

SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS 2015 GHS, European Union CLP EC 1272/2008 & the 8th ATP 2016/918, and the Global Harmonization Standard

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY UNDERTAKING

PRODUCT IDENTIFIER

<u>TRADE NAME (AS LABELED):</u>	190 PROOF ETHANOL
<u>OTHER MEANS OF IDENTIFICATION/SYNONYMS:</u>	Ethyl Alcohol Solution
<u>CHEMICAL NAME/CLASS:</u>	Primary Alkyl Alcohol
<u>RELEVANT USES of the PRODUCT:</u>	Gasoline Manufacture
<u>USES ADVISED AGAINST:</u>	Other than Relevant Use

NOTE: ALL United States Occupational Safety and Health Administration (OSHA) Standard, 29 CFR Parts 1910, 1915, 1917, 1918 and 1926, and the U.S. OSHA Instruction CPL 02-02-079, July 9, 2015, U.S. State equivalent Standards, Canadian WHMIS 2015 GHS, and European Union CLP EC 1272/2008 & the 8th ATP 2016/918 required information is included in appropriate sections based on the UN Global Harmonization Standard format.

2. HAZARD IDENTIFICATION

GLOBAL HARMONIZATION LABELING AND CLASSIFICATION: Classified in accordance with U.S. OSHA Hazard Communication Standard and the Canadian WHMIS 2015 GHS.

Classification: Flammable Liquid Cat. 2, Eye Irritation Cat. 2A, Acute Oral Toxicity Cat. 5, Aspiration Toxicity Cat. 2

Signal Word: Danger

Hazard Statement Codes: Highly flammable liquid and vapor. Causes serious eye irritation. May be harmful if swallowed. May be harmful if swallowed and enters airways

Precautionary Statement Codes: Keep away from heat/sparks/open flames/hot surfaces. — No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection. IF SWALLOWED: Immediately call a POISON CENTER or doctor. Do NOT induce vomiting. Specific treatment (remove from exposure and treat symptoms). Refer to other portions of precautionary text on this label, SDS or other product information sheets, as appropriate. Store locked up. Dispose of contents/containers in accordance with all local, regional, national and international regulations.

Hazard Symbol/Pictogram: GHS02, GHS07, GHS08



GLOBAL HARMONIZATION LABELING AND CLASSIFICATION UNDER EUROPEAN CLP: Classified under European CLP Regulation (EC) 1272/2008.

Classification: Flammable Liquid Cat. 2, Eye Irritation Cat. 2A, Acute Oral Toxicity Cat. 5, Aspiration Toxicity Cat. 2

Signal Word: Danger

Hazard Statement Codes: H225: Highly flammable liquid and vapour. H319: Causes serious eye irritation. H303: May be harmful if swallowed. H305: May be harmful if swallowed and enters airways.

Precautionary Statement Codes: P210: Keep away from heat/sparks/open flames/hot surfaces. — No smoking. P240: Ground/bond container and receiving equipment. P241: Use explosion-proof electrical/ventilating/lighting/equipment. P242: Use only non-sparking tools. P243: Take precautionary measures against static discharge. P264: Wash thoroughly after handling. P270: Do not eat, drink or smoke when using this product. P271: Use only outdoors or in a well-ventilated area. P280: Wear protective gloves/protective clothing/eye protection/face protection. P301 + P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor. P331: Do NOT induce vomiting. P321: Specific treatment (remove from exposure and treat symptoms). Refer to other portions of precautionary text on this label, SDS or other product information sheets, as appropriate. P405: Store locked up. P501: Dispose of contents/containers in accordance with all local, regional, national and international regulations.

Hazard Symbol/Pictogram: GHS02, GHS07, GHS08



See Section 16 for full classification information.

2. HAZARD IDENTIFICATION (Continued)

EMERGENCY OVERVIEW: Product Description: This product is a clear, colorless, highly flammable liquid. **Health Hazards:** Ingestion may cause adverse central nervous system depression effects. Ingestion may lead to aspiration into the lungs and cause potentially fatal chemical pulmonary edema. Inhalation of very high concentration of fumes or vapors may cause irritation of the respiratory system and adverse central nervous system effects. Eye contact may cause moderate to severe irritation. Prolonged skin contact may cause irritation or dermatitis. Ethanol can cause harm to the fetus when consumed as alcohol, but this hazard is unlikely to occur with industrial exposure. This hazard is from ingestion of alcohol during pregnancy. **Flammability Hazards:** This product is flammable and will ignite if heated to its flash point (see Section 5, Fire-Fighting Measures) or if exposed to direct flame. Vapors can travel long-distances and flash back to an ignition source. May form explosive mixtures in air that can easily ignite. If involved in a fire, this product will ignite to produce toxic gases (e.g. carbon oxides). **Reactivity Hazards:** This product is not normally reactive. **Environmental Hazards:** Release of this product to the environment may cause harm to aquatic and terrestrial organisms. **Emergency Response Procedures:** Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding.

3. COMPOSITION and INFORMATION ON INGREDIENTS

Ingredients:	CAS #	European EINECS #	WT %	LABEL ELEMENTS GHS under U.S. OSHA, Canadian WHMIS 2015 GHS & EU CLP (1272/2008)
Ethanol	64-17-5	200-578-6	80.0-94.99%	PUBLISHED and SELF-CLASSIFICATION GHS & EU 1272/2008: Classification: Flammable Liquid Cat. 2, Eye Irritation Cat. 2A, Acute Oral Toxicity Cat. 5, Aspiration Hazard Cat. 1 Hazard Statement Codes: H225, H319, H303, H304
Water	7732-18-5	231-791-2	Balance	EU 67/548: Classification: Not Applicable GHS & EU 1272/2008: Classification:

See Section 16 for full text of all Classification

4. FIRST-AID MEASURES

PROTECTION OF FIRST AID RESPONDERS: Rescuers should be taken for medical attention if necessary. See Sections 6 (Accidental Release Measures) and 8 (Exposure Controls-Personal Protection).

DESCRIPTION OF FIRST AID MEASURES: Victims of chemical exposure must be taken for medical attention. Remove or cover gross contamination to avoid exposure to rescuers. Take a copy of label and MSDS to physician or health professional with the contaminated individual.

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Skin Exposure: If skin contact causes adverse effect, wash with soap and water. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek immediate medical attention if any adverse effect continues after flushing.

Eye Exposure: If aerosols from this product enter the eyes, open victim's eyes while under gentle running water. Quickly and gently blot or brush product off the face. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 20 minutes, while holding the eyelid(s) open. If a contact lens is present, DO NOT delay irrigation or attempt to remove the lens until flushing is done. If necessary, continue flushing during transport to emergency care facility. Seek medical attention if adverse effect continues after flushing.

Inhalation: If aerosols of this product are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if any adverse effect occurs after removal for fresh air.

Ingestion: If large quantity of 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 drink 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: Preexisting skin, eye, and respiratory system conditions or disorders involving the Target Organs (see Section 11, Toxicological Information) may be aggravated by exposure to this material.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT IF NEEDED: Treat symptoms and eliminate exposure. If necessary, administer liver function tests, and eye and vision exams. The following treatment is suggested for various alcohols:

- Gastric lavage with 3–5% sodium bicarbonate, unless more than 2 hours have elapsed since ingestion occurred. Do not use apomorphine. Syrup of ipecac may be a safe way to empty stomach, if given promptly after ingestion.
- Oxygen and artificial respiration as needed for hypoventilation.
- Treat for circular collapse, dehydration and acidosis by intravenous infusions of isotonic sodium chloride or sodium bicarbonate.
- Intravenous glucose can be administered if hypoglycemia occurs.
- Hemodialysis can be done in severe cases in which the alkali treatment may be delayed or is incomplete.
- Keep patient warm. Avoid aspiration of vomitus.

5. FIRE-FIGHTING MEASURES

FLASH POINT (TAG closed cup): 13.8°C (57°F)

AUTOIGNITION TEMPERATURE: For Ethanol: 363-425°C (685-797°F)

DECOMPOSITION TEMPERATURE: Not established.

ELECTRICAL CONDUCTIVITY @ 25°C: For Ethanol: 1.35 pS/m x 10

FLAMMABLE LIMITS (in air by volume, %): For Ethanol: UEL: 3.3%; LEL: 19.0%

FIRE EXTINGUISHING MEDIA: Fire extinguishing materials that can be used against fires of this product include carbon dioxide, dry chemical powder, halon, 'ABC' Class, or appropriate foam. Water should be used in flooding quantities. Consideration for surrounding materials must be taken into account.

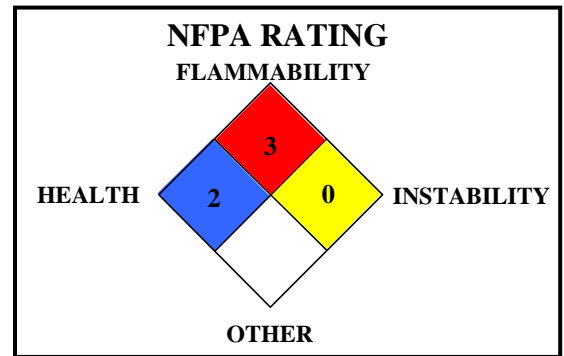
UNSUITABLE FIRE EXTINGUISHING MEDIA: None known.

SPECIFIC HAZARDS ARISING FROM PRODUCT: This product is flammable and may ignite if exposed to high temperature or direct flame. Vapors are slightly heavier than air can travel long distances to a source of ignition and ignite. Vapors can accumulate in low-lying areas. Liquid may accumulate static charge by flow or agitation and ignite. Liquid may float on water and may spread to distant locations and/or spread fire. Vapors can form explosive mixtures in air. If involved in a fire, products of thermal decomposition may include oxides of carbon.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Vapors and liquid from this product may be ignited by static discharge.

SPECIAL PROTECTIVE ACTIONS FOR FIRE-FIGHTERS: Move small containers (55 gallon and smaller) from fire area if it can be done without risk to personnel. Do not enter without wearing specialized protective equipment suitable for the situation. Firefighter's normal protective clothing (Bunker Gear) may not provide adequate protection. Chemical resistant clothing (e.g. chemical splash suit) and positive pressure self-contained breathing apparatus (NIOSH approved or equivalent) may be necessary. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.



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

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES: In the event of a spill, clear the area and protect people. Trained personnel using pre-planned procedures should respond to uncontrolled releases. Eliminate all sources of ignition before cleanup begins. Use non-sparking tools. The level of vapors must be 10% below of the LEL of ethanol (LEL = 3.3 %), before personnel are allowed into the spill area. Remove all combustible materials from spill area. 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). Monitor area and confirm levels are below exposure limits given in Section 8 (Exposure Controls-Personal Protection), if applicable, before non-response personnel are allowed into the spill area).

PROTECTIVE EQUIPMENT:

Small Spills/Spills in Hoods: Personnel wearing gowns, double surgical latex gloves and eye protection should immediately clean spills of less than 5 mL outside a hood.

Large Spills: For large spills (e.g., 1 liter or more), protective apparel should be used with a respirator when there is any danger of airborne mists or sprays being generated. Minimum Personal Protective Equipment should be rubber gloves, rubber boots, face shield, and Tyvek suit. Minimum level of personal protective equipment for releases in which the level of oxygen is less than 19.5% or is unknown must 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.**

METHODS FOR CLEAN-UP AND CONTAINMENT:

Cleanup of Small Spills: Liquids should be wiped with absorbent gauze pads. Clean the spill area (three times) using a bleach solution and detergent solution and then rinse with clean water.

Spills in Hoods: Decontamination of all interior hood surfaces may be required after the above procedures have been followed. If the HEPA filter of a hood is contaminated, label the unit "Do not use-contaminated" and have trained personnel wearing appropriate protective equipment change and dispose of the filter properly as soon as possible.

Large Spills: Review Sections 3, 8, & 12 before proceeding with cleanup. Restrict access to the spill area. For spills of amounts larger than 1 L limit spread by gently covering with absorbent sheets, spill-control pads or pillows or other appropriate, non-reactive absorbent. Decontaminate the area thoroughly. Monitor area and confirm levels are below exposure limits given in Section 8 (Exposure Controls-Personal Protection), if applicable, before non-response personnel are allowed into the spill area. Place all spill residue in a double plastic bag or other containment and seal. Do not mix with wastes from other materials.

ENVIRONMENTAL PRECAUTIONS: Prevent product from entering sewer or confined spaces, waterways, soil or public waters. Do not flush to sewer.

REFERENCE TO OTHER SECTIONS: Review Sections 2, 8, 12 before proceeding with cleanup. See Section 13, Disposal Considerations for more information.

7. HANDLING and STORAGE

PRECAUTIONS FOR SAFE HANDLING: All employees who handle this material should be trained to handle it safely. Use in a well-ventilated location. As with all chemicals, avoid getting this product ON YOU or IN YOU. Do not eat or drink while handling this material. Wash thoroughly after handling this product. Avoid generating aerosols of this material. Avoid breathing mists or sprays generated by this material. Keep away from heat, sparks, and other sources of ignition. Clean work areas routinely to prevent accumulation of residual product. Clean up spills promptly. Remove contaminated clothing as soon as practicable. Ensure this product is used with adequate ventilation (refer to Section 8, Exposure Controls-Personal Protection). Open containers slowly on a stable surface in areas that have been designated for use of this product. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Use non-sparking tools. Bond and ground containers during transfers of material. If this product is transferred into another container, use only portable containers and dispensing equipment (faucet, pump, drip can) approved for flammable liquids. Empty containers may contain residual product; therefore, empty containers should be handled with care.

CONDITIONS FOR SAFE STORAGE: Store in tightly sealed containers to avoid moisture contamination. Keep containers tightly closed when not in use. Store containers in a cool, dry location, away from direct sunlight and sources of intense heat. Store away from incompatible materials. 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 (e.g., sprinkler system, portable fire extinguishers). Refer to NFPA 30, *Flammable and Combustible Liquids Code* for additional information on storage. Store away from incompatible materials (see Section 10, Stability and Reactivity). Material should be stored in secondary containers. Have appropriate extinguishing equipment in the storage area (e.g., sprinkler system, portable fire extinguishers).

SPECIFIC END USE(S): This product is used in gasoline manufacture. 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.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/CONTROL PARAMETERS:

Occupational/Workplace Exposure Limits/Guidelines:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELS		NIOSH	OTHER
		TWA ppm	STEL ppm	TWA ppm	STEL ppm	TWA ppm	STEL ppm	IDLH ppm	ppm
Ethanol	64-17-5	NE	1000	1000	NE	1000	NE	3300 (based on 10% of LEL)	DFG MAKs: TWA = 500 PEAK = 2*MAK 15 min, average value, 1-hr interval, 4 per shift DFG Pregnancy Risk Group C DFG Germ Cell Mutagen Category 5 Carcinogen: MAK-5, TLV-A3
Water	7732-18-5	NE	NE	NE	NE	NE	NE	NE	NE

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

Other International Exposure Limits: Currently, there are no international exposure limits in place for this material. Exposure limits can change and should be checked for currency.

Ethanol

	<u>Limit Value - Eight Hours</u>	<u>Limit Value - Short Term</u>
Australia	1000 ppm, 1880 mg/m ³	
Austria	1000 ppm, 1900 mg/m ³	2000 ppm, 3800 mg/m ³
Belgium	1000 ppm, 1907 mg/m ³	
Canada (Ontario)		1000 ppm
Canada (Québec)	1000 ppm, 1880 mg/m ³	
Denmark	1000 ppm, 1900 mg/m ³	2000 ppm, 3800 mg/m ³
Finland	1000 ppm, 1900 mg/m ³	1300 ppm (1), 2500 mg/m ³ (1)
France	1000 ppm, 1900 mg/m ³	5000 ppm, 9500 mg/m ³
Germany (AGS)	500 ppm, 960 mg/m ³	1000 ppm (1), 1920 mg/m ³ (1)
Germany (DFG)	200 ppm, 380 mg/m ³	800 ppm (1), 1520 mg/m ³ (1)
Hungary	1900 mg/m ³	7600 mg/m ³
Ireland		1000 ppm (1)
Latvia		
New Zealand	1000 ppm, 1880 mg/m ³	
Poland	1900 mg/m ³	
Romania	1000 ppm, 1900 mg/m ³	5000 ppm (1), 9500 mg/m ³ (1)
Singapore	1000 ppm, 1880 mg/m ³	
South Korea	1000 ppm, 1900 mg/m ³	
Spain		1000 ppm, 1910 mg/m ³
Sweden	500 ppm; 1000 mg/m ³	1000 ppm (1); 1900 mg/m ³ (1)
Switzerland	500 ppm; 960 mg/m ³	1000 ppm; 1920 mg/m ³
The Netherlands	260 mg/m ³	1900 mg/m ³
	<u>Remarks</u>	
Finland	(1) 15 minutes average value.	
Germany (ACS)	(1) 15 minutes average value.	
Germany (DFG)	(1) 15 minutes average value.	
Ireland	(1) 15 minutes reference period.	
Romania	(1) 15 minutes average value.	
Sweden	(1) 15 minutes average value.	

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

EXPOSURE LIMITS/CONTROL PARAMETERS (continued):

UK Minimum Exposure Limits (MELs):

CHEMICAL NAME	CAS #	WORKPLACE EXPOSURE LIMIT				Comments
		Long-Term Exposure Limit (8-Hrs TWA Reference Period)		Short-Term Exposure Limit (15-minute Reference Period)		
		ppm	mg.m ⁻³	ppm	mg.m ⁻³	
Ethanol	64-17-5	1000	1920	--	--	The Carcin, Sen and Skin notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives

NE = Not Established.

ACGIH Biological Exposure Indices (BEIs): No Biological Exposure Indices (BEIs) have been established for components of this product.

UK Biological Monitoring Guidance Values (BMGVs): Currently, no BMGVs have been established for the components of this product.

PROTECTIVE EQUIPMENT: 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, including U.S. Federal OSHA Respiratory Protection (29 CFR 1910.134), OSHA Eye Protection 29 CFR 1910.133, OSHA Hand Protection 29 CFR 1910.138, OSHA Foot Protection 29 CFR 1910.136 and OSHA Body Protection 29 CFR 1910.132), equivalent standards of Canada (including CSA Respiratory Standard Z94.4-02, Z94.3-M1982, Industrial Eye and Face Protectors and CSA Standard Z195-02, Protective Footwear), or 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). Please reference applicable regulations and standards for relevant details.

Respiratory Protection: A respirator is not required for routine conditions of use with adequate engineering controls. A full-face Air-Purifying Respirator with high-efficiency particulate filter or a Supplied-Air Respirator must be worn during operations where engineering controls are not sufficient, large spill cleanup, or when processing generates airborne aerosols. If respiratory protection is needed, use only respiratory protection authorized under appropriate regional regulations. For additional information, the following NIOSH recommendations for respiratory protection are provided for Ethanol, as follows:

ETHANOL

CONCENTRATION RESPIRATORY PROTECTION

Up to 3300 ppm: Any Supplied-Air Respirator (SAR), or any Self-Contained Breathing Apparatus (SCBA) with a full facepiece.

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

Escape: Any appropriate escape-type, SCBA.

Eye Protection: For situations in which excessive aerosols of this product may be generated, wear safety glasses with side shields, chemical splash goggles, or regular splash goggles. If necessary, refer to appropriate regulations and standards.

Hand Protection: Wear gloves appropriate for the task. Check gloves for leaks. Wash hands before putting on gloves and after removing gloves. If necessary, refer to appropriate regulations and standards.

Body Protection: Use body protection appropriate for task (e.g., Tyvek suit, rubber apron). If necessary, refer to the *OSHA Technical Manual* (Section VII: Personal Protective Equipment) or appropriate Standards of Canada.

If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in appropriate regulations and standards.

9. PHYSICAL and CHEMICAL PROPERTIES

FORM: Liquid.

MOLECULAR WEIGHT: For Ethanol: 46.07

ODOR: Sweet, ethereal, like wine or whiskey.

ODOR THRESHOLD: For Ethanol: 49-716 ppm. Geometric mean: 180 ppm (detection); 100 ppm (recognition)

SPECIFIC GRAVITY @ 20°C: 0.793

FREEZING POINT: Not available.

VAPOR PRESSURE @ 20°C: 43 mmHg

SOLUBILITY IN WATER @ 20°C: Soluble in all proportions.

OTHER SOLUBILITIES: Soluble in all proportions with diethyl ether, acetone, benzene, chloroform, methanol and some other organic solvents.

FLASH POINT (closed cup): 13.875°C (57°F)

AUTOIGNITION TEMPERATURE: For Ethanol: 363-425°C (685-797°F)

FLAMMABLE LIMITS IN AIR: For Ethanol: UEL: 3.3%; LEL: 19.0%

SATURATION VAPOUR CONCENTRATION @ 20°C: For Ethanol: 58,200 ppm (5.82%)

COEFFICIENT WATER/OIL DISTRIBUTION: For Ethanol: Log P(oct.): -0.31

HOW TO DETECT THIS SUBSTANCE (identification/warning properties): The odor may be a distinctive property as the TLV of Ethanol is 5 to 10 times the odor threshold.

COLOR: Clear, colorless.

MOLECULAR FORMULA: For Ethanol: C₂H₆O

EVAPORATION RATE (n-BuAc = 1): 2.4

pH: Very weak acid and very weak base.

BOILING POINT: 78°C (172.4°F)

VAPOR DENSITY (air = 1): 1.6

PERCENT VOLATILE: 80-95%

10. STABILITY and REACTIVITY

CHEMICAL STABILITY: Stable under normal conditions of handling and use.

DECOMPOSITION PRODUCTS: **Combustion:** Carbon oxides. **Hydrolysis:** None known.

10. STABILITY and REACTIVITY (Continued)

WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong oxidizers, hydrogen peroxide, perchloric acid, metal perchlorates (e.g. silver perchlorate or magnesium perchlorate), mercuric nitrate, silver nitrate, silver and nitric acid, or silver oxide and aqueous ammonia, alkali metals (e.g. sodium or potassium), bromine pentafluoride or bromides, sodium hydrazide, zirconium tetrachloride, phosphorus (III) oxide, potassium tert-butoxide, acids, acid anhydrides, or acid chlorides (e.g. acetyl chloride), calcium oxide or cesium oxide, platinum black catalyst, bromine and phosphorus or iodine and phosphorus. Pure Ethanol can attack plastics, such as acrylics, styrene-acrylonitrile (SAN), polyurethane (rigid), polystyrene and polymethacrylate acrylic, and elastomers, such as polyacrylate, polyurethane, nylon 11, nylon 12, flexible polyvinyl chloride (PVC) and low-density polyethylene (LDPE) at room temperature. 90% Ethanol attacks nylon 12 plastic. Ethanol may corrode aluminum and aluminum alloys.

POSSIBILITY OF HAZARDOUS POLYMERIZATION/REACTIONS: Will not occur.

CONDITIONS TO AVOID: Exposure to sources of ignition, high heat and incompatible chemicals.

11. TOXICOLOGICAL INFORMATION

SYMPTOMS OF EXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of industrial exposure to this product are by eye contact and inhalation.

Inhalation: Inhalation of mists or sprays of this material can irritate mucous membranes and the upper respiratory tract. Symptoms may include coughing, sneezing, dry throat, and temporary bronchial constriction. Inhalation can cause depression of the central nervous system and adverse neurological effects. Symptoms can include headache, nausea, dizziness, drowsiness, incoordination and confusion. Inhalation exposure to 10,000 ppm or above may be fatal. In addition, information on symptoms of exposure to Ethanol by concentration is provided as follows:

ETHANOL

CONCENTRATION

1800–2000 ppm (30 min)

5300–10,600 ppm (cited as 10-20 mg/L)

16,000 ppm (cited as 30 mg/L)

21,300 ppm (cited as 40 mg/L)

SYMPTOMS

Coughing, dry throat, temporary bronchial constriction.

Temporary nose irritation, coughing.

Continuous irritation of nose, coughing.

Intolerable for even a short period of time.

Contact with Skin or Eyes: Skin contact may cause irritation, especially if product is trapped under clothing and in contact with the skin. Prolonged skin contact can cause dermatitis and defatting of the skin. Eye contact will cause moderate to severe irritation; no eye damage has been seen. Vapors can also be irritating.

Skin Absorption: Ethanol can be minimally absorbed through the skin. Harmful effects would not be expected.

Ingestion: Ingestion is not anticipated to be a significant route of exposure for the product. Ingestion of this product may cause irritation to throat, esophagus and digestive system. Ingestion that results in vomiting and aspiration into the lungs can be life-threatening by causing chemical pulmonary edema. In addition, evidence from animal studies and human consumption of alcoholic beverages demonstrates that ingestion of large amounts of Ethanol depresses the central nervous system (CNS) with symptoms such as lack of coordination, impaired vision, reduced reaction time, slurred speech, impaired judgment, nausea and vomiting, and unconsciousness progressing to death from respiratory or circulatory failure. For an average adult, the fatal ingested dose is approximately 1 L (approximately 2 pints) of 40-55% Ethanol consumed within a few minutes. Long-term ingestion of alcoholic beverages has been clearly associated with significant health problems, including cirrhosis of the liver and diseases of the gastrointestinal, cardiovascular, respiratory, and nervous systems.

Injection: Accidental injection of this material, via laceration or puncture by a contaminated object, may cause local redness, tissue swelling, and discomfort in addition to the wound.

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

Acute: This product may cause irritation by all routes of exposure. Eye irritation can be more pronounced, but should not cause damage. Ingestion and inhalation exposure may cause adverse effects on the central nervous system.

Chronic: Chronic skin exposure may cause dermatitis and defatting of skin. Chronic exposure may have adverse liver effect.

TARGET ORGANS: **Acute:** Skin, respiratory system, eyes, central nervous system. **Chronic:** Skin, respiratory system, liver.

TOXICITY DATA: The following toxicological data are available for Ethanol. Due to the large amount of data available, only available human data, corrosivity data, LD50 (Oral-Rat or Mouse), LD50 (Skin-Rabbit or Rat), LC50 (Inhalation-Rat or Mouse) and mutagenic data are presented in this SDS.

ETHANOL:

Open Irritation Test (Skin-Rabbit) 400 mg: Mild

Standard Draize Test (Skin-Rabbit) 20 mg/24 hours: Moderate

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

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

Rinsed with Water (Eye-Rabbit) 100 mg/ seconds: Moderate

TDLo (Oral-Human) 22,500 mg/kg/4 weeks-intermittent: Endocrine: other changes; Blood: other changes

ETHANOL (continued):

TDLo (Oral-Human) 0.5 mg/kg: Behavioral: changes in psychophysiological tests

TDLo (Oral-Human) 400 mg/kg: Behavioral: alteration of operant conditioning

TDLo (Oral-Human) 0.7 gm/kg/10 minutes: Behavioral: changes in psychophysiological tests

TDLo (Oral-Human) 0.5 gm/kg: Behavioral: somnolence (general depressed activity), changes in psychophysiological tests

TDLo (Oral-Human) 1.4 gm/kg: Behavioral: euphoria, changes in psychophysiological tests; Gastrointestinal: nausea or vomiting



HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD	(BLUE)	2
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FLAMMABILITY HAZARD	(RED)	3
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PHYSICAL HAZARD	(YELLOW)	0
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PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8

For Routine Industrial Use and Handling Applications

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

11. TOXICOLOGICAL INFORMATION (Continued)

TOXICITY DATA (continued):

ETHANOL (continued):

(Oral-Infant) 11,712 µL/kg: Behavioral: general anesthetic; Cardiac: arrhythmias (including changes in conduction); Lungs, Thorax, or Respiration: dyspnea
TDLo (Oral-Child) 14400 mg/kg/30 minutes (intermittent): Behavioral: coma; Lungs, Thorax, or Respiration: dyspnea; Gastrointestinal: nausea or vomiting
TDLo (Oral-Woman) 1200 mg/kg/3 hours: Endocrine: changes in gonadotropins; Endocrine: other changes; Blood: other changes
TDLo (Oral-Woman) 256 gm/kg/12 weeks: Behavioral: hallucinations, distorted perceptions; Endocrine: effect on menstrual cycle
TDLo (Oral-Woman) 0.7 gm/kg: Behavioral: changes in psychophysiological tests
TDLo (Oral-Woman) 41 gm/kg: female 41 week(s) after conception: Reproductive: Effects on Newborn: Apgar score (human only), other neonatal measures or effects, drug dependence
TDLo (Oral-Woman) 250 mg/kg: female 37 week(s) after conception: Reproductive: Effects on Embryo or Fetus: other effects to embryo
TDLo (Oral-Woman) 5860 mL/kg: female 3 year(s) pre-mating: 100 day(s) post-birth: Reproductive: Specific Developmental Abnormalities: craniofacial (including nose and tongue); Effects on Newborn: behavioral, delayed effects
TDLo (Oral-Man) 3371 µL/kg: Behavioral: altered sleep time (including change in righting reflex), excitement, coma
TDLo (Oral-Man) 700 mg/kg: Behavioral: changes in psychophysiological tests
TDLo (Oral-Man) 50 mg/kg: Gastrointestinal: alteration in gastric secretion, other changes
TDLo (Oral-Man) 1430 µg/kg: Behavioral: changes in motor activity (specific assay), ataxia, antipsychotic
TDLo (Intravenous-Human) 1.6 gm/kg/6 hours: Biochemical: Metabolism (Intermediary): other

ETHANOL (continued):

TDLo (Intravenous-Human) 0.89 mL/kg: Vascular: regional or general arteriolar constriction, measurement of regional blood flow
TDLo (Intravenous-Man) 0.57 gm/kg: Behavioral: changes in psychophysiological tests
TDLo (Intravenous-Woman) 8 gm/kg: female 32 week(s) after conception: Reproductive: Effects on Newborn: Apgar score (human only), other neonatal measures or effects
TDLo (Intraarterial-Man) 0.071 mL/kg: Vascular: acute arterial occlusion
TDLo (Intrauterine-Woman) 200 mg/kg: female 5 day(s) pre-mating: Reproductive: Fertility: female fertility index (e.g. # females pregnant per # sperm positive females; # females pregnant per # females mated)
TDLo (Multiple Routes-Man) 3660 mg/kg: Endocrine: evidence of thyroid hypofunction
TCLo (Inhalation-Human) 2500 mg/m³/20 minutes: Peripheral Nerve and Sensation: recording from afferent nerve
LDLo (Oral-Child) 2 gm/kg: Lungs, Thorax, or Respiration: other changes; Liver: fatty liver degeneration; Blood: other changes
LDLo (Oral-Human) 1400 mg/kg: Behavioral: sleep, headache; Gastrointestinal: nausea or vomiting
LDLo (Subcutaneous-Infant) 19,440 mg/kg: Behavioral: convulsions or effect on seizure threshold, coma; Nutritional and Gross Metabolic: body temperature decrease
LC₅₀ (Inhalation-Rat) 20,000 ppm/10 hours
LC₅₀ (Inhalation-Mouse) 39 gm/m³/4 hours
LD₅₀ (Oral-Rat) 7060 mg/kg: Lungs, Thorax, or Respiration: other changes
LD₅₀ (Oral-Rat) 7 gm/kg
LD₅₀ (Oral-Mouse) 3450 mg/kg

CARCINOGENIC POTENTIAL OF COMPONENTS: Ethanol is listed by agencies tracking the carcinogenic potential of chemical compounds, as follows:

ETHANOL: ACGIH TLV-A3 (Confirmed Animal Carcinogen); MAK-5 (Substances with Carcinogenic and Genotoxic Effects, the Potency of Which is Considered to Be So Low that, Provided the MAK and BAT Values are Observed, No Significant Contribution to Human Cancer Risk is to Be Expected)

IRRITANCY OF PRODUCT: This product may cause moderate to severe irritation to the eyes. Prolonged skin exposure may cause dermatitis.

SENSITIZATION TO THE PRODUCT: No component of this product is known to cause human skin or respiratory sensitization.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product on the human reproductive system and information from animal test data.

Mutagenicity: Ethanol is considered a very toxic mutagen, because it has caused mutations in both the germ cells and somatic cells of live animals. These effects were observed following exposure of the animals to very high, oral doses of Ethanol. The following are mutagenic data from testing of the Ethanol component on specific human tissues:

ETHANOL:

DNA Inhibition (Human-Lymphocyte) 220 mmol/L
Micronucleus Test (Oral-Human) 817.6 g/kg/6 years-intermittent
Cytogenetic Analysis (Human-Lymphocyte) 2.5 pph/24 hours
Cytogenetic Analysis (Human-Lymphocyte) 1160 g/L

ETHANOL (continued):

Cytogenetic Analysis (Human-Fibroblast) 12,000 ppm
Cytogenetic Analysis (Human-Leukocyte) 1 pph/72 hours-continuous
Cytogenetic Analysis (Oral-Human) 49,014 g/kg/25 years
Sister Chromatid Exchange (Human-Lymphocyte) 500 ppm/72 hours-continuous

Embryotoxicity: There are no reports of adverse effects on pregnancy following occupational exposure to Ethanol. It is well documented that exposure to Ethanol through the ingestion of alcoholic beverages during pregnancy can cause significant harmful effects in unborn children. The harmful effects of Ethanol administration to pregnant animals are well documented. The minimum dose required to produce embryotoxicity varies and determination of this dose is complicated by factors such as the duration and route of exposure and the stage of pregnancy during which the Ethanol is administered. For example, long-term exposure during pregnancy produces effects at lower doses than short-term exposure. Most studies involving oral exposure to Ethanol have involved very large doses, which have also produced significant maternal toxicity.

Teratogenicity: Ethanol has shown significant teratogenic effects in animal tests (e.g., malformations of the central nervous system, facial structures, heart, limbs and urogenital system). The lowest reported dose that caused teratogenicity in rats is approximately 316 mg/kg (cited as 0.4 mL/kg). No firm conclusions can be drawn from this study since the authors did not conduct a full evaluation of maternal toxicity. Inhalation exposure to levels as high as 20,000 ppm have not produced any statistically significant teratogenic effects despite severe maternal toxicity (unconsciousness). In a related study, male and female rats were exposed to 16,000 or 10,000 ppm for 6 weeks before mating with untreated rats. Pregnant rats were exposed throughout pregnancy. Despite the presence of measurable neuro-chemical effects, there were no behavioral effects observed in the offspring of exposed male or female rats.

Reproductive Toxicity: There are no reports of adverse effects on pregnancy following occupational exposure to Ethanol. Reproductive effects have been observed in people who have consumed large amounts of alcoholic beverages that contain Ethanol. In tests involving Ethanol, effects on reproductive organs, including decreased testicular weight, decreased numbers of motile sperm, decreased ovarian function and irregular fertility cycles, have been observed in animals given large oral doses of Ethanol. However, no confirmed effects on fertility or reproductive capability have been observed. In a well-conducted continuous breeding study involving Ethanol, mice were exposed to 5, 10 or 15% Ethanol in water (approximately 8,500, 16,000 and 20,000 mg/kg/day). No effects on fertility and only minor reproductive effects were observed (reduced sperm motility and increased time between litters). Male and female rats with inhalation exposure to 10,000 or 16,000 ppm Ethanol for 6 weeks prior to mating showed no effect on fertility.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY: Using a structure estimation method based on molecular connectivity indices, the Koc for Ethanol can be estimated to be 1. According to a classification scheme, this estimated Koc value suggests that Ethanol is expected to have very high mobility in soil.

12. ECOLOGICAL INFORMATION (Continued)

PERSISTENCE AND BIODEGRADABILITY: If released to the atmosphere, an extrapolated vapor pressure of 59.3 mmHg at 25°C indicates that Ethanol will exist solely in the vapor phase. Vapor phase Ethanol is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 5 days. If released to soil, Ethanol is expected to have very high mobility based upon an estimated Koc of 1. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 5X10⁻⁶ atm-cu m/mole. Ethanol may also volatilize from dry soils based upon its vapor pressure. Biodegradation is expected to occur rapidly in the environment based on numerous screening tests using different types of inocula and incubation periods. Ethanol was degraded with half-lives on the order of a few days using microcosms constructed with a low organic sandy soil and groundwater, indicating it is unlikely to be persistent in the environment. If released into water, Ethanol is not expected to adsorb to suspended solids and sediment based upon the estimated Koc. Volatilization from water surfaces is expected to be an important fate process based upon this compound's Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 3 and 39 days, respectively. An estimated BCF of 3 suggests the potential for bioconcentration in aquatic organisms is low. Hydrolysis of Ethanol and photolysis in sunlight surface waters are not expected since Ethanol lacks functional groups that are susceptible to hydrolysis or photolysis under environmental conditions.

BIO-ACCUMULATION POTENTIAL: An estimated BCF of 3 was calculated for Ethanol, using a log Kow of -0.31 and a regression-derived equation. According to a classification scheme, this BCF suggests the potential for bioconcentration in aquatic organisms is low.

ECOTOXICITY: This product has not been tested for aquatic or plant toxicity. Aquatic toxicity data are available for components of this product, as follows (only select data are provided in this SDS).

ETHANOL:

LC₅₀ (*Palaemonetes pugio*, grass shrimp) 96 hours = 250 µg/L
LC₅₀ (*Salmo gairdneri*, rainbow trout) 96 hours = 13000 mg/L
LC₅₀ (*Pimephales promelas*, fathead minnow) 96 hours = 14.2-15.3 mg/L
LC₅₀ (*Artemia salina*) 24 hours = 24,000 mg/L
LC₅₀ (*Streptocephalus proboscideus*) 24 hours = 19,000 mg/L
LC₅₀ (*Daphnia magna*) 24 hours = 11,000 mg/L

ETHANOL (continued):

LC₅₀ (fingerling trout) 24 hours = 11,200 mg/L
LC₅₀ (*Semotilus atromaculatus*, creek chub) 24 hours = > 7,000 mg/L
LC₅₀ (*Poecilia reticulata*, guppy) 7 days = 11,050 ppm
LC₅₀ (*Alburnus alburnus*, bleak) 96 hours = 11,000 mg/L
LC₅₀ (*Nitocra spinipes*) 96 hours = 7,750 mg/L

OTHER ADVERSE EFFECTS: This product does not contain any component with known ozone depletion potential.

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

RESULTS OF PBT AND vPvB ASSESSMENT: No data available. PBT and vPvB assessments are part of the chemical safety report required for some substances in European Union Regulation (EC) 1907/2006, Article 14.

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 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 metal containers. Permeable cardboard containers are not appropriate and should not be used. Ensure that any required marking or labeling of the containers be done to satisfy applicable regulations.

PRECAUTIONS TO BE FOLLOWED DURING WASTE HANDLING: Wear proper protective equipment when handling waste materials.

U.S. EPA WASTE NUMBER: Wastes of this product should be tested to see if they meet the criteria of D001 (Waste Characteristic-Ignitability)

EU EWC WASTE CODE: OIL WASTES AND WASTES OF LIQUID FUELS: 13 07 02* petrol.

14. TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS: This product is classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

UN Identification Number:

UN 1170

Proper Shipping Name:

Ethanol Solution

Hazard Class Number and Description:

3 (Flammable)

Packing Group:

II

DOT Label(s) Required:

Class 3 (Flammable)

Emergency Response Guidebook Number (2016):

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Marine Pollutant: No component meets the criteria of a Marine Pollutant under (49 CFR 172.101, Appendix B).

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

UN Identification Number:

UN 1170

Proper Shipping Name:

Ethanol Solution

Hazard Class Number and Description:

3 (Flammable)

14. TRANSPORTATION INFORMATION (Continued)

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS (continued):

<u>Hazard Label(s) Required:</u>	Class 3 (Flammable)
<u>Packing Group:</u>	II
<u>Special Provisions:</u>	None
<u>Explosive Limit & Limited Quantity Index:</u>	1
<u>Excepted Quantities:</u>	E2
<u>ERAP Index:</u>	None
<u>Passenger Carrying Ship Index:</u>	None
<u>Passenger Carrying Road or Rail Vehicle Index:</u>	5

INTERNATIONAL AIR TRANSPORT ASSOCIATION DESIGNATION: This product is classified as dangerous goods, per rules of IATA.

<u>UN Identification Number:</u>	UN 1170
<u>Proper Shipping Name:</u>	Ethanol Solution
<u>Hazard Class Number and Description:</u>	3 (Flammable)
<u>Packing Group:</u>	II
<u>Hazard Label(s) Required:</u>	Class 3 (Flammable)
<u>Excepted Quantities:</u>	E2
<u>Passenger and Cargo Aircraft Packing Instruction:</u>	353
<u>Passenger and Cargo Aircraft Maximum Net Quantity Per Pkg.:</u>	5 L
<u>Passenger and Cargo Aircraft Limited Quantity Packing Instruction:</u>	Y341
<u>Passenger and Cargo Aircraft Limited Quantity Maximum Net Quantity Per Pkg.:</u>	1 L
<u>Cargo Aircraft Only Packing Instruction:</u>	364
<u>Cargo Aircraft Only Maximum Net Quantity Per Pkg.:</u>	60 L
<u>Special Provisions:</u>	A3, A58, A180
<u>ERG Code:</u>	3L

INTERNATIONAL MARITIME ORGANIZATION (IMO): This product is classified as dangerous goods, per rules of the IMO.

<u>UN Identification Number:</u>	UN 1170
<u>Proper Shipping Name:</u>	Ethanol Solution
<u>Hazard Class Number and Description:</u>	3 (Flammable)
<u>Packing Group:</u>	II
<u>Special Provisions:</u>	144
<u>Hazard Label(s) Required:</u>	Class 3 (Flammable)
<u>Excepted Quantities:</u>	E2
<u>Limited Quantities:</u>	1 L
<u>Packing:</u>	Instructions: P001; Provisions: None
<u>IBCs:</u>	Instructions: IBC02; Provisions: None
<u>Tanks:</u>	Instructions: T4; Provisions: TP1
<u>EmS:</u>	F-E, S-D
<u>Stowage and Segregation:</u>	Category A.

Marine Pollutant: No component meets the criteria of the IMO to be a Marine Pollutant.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD

(ADR): This product is classified by the United Nations Economic Commission for Europe to be dangerous goods.

<u>UN Number:</u>	UN 1170
<u>Name and Description:</u>	Ethanol Solution
<u>Class:</u>	3
<u>Classification Code:</u>	F1
<u>Packing Group:</u>	II
<u>Labels:</u>	3
<u>Special Provisions:</u>	144, 601
<u>Limited Quantities:</u>	1 L
<u>Excepted Quantities:</u>	E2
<u>Packing Instruction:</u>	P001, IBC02, R001
<u>Special Packing Provisions:</u>	None
<u>Mixed Packing Instruction:</u>	MP19
<u>Portable Tanks and Bulk Containers:</u>	Instructions: T4; Special Provisions: TP2
<u>Hazard Identification Number:</u>	33

TRANSPORT IN BULK ACCORDING TO THE IBC CODE: See the information under the individual jurisdiction listings for IBC information.

ENVIRONMENTAL HAZARDS: This product is neither environmentally hazardous according to the criteria of the UN Model Regulations (as reflected in the IMDG Code, ADR, RID, and ADN) no component is listed as a marine pollutant according to the IMDG Code and is not listed in Annex III under MARPOL 73/78.

15. REGULATORY INFORMATION

UNITED STATES REGULATIONS:

U.S. SARA Reporting Requirements: Ethanol is not subject to Sections 302, 304, and 313 reporting requirements under the Superfund Amendment and Reauthorization Act.

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

15. REGULATORY INFORMATION (Continued)

UNITED STATES REGULATIONS (continued):

U.S. CERCLA Reportable Quantity (RQ): Not applicable.

U.S. TSCA Inventory Status: Ethanol is listed on the TSCA Inventory.

Other U.S. Federal Regulations: None.

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65): In the form of alcoholic beverages to be consumed, the Ethanol component of this product is on the California Proposition 65 lists as a compound that is known to cause developmental harm. This does not apply to Ethanol that is not consumed as a beverage.

CANADIAN REGULATIONS:

Canadian DSL/NDSL Inventory Status: The components of this material are included in the DSL Inventory.

Canadian WHMIS IDL Disclosure Status: Ethanol is on the Ingredient Disclosure List with a disclosure limit of 0.1%.

Canadian Environmental Protection Agency (CEPA) Priority Substances Lists: Ethanol is not on the Priority Substances Lists.

Canadian WHMIS (HPR-GHS) 2015 Classification and Symbols: See Section 16 for in Classification and Symbols under HPR-GHS 2015.

EUROPEAN REGULATIONS:

SAFETY, HEALTH, AND ENVIRONMENTAL REGULATIONS/LEGISLATION SPECIFIC FOR THE PRODUCT: None known.

CHEMICAL SAFETY ASSESSMENT: No data available. The chemical safety assessment is required for some substances according to European Union Regulation (EC) 1907/2006, Article 14.

UNITED KINGDOM REGULATIONS:

Safety, Health, and Environmental Regulations/Legislation Specific for the Product: None found.

16. OTHER INFORMATION

GLOBAL HARMONIZATION LABELING AND CLASSIFICATION: Classified in accordance with U.S. OSHA Hazard Communication Standard and the Canadian WHMIS 2015 GHS.

Classification: Flammable Liquid Category 2, Eye Irritation Category 2A, Acute Oral Toxicity Category 5, Aspiratory Toxicity Category 2

Signal Word: Danger

Hazard Statements: Highly flammable liquid and vapor. Causes serious eye irritation. May be harmful if swallowed. May be harmful if swallowed and enters airways.

Precautionary Statements:

Prevention: Keep away from heat/sparks/open flames/hot surfaces. — No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.

Response: In case of fire: Use materials appropriate for surrounding fire for extinction. IF SWALLOWED: Immediately call a POISON CENTER or doctor. Do NOT induce vomiting. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. If eye irritation persists: Get medical advice/attention. Specific treatment (remove from exposure and treat symptoms). Refer to other portions of precautionary text on this label, SDS or other product information sheets, as appropriate.

Storage: Store in a well-ventilated place. Keep container tightly closed. Keep cool. Store locked up.

Disposal: Dispose of contents/containers in accordance with all local, regional, national and international regulations.

Hazard Symbols/Pictograms: GHS02, GHS07, GHS08

GLOBAL HARMONIZATION AND EU CLP REGULATION (EC) 1272/2008 LABELING AND CLASSIFICATION: Classified in accordance with CLP Regulation (EC) 1272/2008 and the Global Harmonization Standard. For additional information on classification under (67/548/EEC), see below.

Classification: Flammable Liquid Category 2, Eye Irritation Category 2A, Acute Oral Toxicity Category 5, Aspiratory Toxicity Category 2

Signal Word: Danger

Hazard Statements: H225: Highly flammable liquid and vapour. H319: Causes serious eye irritation. H303: May be harmful if swallowed. H305: May be harmful if swallowed and enters airways.

Precautionary Statements:

Prevention: P210: Keep away from heat/sparks/open flames/hot surfaces. — No smoking. P240: Ground/bond container and receiving equipment. P241: Use explosion-proof electrical/ventilating/lighting/equipment. P242: Use only non-sparking tools. P243: Take precautionary measures against static discharge. P264: Wash thoroughly after handling. P270: Do not eat, drink or smoke when using this product. P271: Use only outdoors or in a well-ventilated area. P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response: P370 + P378: In case of fire: Use materials appropriate for surrounding fire for extinction. P301 + P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor. P331: Do NOT induce vomiting. P303 + P361 + P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. P337 + P313: If eye irritation persists: Get medical advice/attention. P321: Specific treatment (remove from exposure and treat symptoms). Refer to other portions of precautionary text on this label, SDS or other product information sheets, as appropriate.

Storage: P403 + P233 + P235: Store in a well-ventilated place. Keep container tightly closed. Keep cool. P405: Store locked up.

Disposal: P501: Dispose of contents/containers in accordance with all local, regional, national and international regulations.

Hazard Symbols/Pictograms: GHS02, GHS07, GHS08

CLASSIFICATION OF COMPONENTS:

CLP Regulation (EC) 1272/2008

Ethyl Alcohol: This is a published and self-classification.

Classification: Flammable Liquid Category 2, Eye Irritation Category 2A, Acute Oral Toxicity Category 5, Aspiration Hazard Category 1

Hazard Statements: H225: Highly flammable liquid and vapour.

16. OTHER INFORMATION (Continued)

REVISIONS DETAILS: October 2018: Review and up-date of entire SDS to current regulations.

REFERENCES AND DATA SOURCES: Contact the supplier for information.

METHODS OF EVALUATING INFORMATION FOR THE PURPOSE OF CLASSIFICATION: Bridging principles were used to classify this product.

DEFINITIONS OF TERMS

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

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

EXPOSURE LIMITS IN AIR:

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

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

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

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

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

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

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

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

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

WEEL: Workplace Environmental Exposure Limits from the AIHA.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS:

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

HEALTH HAZARD: 0 Minimal Hazard: No significant health risk, irritation of skin or eyes not anticipated. *Skin Irritation:* Essentially non-irritating. Mechanical irritation may occur. PII or Draize = 0. *Eye Irritation:* Essentially non-irritating, minimal effects clearing in < 24 hours. Mechanical irritation may occur. Draize = 0. *Oral Toxicity LD₅₀ Rat:* > 5000 mg/kg. *Dermal Toxicity LD₅₀ Rat or Rabbit:* > 2000 mg/kg. *Inhalation Toxicity 4-hrs LC₅₀ Rat:* > 20 mg/L. **1 Slight Hazard:** Minor reversible injury may occur; may irritate the stomach if swallowed; may defat the skin and exacerbate existing dermatitis. *Skin Irritation:* Slightly or mildly irritating. PII or Draize > 0 < 5. *Eye Irritation:* Slightly to mildly irritating, but reversible within 7 days. Draize > 0 ≤ 25. *Oral Toxicity LD₅₀ Rat:* > 500–5000 mg/kg. *Dermal Toxicity LD₅₀ Rat or Rabbit:* > 1000–2000 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 2–20 mg/L. **2 Moderate Hazard:** Temporary or transitory injury may occur; prolonged exposure may affect the CNS. *Skin Irritation:* Moderately irritating; primary irritant; sensitizer. PII or Draize ≥ 5, with no destruction of dermal tissue. *Eye Irritation:* Moderately to severely irritating; reversible corneal opacity; corneal involvement or irritation clearing in 8–21 days. Draize = 26–100, with reversible effects. *Oral Toxicity LD₅₀ Rat:* > 50–500 mg/kg. *Dermal Toxicity LD₅₀ Rat or Rabbit:* > 200–1000 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 0.5–2 mg/L. **3 Serious Hazard:** Major injury likely unless prompt action is taken and medical treatment is given; high level of toxicity; corrosive. *Skin Irritation:* Severely irritating and/or corrosive; may cause destruction of dermal tissue, skin burns, and dermal necrosis. PII or Draize > 5–8, with destruction of tissue. *Eye Irritation:* Corrosive, irreversible destruction of ocular tissue; corneal involvement or irritation persisting for more than 21 days. Draize > 80 with effects irreversible in 21 days. *Oral Toxicity LD₅₀ Rat:* > 1–50 mg/kg. *Dermal Toxicity LD₅₀ Rat or Rabbit:* > 20–200 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 0.05–0.5 mg/L. **4 Severe Hazard:** Life-threatening; major or permanent damage may result from single or repeated exposure; extremely toxic; irreversible injury may result from brief contact. *Skin Irritation:* Not appropriate. Do not rate as a 4, based on skin irritation alone. *Eye Irritation:* Not appropriate. Do not rate as a 4, based on eye irritation alone. *Oral Toxicity LD₅₀ Rat:* ≤ 1 mg/kg. *Dermal Toxicity LD₅₀ Rat or Rabbit:* ≤ 20 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* ≤ 0.05 mg/L.

FLAMMABILITY HAZARD: 0 Minimal Hazard: Materials that will not burn in air when exposure to a temperature of 815.5°C (1500°F) for a period of 5 minutes. **1 Slight Hazard:** Materials that must be pre-heated before ignition can occur. Material requires considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur. This usually includes the following: Materials that will burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less; Liquids, solids and semisolids having a flash point at or above 93.3°C (200°F) (i.e. OSHA Class IIB); and Most ordinary combustible materials (e.g. wood, paper, etc.).

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued): 2 Moderate Hazard: Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not, under normal conditions, form hazardous atmospheres in air, but under high ambient temperatures or moderate heating may release vapor in sufficient quantities to produce hazardous atmospheres with air. This usually includes the following: Liquids having a flash-point at or above 37.8°C (100°F); Solid materials in the form of coarse dusts that may burn rapidly but that generally do not form explosive atmospheres; Solid materials in a fibrous or shredded form that may burn rapidly and create flash fire hazards (e.g. cotton, sisal, hemp); and Solids and semisolids (e.g. viscous and slow flowing as asphalt) that readily give off flammable vapors. **3 Serious Hazard:** Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures, or, unaffected by ambient temperature, are readily ignited under almost all conditions. This usually includes the following: Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 38°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (100°F) (i.e. OSHA Class IB and IC); Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air (e.g., dusts of combustible solids, mists or droplets of flammable liquids); and Materials that burn extremely rapidly, usually by reason of self-contained oxygen (e.g. dry nitrocellulose and many organic peroxides). **4 Severe Hazard:** Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and that will burn readily. This usually includes the following: Flammable gases; Flammable cryogenic materials; Any liquid or gaseous material that is liquid while under pressure and has a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F) (i.e. OSHA Class IA); and Materials that ignite spontaneously when exposed to air at a temperature of 54.4°C (130°F) or below (pyrophoric).

PHYSICAL HAZARD: 0 Water Reactivity: Materials that do not react with water. *Organic Peroxides:* Materials that are normally stable, even under fire conditions and will not react with water. *Explosives:* Substances that are Non-Explosive. *Compressed Gases:* No Rating. *Pyrophorics:* No Rating. *Oxidizers:* No 0 rating. *Unstable Reactives:* Substances that will not polymerize, decompose, condense, or self-react. **1 Water Reactivity:** Materials that change or decompose upon exposure to moisture. *Organic Peroxides:* Materials that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy violently. *Explosives:* Division 1.5 & 1.6 explosives. Substances that are very insensitive explosives or that do not have a mass explosion hazard. *Compressed Gases:* Pressure below OSHA definition. *Pyrophorics:* No Rating. *Oxidizers:* Packaging Group III oxidizers; Solids: any material that in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65%)/cellulose mixture and the criteria for Packing Group I and II are not met. *Unstable Reactives:* Substances that may decompose, condense, or self-react, but only under conditions of high temperature and/or pressure and have little or no potential to cause significant heat generation or explosion hazard. Substances that readily undergo hazardous polymerization in the absence of inhibitors. **2 Water Reactivity:** Materials that may react violently with water. *Organic Peroxides:* Materials that, in themselves, are normally unstable and will readily undergo violent chemical change, but will not detonate. These materials may also react violently with water. *Explosives:* Division 1.4 explosives. Explosive substances where the explosive effects are largely confined to the package and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. *Compressed Gases:* Pressurized and meet OSHA definition but < 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics:* No Rating. *Oxidizers:* Packaging Group II oxidizers. Solids: any material that, either in concentration tested, exhibits a mean burning time of less than or equal to the mean burning time of a 2:3 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise of a 1:1 aqueous sodium chlorate solution (40%)/cellulose mixture and the criteria for Packing Group I are not met. *Reactives:* Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure, but have a low potential (or low risk) for significant heat generation or explosion. Substances that readily form peroxides upon exposure to air or oxygen at room temperature. **3 Water Reactivity:** Materials that may form explosive reactions with water. *Organic Peroxides:* Materials that are capable of detonation or explosive reaction, but require a strong initiating source or must be heated under confinement before initiation; or materials that react explosively with water. *Explosives:* Division 1.3 explosives. Explosive substances that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but do not have a mass explosion hazard. *Compressed Gases:* Pressure ≥ 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics:* No Rating. *Oxidizers:* Packaging Group I oxidizers. Solids: any material that, in either concentration tested, exhibits a mean burning time less than the mean burning time of a 3:2 potassium bromate/cellulose mixture. Liquids: any material that spontaneously ignites when mixed with cellulose in a 1:1 ratio, or which exhibits a mean pressure rise time less than the pressure rise time of a 1:1 perchloric acid (50%)/cellulose mixture. *Unstable Reactives:* Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure and have a moderate potential (or moderate risk) to cause significant heat generation or explosion. **4 Water Reactivity:** Materials that react explosively with water without requiring heat or confinement. *Organic Peroxides:* Materials that are readily capable of detonation or explosive decomposition at normal temperature and pressures. *Explosives:* Division 1.1 & 1.2 explosives. Explosive substances that have a mass explosion hazard or have a projection hazard. A mass explosion is one that affects almost the entire load instantaneously. *Compressed Gases:* No Rating. *Pyrophorics:* Add to the definition of Flammability 4. *Oxidizers:* No 4 rating. *Unstable Reactives:* Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure and have a high potential (or high risk) to cause significant heat generation or explosion.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

HEALTH HAZARD: 0 Materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials. Gases and vapors with an LC₅₀ for acute inhalation toxicity greater than 10,000 ppm. Dusts and mists with an LC₅₀ for acute inhalation toxicity greater than 200 mg/L. Materials with an LD₅₀ for acute dermal toxicity greater than 2000 mg/kg. Materials with an LD₅₀ for acute oral toxicity greater than 2000 mg/kg. Materials essentially non-irritating to the respiratory tract, eyes, and skin. **1** Materials that, under emergency conditions, can cause significant irritation. Gases and vapors with an LC₅₀ for acute inhalation toxicity greater than 5,000 ppm but less than or equal to 10,000 ppm. Dusts and mists with an LC₅₀ for acute inhalation toxicity greater than 10 mg/L but less than or equal to 200 mg/L.

DEFINITIONS OF TERMS (Continued)

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

HEALTH HAZARD (continued): 1 (continued): Materials with an LD₅₀ for acute dermal toxicity greater than 1000 mg/kg but less than or equal to 2000 mg/kg. Materials that slightly to moderately irritate the respiratory tract, eyes and skin. Materials with an LD₅₀ for acute oral toxicity greater than 500 mg/kg but less than or equal to 2000 mg/kg. **2** Materials that, under emergency conditions, can cause temporary incapacitation or residual injury. Gases with an LC₅₀ for acute inhalation toxicity greater than 3,000 ppm but less than or equal to 5,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 5000 ppm and that does not meet the criteria for either degree of hazard 3 or degree of hazard 4. Dusts and mists with an LC₅₀ for acute inhalation toxicity greater than 2 mg/L but less than or equal to 10 mg/L. Materials with an LD₅₀ for acute dermal toxicity greater than 200 mg/kg but less than or equal to 1000 mg/kg. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause severe tissue damage, depending on duration of exposure. Materials that are respiratory irritants. Materials that cause severe, but reversible irritation to the eyes or are lachrymators. Materials that are primary skin irritants or sensitizers. Materials whose LD₅₀ for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg. **3** Materials that, under emergency conditions, can cause serious or permanent injury. Gases with an LC₅₀ for acute inhalation toxicity greater than 1,000 ppm but less than or equal to 3,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4. Dusts and mists with an LC₅₀ for acute inhalation toxicity greater than 0.5 mg/L but less than or equal to 2 mg/L. Materials with an LD₅₀ for acute dermal toxicity greater than 40 mg/kg but less than or equal to 200 mg/kg. Materials that are corrosive to the respiratory tract. Materials that are corrosive to the eyes or cause irreversible corneal opacity. Materials corrosive to the skin. Cryogenic gases that cause frostbite and irreversible tissue damage. Compressed liquefied gases with boiling points below -55°C (-66.5°F) that cause frostbite and irreversible tissue damage. Materials with an LD₅₀ for acute oral toxicity greater than 5 mg/kg but less than or equal to 50 mg/kg. **4** Materials that, under emergency conditions, can be lethal. Gases with an LC₅₀ for acute inhalation toxicity less than or equal to 1,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than ten times its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 1000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is less than or equal to 0.5 mg/L. Materials whose LD₅₀ for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LD₅₀ for acute oral toxicity is less than or equal to 5 mg/kg.

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 of NFPA 704. **1** Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur. Materials that will burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D of NFPA 704. Liquids, solids, and semisolids having a flash point at or above 93.4°C (200°F) (i.e. Class IIIB liquids). Liquids with a flash point greater than 35°C (95°F) that do not sustain combustion when tested using the *Method of Testing for Sustained Combustibility*, per 49 CFR 173, Appendix H or the *UN Recommendations on the Transport of Dangerous Goods, Model Regulations* (current edition) and the related *Manual of Tests and Criteria* (current edition). Liquids with a flash point greater than 35°C (95°F) in a water-miscible solution or dispersion with a water non-combustible liquid/solid content of more than 85% by weight. Liquids that have no fire point when tested by ASTM D 92, *Standard Test Method for Flash and Fire Points by Cleveland Open Cup*, up to the boiling point of the liquid or up to a temperature at which the sample being tested shows an obvious physical change. Combustible pellets with a representative diameter of greater than 2 mm (10 mesh). Most ordinary combustible materials. Solids containing greater than 0.5% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. **2** Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air. Liquids having a flash point at or above 37.8°C (100°F) and below 93.4°C (200°F) (i.e. Class II and Class IIIA liquids.) Solid materials in the form of powders or coarse dusts of representative diameter between 420 microns (40 mesh) and 2 mm (10 mesh) that burn rapidly but that generally do not form explosive mixtures with air. Solid materials in fibrous or shredded form that burn rapidly and create flash fire hazards, such as cotton, sisal, and hemp. Solids and semisolids that readily give off flammable vapors. Solids containing greater than 0.5% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. **3** Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions. Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 37.8°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (100°F) (i.e. Class IB and IC liquids). Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air. Flammable or combustible dusts with representative diameter less than 420 microns (40 mesh). Materials that burn with extreme rapidity, usually by reason of self-contained oxygen (e.g. dry nitrocellulose and many organic peroxides). Solids containing greater than 0.5% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. **4** Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and will burn readily. Flammable gases. Flammable cryogenic materials. Any liquid or gaseous materials that is liquid while under pressure and has a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F) (i.e. Class IA liquids). Materials that ignite when exposed to air. Solids containing greater than 0.5% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

INSTABILITY HAZARD: 0 Materials that in themselves are normally stable, even under fire conditions. Materials that have an instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) below 0.01 W/mL. Materials that do not exhibit an exotherm at temperatures less than or equal to 500°C (932°F) when tested by differential scanning calorimetry. **1** Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures. Materials that have an instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 0.01 W/mL and below 10 W/mL. **2** Materials that readily undergo violent chemical change at elevated temperatures and pressures. Materials that have an instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 10 W/mL and below 100W/mL. **3** Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before initiation. Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 100 W/mL and below 1000 W/mL. Materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures. **4** Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures. Materials that are sensitive to localized thermal or mechanical shock at normal temperatures and pressures. Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) of 1000 W/mL or greater.

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (NFPA). **Flash Point:** Minimum temperature at which a liquid gives off sufficient vapor to form an ignitable mixture with air near the surface of the liquid or within the test vessel used. **Autoignition Temperature:** Minimum temperature of a solid, liquid, or gas required to initiate or cause self-sustained combustion in air with no other source of ignition. **LEL:** Lowest concentration of a flammable vapor or gas/air mixture that will ignite and burn with a flame. **UEL:** Highest concentration of a flammable vapor or gas/air mixture that will ignite and burn with a flame.

TOXICOLOGICAL INFORMATION:

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

REPRODUCTIVE TOXICITY INFORMATION:

Mutagen: A chemical that causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. **Embryotoxin:** 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. **Teratogen:** A chemical that causes damage to a developing fetus, but the damage does not propagate across generational lines. **Reproductive toxin:** Any substance that interferes in any way with the reproductive process.

ECOLOGICAL INFORMATION:

EC: Effect concentration in water. **BCF:** Bioconcentration Factor, which is used to determine if a substance will concentrate in life forms that consume contaminated plant or animal matter. **TLM:** Median threshold limit. **log K_{ow}** or **log K_{oc}:** Coefficient of Oil/Water Distribution is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION: This section explains the impact of various laws and regulations on the material.

U.S.:

EPA: U.S. Environmental Protection Agency. **ACGIH:** American Conference of Governmental Industrial Hygienists, a professional association that establishes exposure limits. **OSHA:** U.S. Occupational Safety and Health Administration. **NIOSH:** National Institute of Occupational Safety and Health, which is the research arm of OSHA. **DOT:** U.S. Department of Transportation. **IC:** Transport Canada. **SARA:** Superfund Amendments and Reauthorization Act. **TSCA:** U.S. Toxic Substance Control Act. **CERCLA:** Comprehensive Environmental Response, Compensation, and Liability Act. Marine Pollutant status according to the DOT; CERCLA or Superfund; and various state regulations. This section also includes information on the precautionary warnings that appear on the material's package label.

CANADA:

WHMIS: Canadian Workplace Hazardous Materials Information System. **IC:** Transport Canada. **DSL/NDL:** Canadian Domestic/Non-Domestic Substances List.

EUROPE:

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