MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS Standards, European Directives, Australian WorkSafe and SPRING Singapore Standards

1. PRODUCT IDENTIFICATION

TRADE NAME[S] (AS LABELED):	**SOLTEX MM Series POLYBUTENES; PIB 85 MM, PIB 100 MM, PB 120 MM, PB 155 MM, PB 220 MM**
CHEMICAL NAME/CLASS:	Polyisobutylene; Butylene Polymer
CHEMICAL FORMULA:	$C_4nH(8n)$ [n = number of moles of butene mixture]
SYNONYMS:	Butene Homopolymer; Butene Polymer; Polybutene; Polybutylene
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:	Fuel Additive
U.S. SUPPLIER/MANUFACTURER'S NAME:	**SOLTEX, INC.**
ADDRESS:	3707 FM 1960West, Ste. 560 Houston, TX 77068 USA
BUSINESS PHONE:	1-281-587-0900
FACSIMILE:	1-281-587-1998
AUSTRALIAN SUPPLIER/DISTRIBUTOR'S NAME:	
ADDRESS:	
BUSINESS PHONE:	
EUROPEAN SUPPLIER/ DISTRIBUTOR'S NAME:	
ADDRESS:	
BUSINESS PHONE:	
SINGAPORE SUPPLIER/ DISTRIBUTOR'S NAME:	
ADDRESS:	
BUSINESS PHONE:	
EMERGENCY PHONE:	United States/Canada: 1-800/424-9300 (Chemtrec) [24-hours] International: +1-703-527-3887 (Chemtrec) [24-hours]
EMAIL ADDRESS/COMPETENT PERSON FOR MSDS	Mr. C. Edward Baxter: eBaxter@soltexinc.com
DATE OF PREPARATION:	October 27, 2008

NOTE: ALL Canadian WHMIS, European Directive, Australian NOHSC and Singapore SPRING 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 and the MSDS contains all the information required by the Canadian WHMIS [Controlled Products Regulations] and European Union [Regulation (EC) 1907/2006 Annex II], Australian (NOHSC:2011, 8.30–8.48) information, and Singapore SPRING required information is included.

2. HAZARD IDENTIFICATION

EU LABELING AND CLASSIFICATION: An official classification for these materials has not been published under EU Directives.

EU CLASSIFICATION: Not Applicable
EU RISK PHRASES: Not Applicable
EU SAFETY PHRASES: Not Applicable
EUROPEAN COMMUNITY ANNEX II HAZARD SYMBOL: Not Applicable

EMERGENCY OVERVIEW: These are clear colorless, or pale yellow, tacky semi-solid/liquid resin or rubber-like solids, which are odorless or may have a mild, hydrocarbon odor. The tackiness of these compounds increases with molecular weight. Impurities and/or additives will change the odor and/or color. **Health Hazards:** These products may irritate skin, eyes, and other contaminated tissues. Vapor of liquids may act as a simple asphyxiants in high concentration. **Flammability Hazards:** These products are Class IIIB combustible liquids which must be highly heated for ignition to become a potential hazard. If involved in a fire these materials will form the following decomposition products: For Solids: Carbon monoxide, formaldehyde, organic aldehydes, acids, hydrogen gas and hydrocarbons such as ethene, propene, butene, 2-pentene, and ethane. For Liquids: smaller polymers (lower oligomers), carbon monoxide, formic acid, acetone, and other oxygenated small organic molecules. Thermal decomposition in absence of air releases mainly saturated and unsaturated hydrocarbons, methane, propane, butene isomers, dimethylpropane isomers, and dimethylheptane isomers. . **Reactivity Hazards:** These products are not reactive, by can Oxidize slowly by air at room temperature to form peroxides. Air oxidation increases rapidly at temperatures above 200°C (392°F). The rate of oxidation also increases as the polymer chain length increases. Light and/or heat increase the rate of decomposition and peroxide formation. **Environmental Hazards:** Releases of these products may be harmful to the environment. **Emergency Recommendations:** Emergency responders must wear the personal protective equipment suitable for the situation to which they are responding.

3. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	EINECS #	AICS Inventory Listing	% w/v	EU/AUSTRALIAN CLASSIFICATION FOR COMPONENTS
Polybutenes	9003-29-6	NLP # 500-004-7	Listed	100%	Hazard Classification: Not Applicable Risk Phrases: Not Applicable

See Section 15 for full text of Ingredient Risk Phrases for components. See Section 15 for Inventory listing for other countries.

4. FIRST-AID MEASURES

Victims of chemical exposure must be taken for medical attention if any adverse effect occurs. Remove or cover gross contamination to avoid exposure to rescuers. Rescuers should be taken for medical attention, if necessary. Take a copy of label and MSDS to health professional with victim.

SKIN EXPOSURE: If this product contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 20 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek medical attention if any adverse effect occurs/continues after flushing.

EYE EXPOSURE: If vapors or liquid from this product enter the eyes, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 20 minutes. Victim must seek medical attention if any adverse effect occurs.

INHALATION: If vapors, mists, or sprays of this product are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. If adverse effect continues after removal to fresh air, seek medical attention.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. DO NOT INDUCE VOMITING, unless directly by medical personnel. Have victim rinse mouth with water or give several cupfuls of 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, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions, skin disorders, central nervous system conditions, or disorders involving the “Target Organs” (see Section 11, “Toxicological Information”) may be aggravated by overexposure to this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure. Provide oxygen, if necessary.

5. FIRE-FIGHTING MEASURES

FLASH POINT:
Solids: 170-200°C (338-392°F)
Liquids: 65-170°C (149-338°F)

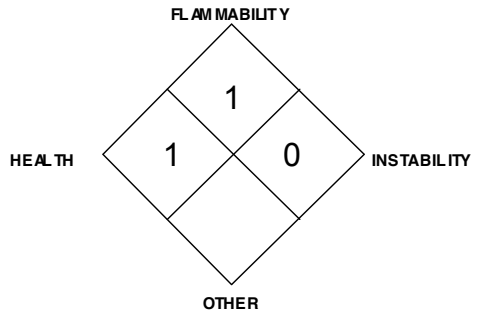
FLAMMABILITY LIMITS:
Solids: Not applicable.
Liquids: Not established.

AUTOIGNITION:
Solids: Not applicable; decomposes.
Liquids: Not established.

FIRE EXTINGUISHING MATERIALS: The following extinguishing materials are recommended for fires involving this product.
Carbon Dioxide: YES *Dry Chemical*: YES *Other*: Any "B" Class
Halon: YES *Foam*: YES *Water Spray*: YES (for cooling only)

FIRE EXTINGUISHING MATERIALS NOT BE USED: None known.

NFPA RATING



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

UNUSUAL FIRE AND EXPLOSION HAZARDS: These products can burn if highly heated. Decomposition products may ignite in air at or above the flash point. Volatile flammable hydrocarbons are released when the polymer is stored hot for a prolonged period of time, which can accumulate in confined spaces, resulting in a fire or explosion hazard. Stored hot polymer auto-oxidizes, which can lead to spontaneous combustion. Hot, liquefied material may accumulate static charge. During a fire, very toxic gases and other compounds are formed. These include: For Solids: Carbon monoxide, formaldehyde, organic aldehydes, acids, hydrogen gas and hydrocarbons such as ethene, propene, butene, 2-pentene, and ethane. For Liquids: smaller polymers (lower oligomers), carbon monoxide, formic acid, acetone, and other oxygenated small organic molecules. Thermal decomposition in absence of air releases mainly saturated and unsaturated hydrocarbons, methane, propane, butene isomers, dimethylpropane isomers, and dimethylheptane isomers. Once ignited, non-stabilized polymer burns vigorously and the fire can spread rapidly. In the heat of a fire, the polymer melts and flows, producing flaming tar-like drippings, which are difficult to extinguish and can start secondary fires. Depending on the fire conditions, dense sooty smoke may be formed. Some additives can increase the amount of smoke produced. Fire gases and vapors have a pungent odor, smelling like wax or paraffin. The behavior of polymers in a fire is influenced by a number of factors, including the chemical composition and structure of the polymer, as well as the presence of additives. Heat from a fire can cause a build-up of pressure inside containers due to thermal decomposition of product, which may cause explosive rupture. The fire properties of polymers can be modified by the addition of fire retardants.

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: If heated, vapors may be ignited by static electrical energy.

5. FIRE-FIGHTING MEASURES (Continued)

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Chemical resistant clothing may be necessary. Move containers from fire area if it can be done without risk to personnel. Water spray can be used to cool fire-exposed containers. Water fog or spray can also be used by trained firefighters to disperse this product's vapors and to protect personnel. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas. Rinse contaminated equipment thoroughly with soapy water before returning such equipment to service.

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. Eliminate all sources of ignition before cleanup begins. Use non-sparking tools. The atmosphere must have levels of components lower than those listed in Section 8, (Exposure Controls and Personal Protective Equipment), if applicable, and have at least 19.5 percent oxygen before personnel can be allowed into the area without Self-Contained Breathing Apparatus (SCBA).

Small Spills: Absorb spilled liquid with clay, sand, activated carbon, polypads, or other suitable absorbent materials, wearing gloves, goggles and apron.

Large Spills: Minimum Personal Protective Equipment should be **Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard hat, and Self-Contained Breathing Apparatus.** For large spills, dike or otherwise contain spill and remove with vacuum truck or pump to storage/salvage vessels. Decontaminate the area thoroughly. Prevent material from entering sewer or confined spaces, waterways, soil or public waters. Monitor area for combustible vapor levels and confirm levels are bellow exposure limits given in Section 8 (Exposure Controls-Personal Protection), if applicable, and that levels are below applicable LELs (see Section 5 – Fire Fighting Measures) before non-response personnel are allowed into the spill area.

Place all spill residue in a double plastic bag or other containment and seal. 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.

7. HANDLING and STORAGE

SAFE WORK AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Eye wash stations or safety showers should be near areas where this product is stored or handled. 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 and launder before reuse.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Keep away from heat, sparks, and other sources of ignition. Keep container tightly closed when not in use. Use non-sparking tools. Bond and ground containers during transfers of material. If this product is transferred into another container, only use portable containers and dispensing equipment (faucet, pump, drip can) approved for combustible liquids. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Do not store containers above 100°C (212°F). Material stored at cold temperatures may become very viscous and be difficult to pump. Material should be stored in secondary containers or in a diked area, as appropriate. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). Containers should be separated from oxidizing materials by a minimum distance of 20 ft. or by a barrier of non-combustible material at least 5 ft. high having a fire-resistance rating of at least 0.5 hours. 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). Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged. Refer to NFPA 30, *Flammable and Combustible Liquids Code*, for additional information on storage. Empty containers may contain residual liquid or vapors that are flammable; therefore, empty containers should be handled with care. Never perform any welding, cutting, soldering, drilling, or other hot work on an empty container or piping until all liquid, vapors, and residue have been cleared.

SPECIFIC USE(S): This product is used in a variety of industrial applications. Follow all industry standards for use of this product.

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

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION, ENGINEERING AND OCCUPATIONAL EXPSOURE CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below. Exhaust directly to the outside, taking necessary precautions for environmental protection. 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)

OCCUPATIONAL EXPOSURE STANDARDS:

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
Polybutenes	9003-29-6	NE	NE	NE	NE	NE	NE	NE	NE

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

INTERNATIONAL EXPOSURE LIMITS: Currently, there are no international exposure limits established for these compounds. Individual countries should be contacted to determine if more current limits are in force.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with regulations found in U.S. OSHA 29 CFR Subpart I (beginning at 1910.132), equivalent standards of Canada (including CSA Standard Z94.4-02 and CSA Standard Z94.3-02), standards of EU member states (including EN 529:2005 for respiratory PPE, CEN/TR 15419:2006 for hand protection, and CR 13464:1999 for face/eye protection), or 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). Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-02, the European Standard EN 529:2005, and EU member state standards, the Australian Standard 1716-Respiratory Protective Devices and Australian Standard 1715-Selection, Use, and Maintenance of Respiratory Protective Devices, or Singapore standards. 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: Wear safety glasses with side shields (or goggles) and a face shield. If necessary, refer to U.S. OSHA 29 CFR 1910.133, Canadian CSA Standard Z94.3-02, European Standard CR 13464:1999, the Australian Standard 1337-Eye Protection for Industrial Applications and Australian Standard 1336-Recommended Practices for Eye Protection in the Industrial Environment, or Singapore standards.

HAND PROTECTION: Wear appropriate gloves to prevent protection against solvents. If material is heated, wear insulated gloves. Check gloves for leaks. Wash hands before putting on gloves and after removing gloves. If necessary, refer to U.S. OSHA 29 CFR 1910.138, appropriate Standards of Canada, the Australian Standard 2161-Industrial Safety Gloves and Mittens, the European Standard CEN/TR 15419:2006, or Singapore standards.

BODY/SKIN PROTECTION: Use body protection appropriate for task (e.g., coveralls or apron). For prolonged or repeated exposures, use impervious synthetic rubber clothing (boots, gloves, aprons, etc.) over parts of the body subject to exposure. If handling hot fluid, use insulated protective clothing (boots, gloves, aprons, etc.). If necessary, refer to appropriate Standards of Canada, the European Standard CEN/TR 15419:2006, Australian Standard 3765-Clothing for Protection Against Hazardous Chemicals, or Singapore standards. 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

The physical properties values will vary depending on the impurities present, the chain length and form of the polymer, and additives.

The following values are for Polybutenes, molecular weight greater than 400 and less than or equal to 5000:

SURFACE TENSION: Not established.
EVAPORATION RATE (n-BuAc = 1): < 1
MELTING/POUR POINT: -51-20°C (-60-69°F)
BOILING POINT: Not applicable (decomposes)
VAPOR PRESSURE @ 20°C: < 0.001 kPa (0.01 mm Hg)
VAPOR DENSITY: 12-86
OXIDIZING PROPERTIES: Not applicable.
SHOCK SENSITIVTY: Not applicable.
VISCOSITY DYNAMIC @ 100°C: 11-4600cts
ODOR THRESHOLD: Not established.
VOLATILITY: Not established.
SPECIFIC GRAVITY @ 16°C: 0.84-0.91
FLAMMABILITY LIMITS: Not established.
FLASH POINT (CC): 115-170°C (239-338°F)
AUTOIGNITION: Decomposes.
PHYSICAL STATE: Liquid
pH: Not determined.
SOLUBILITY IN WATER: Insoluble (< 1 mg/L)

SOLUBILITY IN SOLVENTS: Soluble in non-polar solvents such as hydrocarbons and chlorinated hydrocarbons. Slightly soluble or insoluble in most other solvents (e.g. acetone, dioxane).

SATURATION VAPOR CONCENTRATION @20°C (estimated): 13 ppm

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

9. PHYSICAL and CHEMICAL PROPERTIES (Continued)

The following values are for Polybutenes, less than or equal to 400 (number average molecular weight (Mn)):

SURFACE TENSION: Not established.
MELTING/POUR POINT: -60 to -51°C (-76 to -60°F)
VAPOR PRESSURE @ 20°C: < 0.001 kPa (0.01 mm Hg)
OXIDIZING PROPERTIES: Not applicable.
VISCOSITY DYNAMIC @ 20°C: 3-5 cts
VOLATILITY: Not established.
FLAMMABILITY LIMITS: Not established.
AUTOIGNITION: Decomposes.
pH: Not determined.
EVAPORATION RATE (n-BuAc = 1): < 1
BOILING POINT: Not applicable (decomposes)
VAPOR DENSITY: 6-11
SHOCK SENSITIVTY: Not applicable.
ODOR THRESHOLD: Not established.
SPECIFIC GRAVITY @ 16°C: 0.79-0.84
FLASH POINT (CC): 65-82°C (149-180°F)
PHYSICAL STATE: Liquid
SOLUBILITY IN WATER: Insoluble (< 1 mg/L)
SOLUBILITY IN SOLVENTS: Soluble in non-polar solvents such as hydrocarbons and chlorinated hydrocarbons. Slightly soluble or insoluble in most other solvents (e.g. acetone, dioxane).
SATURATION VAPOR CONCENTRATION @20°C (estimated): 13 ppm
COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not established.

The following information is for all Polybutenes:

APPEARANCE, ODOR and COLOR: These are clear colorless, or pale yellow, tacky semi-solid/liquid resin or rubber-like solids, which are odorless or may have a mild, hydrocarbon odor. The tackiness of these compounds increases with molecular weight. Impurities and/or additives will change the odor and/or color.

HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance of these products may be an identifying property in event of an accidental release.

10. STABILITY and REACTIVITY

DECOMPOSITION CONDITIONS/STABILITY: Stable under conditions of standard temperature and pressure. These products are not reactive, by can Oxidize slowly by air at room temperature to form peroxides. Air oxidation increases rapidly at temperatures above 200°C (392°F). The rate of oxidation also increases as the polymer chain length increases. Light and/or heat increase the rate of decomposition and peroxide formation. These materials can decompose upon prolonged exposure to light.

DECOMPOSITION PRODUCTS: *Combustion:* For Solids: Carbon monoxide, formaldehyde, organic aldehydes, acids, hydrogen gas and hydrocarbons such as ethene, propene, butene, 2-pentene, and ethane. For Liquids: smaller polymers (lower oligomers), carbon monoxide, formic acid, acetone, and other oxygenated small organic molecules. Thermal decomposition in absence of air releases mainly saturated and unsaturated hydrocarbons, methane, propane, butene isomers, dimethylpropane isomers, and dimethylheptane isomers. *Hydrolysis:* None known.

HAZARDOUS *POLYMERIZATION*: Will not occur.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: These compounds would be incompatible with strong oxidizers.

CONDITIONS TO AVOID: Avoid exposure to or contact with ignition sources, extreme temperatures, direct sunlight and incompatible chemicals.

11. TOXICOLOGICAL INFORMATION

IRRITANCY OF PRODUCT: This product may irritate contaminated eyes, skin, mouth, throat, and other contaminated tissues.

SENSITIZATION TO THE PRODUCT: These compounds are not known to be human skin or respiratory sensitizers.

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

INHALATION: If mists or sprays of this product are inhaled, irritation of the mouth, throat, and other tissues of the respiratory system may occur. Symptoms may include coughing, sneezing, and difficulty breathing. Symptoms of acute exposure are expected to cease after exposure ends.

11. TOXICOLOGICAL INFORMATION (Continued)

INHALATION (continued): The sub-acute inhalation toxicity of Polybutenes was studied in rats. Male Wistar rats were exposed to Polybutenes at concentration ranges of 65 to 72 or 692 to 743 mg/cu m, 7 hours/day, 5 days/week for 2 weeks. The rats were observed for clinical signs of toxicity. They were killed, weighed, and necropsied after 2 weeks. Three of four rats exposed to the high concentration of Polybutene died. Lung weights were significantly increased in all high exposure groups. All high dose rats had significantly increased liver weights. Heart, kidney, and testes weights were increased in rats exposed to high concentrations of the alkylbenzenes. The major pathological finding was an increase in numbers of alveolar macrophages and increased macrophage vacuolation in the lungs of rats exposed to concentrations of Polybutene. A slight hepatic fatty degeneration was seen in rats exposed to the high concentration of Polybutene. Two weeks later the concentration averaged 2831 µg/g. It was concluded that inhalation exposure to Polybutene causes toxic effects in the lungs.

CONTACT WITH SKIN or EYES: Depending on the duration and concentration of overexposure, eye contact with vapors may result in mild irritation. Direct eye contact with liquid or mist may cause conjunctival irritation. Contact with the skin is not expected to cause significant cause irritation unless contact is prolonged. Repeated or prolonged contact may produce defatting of the skin leading to irritation and dermatitis, with symptoms of dryness, redness and cracking.

SKIN ABSORPTION: There is no specific information available on potential skin absorption of components of this product.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

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

PROTECTIVE EQUIPMENT

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

INGESTION: Ingestion is not anticipated to be a significant route of occupational exposure. If this product is swallowed, it may cause gastrointestinal irritation and vomiting. Ingestion of large quantities may be harmful or fatal. Ingestion may lead to aspiration into the lungs. Aspiration may lead to chemical pneumonitis which is characterized by pulmonary edema and hemorrhage, and may be fatal.

INJECTION: Accidental injection of this product (via cut or puncture with a contaminated object) may cause irritation in addition to the wound.

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

ACUTE: This product may mild irritate contaminated eyes. Skin inhalation can cause irritation of contaminated tissues. Ingestion of large volumes of this product can be harmful. Aspiration of the liquid can cause potentially fatal conditions of pulmonary edema or chemical pneumonitis.

CHRONIC: Prolonged skin contact may cause dermatitis. Bases on animal tests, chronic inhalation exposure may result in adverse effects to the lungs, heart, liver and kidneys.

TARGET ORGANS: *ACUTE*: Skin, eyes, respiratory system. *CHRONIC*: Skin, respiratory system, heart, liver, kidneys.

TOXICITY DATA: The following toxicology data are available for these compounds (no specific molecular weight noted).

POLYBUTENES:
TCLo (Inhalation-Rat) 700 mg/m^3/7 hours/2 weeks-intermittent: Liver: changes in liver weight; Nutritional and Gross Metabolic: weight loss or decreased weight gain

CARCINOGENIC POTENTIAL OF COMPONENTS: Polybutenes are not found on the following lists: U.S. EPA, U.S. NTP, U.S. OSHA, U.S. NIOSH, GERMAN MAK, IARC, and ACGIH and therefore are neither considered to be nor suspected to be cancer-causing agents by these agencies.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of these materials on the human reproductive system

Mutagenicity: Polybutenes are not reported to produce mutagenic effects in humans.
Embryotoxicity: Polybutenes are not reported to produce embryotoxic effects in humans.
Teratogenicity: Polybutenes are not reported to cause teratogenic effects in humans.
Reproductive Toxicity: Polybutenes 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 generational lines. An embryotoxin is a chemical that causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical that causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance that interferes in any way with the reproductive process.

ACGIH BIOLOGICAL EXPOSURE INDICES: Currently, there are no ACGIH Biological Exposure Indices (BEIs) determined Polybutenes.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY: Polybutenes have not been tested for mobility in soil. They are expected to be highly mobile in soil.

PERSISTEANCE AND BIODEGRADABILITY: No information is available on persistence or biodegradability of Polybutenes. It is expected that some biodegradation will occur to this product; however, no specific information is known.

BIO-ACCUMULATION POTENTIAL: No information is available on bio-accumulation potential of Polybutenes.

ECOTOXICITY: No information is available on aquatic or animal toxicity for Polybutenes. All release to terrestrial, atmospheric and aquatic environments should be avoided.

OTHER ADVERSE EFFECTS: Polybutenes do not have ozone depletion potential.

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

13. DISPOSAL CONSIDERATIONS

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

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

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

U.S. EPA WASTE NUMBER: Wastes of this product should be tested to see if they meet the criteria for waste characteristic ignitability (D001). Testing should be done, per EPA criteria to test wastes to make this determination.

EUROPEAN WASTE CODES: **7: Wastes From the MFSU of Fine Chemicals and Chemical Products Not Otherwise Specified 07 07 99:** wastes not otherwise specified

14. TRANSPORTATION INFORMATION

In drum quantities or less, or in non-heated bulk quantity, Polybutenes are not regulated for transport under any jurisdiction. In bulk quantities and if heated, Polybutenes are regulated as follows:

U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS: If heated, Polybutenes are classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

PROPER SHIPPING NAME:	Elevated temperature liquid, n.o.s. with a flash point at or above 100°C and below its flash point (polybutenes)
HAZARD CLASS NUMBER and DESCRIPTION:	9 (Miscellaneous Hazard)
UN IDENTIFICATION NUMBER:	UN 3257
PACKING GROUP:	III
DOT LABEL(S) REQUIRED:	9 (Miscellaneous Hazard)
EMERGENCY RESPONSE GUIDEBOOK NUMBER, 2004:	154

MARINE POLLUTANT: This material is not designated by the Department of Transportation to be a Marine Pollutant (49 CFR 172.101, Appendix B).

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: If heated, Polybutenes are classified as dangerous goods, per regulations of Transport Canada. If this product is heated during transport, the use of the above U.S. DOT information from the U.S. 49 CFR regulations is allowed for shipments that originate in the U.S. For shipments via ground vehicle or rail that originate in Canada, the following information is applicable.

PROPER SHIPPING NAME:	Elevated temperature liquid, n.o.s. with a flash point at or above 100°C and below its flash point (polybutenes)
HAZARD CLASS NUMBER and DESCRIPTION:	9 (Miscellaneous Hazard)
UN IDENTIFICATION NUMBER:	UN 3257
PACKING GROUP:	III
HAZARD LABEL(S) REQUIRED:	Class 9 (Miscellaneous Hazard)
SPECIAL PROVISIONS:	None
EXPLOSIVE LIMIT & LIMITED QUANTITY INDEX:	5
ERAP INDEX:	None
PASSENGER CARRYING SHIP INDEX:	None
PASSENGER CARRYING ROAD OR RAIL VEHICLE INDEX:	Forbidden

MARINE POLLUTANT: This material is not classified as a Marine Pollutant under Transport Canada regulations.

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): If heated, Polybutenes are classified as dangerous goods, per the International Air Transport Association. Heated product is forbidden to be shipped via aircraft.

14. TRANSPORTATION INFORMATION (Continued)

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): If heated, Polybutenes are classified as dangerous goods, under rules of the IMO.

PROPER SHIPPING NAME:	Elevated temperature liquid, n.o.s. with a flash point at or above 100°C and below its flash point (polybutenes)
HAZARD CLASS NUMBER AND DESCRIPTION:	9 (Miscellaneous Hazard)
UN IDENTIFICATION NUMBER:	UN 3257
PACKING GROUP:	III
LABEL(S) REQUIRED:	Class 9 (Miscellaneous Hazard)
SPECIAL PROVISIONS:	232
LIMITED QUANTITIES:	None
PACKING INSTRUCTIONS:	P099
EmS:	F-A, S-P
STOWAGE AND SEGREGATION:	Category A. If under deck, in a mechanically ventilated area.

MARINE POLLUTANT: No component of this product meets the criteria for marine pollutant.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): If heated, Polybutenes are classified as dangerous goods by the United Nations Economic Commission for Europe.

UN NO.:	3257
NAME and DESCRIPTON:	Elevated temperature liquid, n.o.s. with a flash point at or above 100°C and below its flash point (polybutenes)
CLASS:	9
CLASSIFICATION CODE:	M9
PACKING GROUP:	III
LABELS:	9
SPECIAL PROVISIONS:	274, 580, 643
LIMITED QUANTITIES:	LQ0
PACKING INSTRUCTIONS:	P099, IBC99
MIXED PACKING PROVISIONS:	T3
HAZARD IDENTIFICATION No.:	99

AUSTRALIAN FEDERAL OFFICE OF ROAD SAFETY CODE FOR THE TRANSPORTATION OF DANGEROUS GOODS BY ROAD OR RAIL: If heated, Polybutenes are classified as dangerous goods, per regulations of the Federal Office of Road Safety.

U.N. NUMBER:	3257
NAME OF SUBSTANCE:	Elevated temperature liquid, n.o.s. with a flash point at or above 100°C and below its flash point (polybutenes)
HAZARD CLASS:	9
PACKING GROUP:	III
HAZCHEM CODE:	2W
SPECIAL PROVISIONS:	SP232

PACKAGING CODE: 3.8.9

PROPERTIES AND OBSERVATIONS: When the goods are being transported in quantities exceeding package limits the Elevated Temperature Label shall be displayed as a subsidiary risk label on the E.I.P. Refer to Table 7.1

SINGAPORE STANDARD 286: PART A: If heated, Polybutenes have requirements and are classified as hazardous under the Specification for Caution Labeling for Hazardous Substances, Part 4: Marking of Packages, Containers and Vehicles, as follows.

U.N. NUMBER:	3257
NAME OF SUBSTANCE:	Elevated temperature liquid, n.o.s. with a flash point at or above 100°C and below its flash point (polybutenes)
HAZARD CLASS NUMBER AND DESCRIPTION:	9 (Miscellaneous Hazard)
PACKING GROUP:	III
HAZCHEM CODE:	2W
SPECIAL PROVISIONS:	None

15. REGULATORY INFORMATION

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

U.S. SARA REPORTING REQUIREMENTS: Polybutenes are NOT subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: Polybutenes are NOT subject to specific Threshold Planning Quantities requirements. 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. SARA HAZARD CATEGORIES (SECTION 311/312, 40 CFR 370-21): ACUTE: Yes; CHRONIC: No; FIRE: Yes; REACTIVE: No; SUDDEN RELEASE: No

U.S. CERCLA REPORTABLE QUANTITY (RQ): Polybutenes do not have a CERCLA RQ.

15. REGULATORY INFORMATION (Continued)

***ADDITIONAL U.S. REGULATIONS (continued)*:**

U.S. TSCA INVENTORY STATUS: Polybutenes are listed on the TSCA Inventory.

CLEAN WATER AND OIL POLLUTION ACTS: Not applicable.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Polybutenes are NOT listed on the California Proposition 65 lists.

ANSI LABELING (Z129.1): **WARNING!** COMBUSTIBLE LIQUID OR SOLID-CAN IGNITE IF EXPOSED TO FLAME OR HIGH TEMPERATURE. MAY CAUSE EYE AND RESPIRATORY TRACT IRRITATION. Keep away from heat, sparks, and flame. Avoid contact with oxidizers. Avoid breathing vapor or mists. Avoid contact with skin or clothing. Use only with adequate ventilation. Keep container tightly closed. Wash thoroughly after handling. Wear gloves and goggles. Use only with adequate ventilation. **FIRST-AID:** In case of contact, immediately flush skin or eyes for at least 15 minutes with large amounts of water. If inhaled, move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If ingested, do not induce vomiting. Get medical attention immediately. **IN CASE OF FIRE:** Use fog, foam, dry chemical or carbon dioxide. **IN CASE OF SPILL:** Absorb spill with inert material and place in suitable container. Do not allow contamination of waterways or soil. Refer to Material Safety Data Sheet for additional information on this product.

***ADDITIONAL CANADIAN REGULATIONS*:**

CANADIAN DSL/NDSL INVENTORY STATUS: Polybutenes are listed the DSL Inventory

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: Polybutenes are NOT on the CEPA Priority Substances Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: Not applicable for solid Polybutenes. For liquid Polybutenes, the following classification is applicable. **Class B3:** Combustible liquid

EUROPEAN UNION INFORMATION FOR PRODUCT:

EU LABELING AND CLASSIFICATION: An official classification has not been published under European Union Council Directive 67/548/EEC or subsequent Directives.

EU CLASSIFICATION: Not Applicable

EU RISK PHRASES: Not Applicable

EU SAFETY PHRASES: Not Applicable

EU HAZARD SYMBOLS: Not Applicable

***ADDITIONAL AUSTRALIAN REGULATIONS*:**

LABELING AND CLASSIFICATION: This product is NOT classified as Harmful as defined by Australian NOHSC: 1008 (2004).

CLASSIFICATION: Not Applicable

RISK PHRASES: Not Applicable

SAFETY PHRASES: Not Applicable

HAZARD SYMBOLS: Not Applicable

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: Polybutenes are listed on the AICS as given in the table at the end of this Section.

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

ADDITIONAL LABELING INFORMATION: For advice, contact a Poisons Information Centre (Phone eg Australia 131 126; New Zealand 03 4747 000) or a doctor (at once). If swallowed, do NOT induce vomiting.

***ADDITIONAL SINGAPORE REGULATIONS*:**

CODE OF PRACTICE ON POLLUTION CONTROL REQUIREMENTS: Polybutenes are NOT subject to the requirements under the Singapore Code of Practice on Pollution Control.

***INTERNATIONAL CHEMICAL INVENTORY SUMMARY*:** Polybutenes are found on the following National Chemical Inventories:

INVENTORY NAME					
COMPONENT NAME	CAS#	U.S. TSCA	AUSTRALIAN AICS	CANADIAN DSL/NDSL	EUROPEAN EINECS/ELINCS
Polybutenes	9003-29-6	Yes	No	DSL	NLP # 500-004-7

16. OTHER INFORMATION

Revision Date: October 2008

CHEMICAL SAFETY ASSOCIATES, Inc.
PO Box 3519, La Mesa, CA 19944-3519
(800) 441-3365 • (619) 670-0609

DEFINITIONS OF TERMS

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

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

EXPOSURE LIMITS IN AIR:

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

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

DFG MAK Pregnancy Risk Group Classification: Group A: A risk of damage to the developing embryo or fetus has been unequivocally demonstrated. Exposure of pregnant women can 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.

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_{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; slightly or mildly irritating. *Skin Irritation*: Slightly or mildly irritating. *Eye Irritation*: Slightly or mildly irritating. *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. *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_{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 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_{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 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_{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 require considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur, Including:

FLAMMABILITY HAZARD (continued):

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

PHYSICAL HAZARD:

0 (*Water Reactivity*: Materials that do not react with water. *Organic Peroxides*: Materials that are normally stable, even under fire conditions and will not react with water. *Explosives*: Substances that are Non-Explosive. Unstable *Compressed Gases*: No Rating. *Pyrophorics*: No Rating. *Oxidizers*: No "0" rating allowed. *Unstable Reactives*: Substances that will not polymerize, decompose, condense or self-react.); **1** (*Water Reactivity*: Materials that change or decompose upon exposure to moisture. *Organic Peroxides*: Materials that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. *Explosives*: Division 1.5 & 1.6 substances that are very insensitive explosives or that do not have a mass explosion hazard. *Compressed Gases*: Pressure below OSHA definition. *Pyrophorics*: No Rating. *Oxidizers*: Packaging Group III; Solids: any material that in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65%)/cellulose mixture and the criteria for Packing Group I and II are not met. *Unstable Reactives*: Substances that may decompose, condense or self-react, but only under conditions of high temperature and/or pressure and have little or no potential to cause significant heat generation or explosive hazard. Substances that readily undergo hazardous polymerization in the absence of inhibitors.); **2** (*Water Reactivity*: Materials that may react violently with water. *Organic Peroxides*: Materials that, in themselves, are normally unstable and will readily undergo violent chemical change, but will not detonate. These materials may also react violently with water. *Explosives*: Division 1.4 – Explosive substances where the explosive effect is largely confined to the package and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. *Compressed Gases*: Pressurized and meet OSHA definition but < 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics*: No Rating. *Oxidizers*: Packing Group II Solids: any material that, either in concentration tested, exhibits a mean burning time of less than or equal to the mean burning time of a 2:3 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise of a 1:1 aqueous sodium chlorate solution (40%)/cellulose mixture and the criteria for Packing Group I are not met. *Unstable Reactives*: Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure, but have a low potential for significant heat generation or explosion. Substances that readily form peroxides upon exposure to air or oxygen at room temperature); **3** (*Water Reactivity*: Materials that may form explosive reactions with water. *Organic Peroxides*: Materials that are capable of detonation or explosive reaction, but require a strong initiating source, or must be heated under confinement before initiation; or materials that react explosively with water. *Explosives*: Division 1.2 – Explosive substances that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but do not have a mass explosion hazard. *Compressed Gases*: Pressure ≥ 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics*: No Rating. *Oxidizers*: Packing Group I Solids: any material that, in either concentration tested, exhibits a mean burning time less than the mean burning time of a 3.:2 potassium bromate/cellulose mixture. *Oxidizers*: 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.).

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_{50} for acute inhalation toxicity is greater than 10,000 ppm. Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 200 mg/L.

DEFINITIONS OF TERMS (Continued)

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

HEALTH HAZARD (continued): **0 (continued):** Materials whose LD_{50} for acute dermal toxicity is greater than 2000 mg/kg. Materials whose LD_{50} 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_{50} for acute inhalation toxicity is greater than 5,000 ppm but less than or equal to 10,000 ppm. Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 10 mg/L but less than or equal to 200 mg/L. Materials whose LD_{50} for acute dermal toxicity is greater than 1000 mg/kg but less than or equal to 2000 mg/kg. Materials whose LD_{50} 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_{50} for acute inhalation toxicity is greater than 3,000 ppm but less than or equal to 5,000 ppm. Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 2 mg/L but less than or equal to 10 mg/L. Materials whose LD_{50} for acute dermal toxicity is greater than 200 mg/kg but less than or equal to 1000 mg/kg. Materials whose LD_{50} 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_{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. 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_{50} for acute inhalation toxicity is greater than 1,000 ppm but less than or equal to 3,000 ppm. Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 0.5 mg/L but less than or equal to 2 mg/L. Materials whose LD_{50} for acute dermal toxicity is greater than 40 mg/kg but less than or equal to 200 mg/kg. Materials whose LD_{50} 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_{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. 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_{50} for acute inhalation toxicity less than or equal to 1,000 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. 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 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 according 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 up flash point of the solvent. Most ordinary combustible materials. **2** Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air: Liquids having a flash point at or above 37.8°C (100°F) and below 93.4°C (200°F) (i.e. Class II and Class IIIA liquids.) Solid materials in the form of powders or coarse dusts of representative diameter between 420 microns (40 mesh) and 2 mm (10 mesh) that burn rapidly but that generally do not form explosive mixtures in air. Solid materials in fibrous or shredded form that burn rapidly and create flash fire hazards, such as cotton, sisal and hemp. Solids and semisolids that readily give off flammable vapors. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. **3** Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions: Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 37.8°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (73°F) and below 37.8°C (100°F) (i.e. Class IB and IC liquids). Materials that, on account of their physical form or environmental conditions, can form explosive mixtures with air and are readily dispersed in air. Flammable or combustible dusts with a representative diameter less than 420 microns (40 mesh). Materials that burn with extreme rapidity, usually by reason of self-contained oxygen (e.g. dry nitrocellulose and many organic peroxides). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

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

INSTABILITY HAZARD: **0** Materials that in themselves are normally stable, even under fire conditions: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) below 0.01 W/mL. Materials that do not exhibit an exotherm at temperatures less than or equal to 500°C (932°F) when tested by differential scanning calorimetry. **1** Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 0.01 W/mL and below 10 W/mL. **2** Materials that readily undergo violent chemical change at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 10 W/mL and below 100W/mL. **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 **N**ational **F**ire **P**rotection **A**ssociation (**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_{50}** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC_{50}** - 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^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. 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.

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_m** = median threshold limit; Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

U.S. and CANADA:

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

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.