:** No component of this product is listed on the Australian National Pollutant Inventory (NPI).

**AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS:** The components of this product are listed on the AICS or are exempt.

**LIST OF DESIGNATED SUBSTANCES:** Not applicable.

**STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS:** Not applicable.

**LABELING AND CLASSIFICATION:** SELF CLASSIFICATION: Not applicable.

**CLASSIFICATION:** Not applicable. **RISK PHRASES:** Not applicable. **SAFETY PHRASES:** Not applicable.

### JAPANESE INFORMATION FOR PRODUCT:

**JAPANESE EXISTING AND NEW CHEMICAL SUBSTANCE LIST (ENCS) STATUS:** The components of this product are on the ENCS Inventory, except Kelp.

**POISONOUS AND DELETERIOUS SUBSTANCES CONTROL LAW:** No component of this product is a listed Specified Poisonous Substance under the Poisonous and Deleterious Substances Control Law.

**JAPANESE MINISTRY OF ECONOMY, TRADE, AND INDUSTRY (METI) STATUS:** The components of this product are not listed as a Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese METI.

### KOREAN INFORMATION FOR PRODUCT:

**KOREAN TOXIC RELEASE INVENTORY:** The components of this product are not on the Korean Toxic Release Inventory (TRI).

**INTERNATIONAL CHEMICAL INVENTORY SUMMARY:** The components of this product are found on the following national Chemical Inventories:

**ASIA PAC:** On Inventory: Organic Acid; Potassium Salt; Aliphatic Amide

**AUSTRALIAN AICS:** On Inventory: Organic Acid; Organic Sodium Salt; Potassium Salt; Aliphatic Amide

**CANADIAN DSL/NDL:** On Inventory: Organic Acid; Organic Sodium Salt; Potassium Salt; Aliphatic Amide

**CHINA:** Not on Inventory

**EUROPEAN EINECS:** On Inventory: Organic Acid; Organic Sodium Salt; Potassium Salt; Aliphatic Amide

**JAPANESE ENCS:** On Inventory: Organic Acid; Organic Sodium Salt; Potassium Salt; Aliphatic Amide

**KOREAN KECI:** On Inventory: Organic Acid: ECL # KE-20831; Organic Sodium Salt: ECL # KE-00492; Potassium Salt: ECL # KE-12167; Aliphatic Amide: ECL # KE-35144

**PHILIPPINE PICCS:** On Inventory: Organic Acid; Organic Sodium Salt; Potassium Salt; Aliphatic Amide

**SWISS GIFTLISTE:** On Inventory: Organic Acid; Organic Sodium Salt; Potassium Salt; Aliphatic Amide

**TAIWAN TOXIC SUBSTANCES LIST:** None

**U.S. TSCA INVENTORY:** On Inventory: Organic Acid; Organic Sodium Salt; Potassium Salt; Aliphatic Amide

## 16. OTHER INFORMATION

**PREPARED BY:**

CHEMICAL SAFETY ASSOCIATES, Inc.  
PO Box 3519, La Mesa, CA 91944-3519  
800-441-3365

### DEFINITIONS OF TERMS

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

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

**EXPOSURE LIMITS IN AIR:**

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

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

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

**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.

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

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

**NIC:** Notice of Intended Change.

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

## DEFINITIONS OF TERMS (Continued)

### EXPOSURE LIMITS IN AIR:

**NIOSH RELs:** NIOSH's Recommended Exposure Limits.

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

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

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

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

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

### HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

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

#### HEALTH HAZARD:

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

#### FLAMMABILITY HAZARD:

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

### HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

#### HAZARD RATINGS (continued):

##### FLAMMABILITY HAZARD (continued):

**4 (Severe Hazard-Materials)** that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and which will burn readily, including: Flammable gases; Flammable cryogenic materials; Any liquid or gaseous material that is liquid while under pressure and has a flash point below 22.8°C [73°F] and a boiling point below 37.8°C [100°F] [e.g. OSHA Class IA; Material that ignite spontaneously when exposed to air at a temperature of 54.4°C [130°F] or below [e.g. pyrophoric].

##### PHYSICAL HAZARD:

**0 (Water Reactivity):** Materials that do not react with water. *Organic Peroxides:* Materials that are normally stable, even under fire conditions and will not react with water. *Explosives:* Substances that are Non-Explosive. *Unstable Compressed Gases:* No Rating. *Pyrophorics:* No Rating. *Oxidizers:* No "0" rating allowed. *Unstable Reactives:* Substances that will not polymerize, decompose, condense or self-react.; **1 (Water Reactivity):** Materials that change or decompose upon exposure to moisture. *Organic Peroxides:* Materials that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. *Explosives:* Division 1.5 & 1.6 substances that are very insensitive explosives or that do not have a mass explosion hazard. *Compressed Gases:* Pressure below OSHA definition. *Pyrophorics:* No Rating. *Oxidizers:* Packaging Group III; *Solids:* any material that in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met. *Liquids:* any material that exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65%)/cellulose mixture and the criteria for Packing Group I and II are not met. *Unstable Reactives:* Substances that may decompose, condense or self-react, but only under conditions of high temperature and/or pressure and have little or no potential to cause significant heat generation or explosive hazard. Substances that readily undergo hazardous polymerization in the absence of inhibitors.);

### HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

#### HAZARD RATINGS (continued):

##### PHYSICAL HAZARD (continued):

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

## DEFINITIONS OF TERMS (Continued)

### NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

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

**FLAMMABILITY HAZARD: 0** Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand: Materials that will not burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. **1** Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur: Materials that will burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. Liquids, solids and semisolids having a flash point at or above 93.4°C (200°F) (i.e. Class IIIB liquids). Liquids with a flash point greater than 35°C (95°F) that do not sustain combustion when tested using the *Method of Testing for Sustained Combustibility*, per 49 CFR 173, Appendix H or the *UN Recommendation on the Transport of Dangerous Goods, Model Regulations* (current edition) and the related *Manual of Tests and Criteria* (current edition). Liquids with a flash point greater than 35°C (95°F) in a water-miscible solution or dispersion with a water non-combustible liquid/solid content of more than 85 percent by weight. Liquids that have no fire point when tested by ASTM D 92 Standard Test Method for Flash and Fire Points by Cleveland Open Cup, up to a boiling point of the liquid or up to a temperature at which the sample being tested shows an obvious physical change. Combustible pellets with a representative diameter of greater than 2 mm (10 mesh). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. Most ordinary combustible materials. **2** Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air: Liquids having a flash point at or above 37.8°C (100°F) and below 93.4°C (200°F) (i.e. Class II and Class IIIA liquids.)

### NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

**FLAMMABILITY HAZARD (continued): 2 (continued):** Solid materials in the form of powders or coarse dusts of representative diameter between 420 microns (40 mesh) and 2 mm (10 mesh) that burn rapidly but that generally do not form explosive mixtures in air. Solid materials in fibrous or shredded form that burn rapidly and create flash fire hazards, such as cotton, sisal and hemp. Solids and semisolids that readily give off flammable vapors. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. **3** Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions: Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 37.8°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (73°F) and below 37.8°C (100°F) (i.e. Class IB and IC liquids). Materials that, on account of their physical form or environmental conditions, can form explosive mixtures with air and are readily dispersed in air. Flammable or combustible dusts with a representative diameter less than 420 microns (40 mesh). Materials that burn with extreme rapidity, usually by reason of self-contained oxygen (e.g. dry nitrocellulose and many organic peroxides). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

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

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

### TOXICOLOGICAL INFORMATION:

**Human and Animal Toxicology:** Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD<sub>50</sub>** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC<sub>50</sub>** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m<sup>3</sup>** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information:** **BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

## DEFINITIONS OF TERMS (Continued)

### ECOLOGICAL INFORMATION:

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

### REGULATORY INFORMATION:

#### U.S. and CANADA:

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

### REGULATORY INFORMATION (continued):

**EUROPEAN**: **EU** is the European Union (formerly known as the **EEC**, European Economic Community). **EINECS**: This the European Inventory of Now-Existing Chemical Substances. The **ARD** is the European Agreement Concerning the International Carriage of Dangerous Goods by Road and the **RID** are the International Regulations Concerning the Carriage of Dangerous Goods by Rail. **AUSTRALIAN**: **AICS** is the Australian Inventory of Chemical Substances. **NOHSC**: National Occupational Health & Safety Code. **MITI** is the Japanese Minister of International Trade and Industry.