

**GC Electronics**  
1801 Morgan Street  
Rockford, IL 61102  
Phone: (815) 968-9661  
Fax: (815) 968-9731  
www.gcelectronics.com

**Product Name: Print Kote Conformal Coating**

MSDS Number: 138  
Revision Date: 7/7/06  
Supersedes Date: 1/20/03

**MATERIAL SAFETY DATA SHEET**

Complies with OSHA Hazard Communication Standard 29 CFR 1910.1200

Product Type: Silicone resin solution  
Product Name: **Print Kote Conformal Coating**  
Part Number(s): **22-203**

**Emergency Contact: Chemtrec**  
**Phone (24 hours): (800)424-9300**

**Section 1 - Identification of Product**

**NFPA RATINGS**

Health	1	Least	0
Flammability	3	Slight	1
Reactivity	0	Moderate	2
Personal Protection	B	High	3
		Extreme	4
Product Name: Silicone Resin Solution		Gloves, Safety Glasses	B

Note: NFPA = National Fire Protection Association

**Section 2 - Hazardous Ingredients**

Component	Cas Number	% Weight	Exposure Limits
Octamethyltrisiloxane (Silicone Resins)	107-51-7	>60	TWA 200 PPM
Dimethyl. Methylphenylmethoxy Siloxane	68952-93-2	15-40	See methyl alcohol comments
Toluene	108-88-3	3-7	OSHA PEL (final rule): 8 Hour TWA 200 PPM, Ceiling 300 ppm 10 minutes maximum duration 500 ppm./ ACGIH TLV- Skin: TWA 50 PPM.
Methyltrimethoxysilane	1185-55-3	3-7	TWA 50 PPM. Also see methyl alcohol comments.

Comments: Methyl alcohol forms on contact with water or humid air. Provide adequate ventilation to control exposures within guidelines of OSHA PEL: TWA 200 PPM and ACGIH TLV-Skin: TWA 200 PPM, STEL 250 PPM

The above components are hazardous as defined in 29 CFR 1910.1200.

Warning: This product contains Toluene, known to the State of California to cause birth defects or other reproductive harm.

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**Section 3 - Physical Data**

Physical form:	Liquid
Color:	Translucent
Odor:	Some odor
Specific Gravity @ 25C:	0.9
Viscosity:	350.00 cSt
Freezing/Melting Point:	Not Determined
Boiling Point:	101°C
Vapor Pressure @ 25C:	Not Determined
Vapor Density:	Not Determined
Solubility in Water:	Not Determined
pH:	Not Determined
Volatile Content:	Not Determined

Note: The above information is not intended for use in preparing product specifications.

**Section 4 - Fire & Explosion Hazard Data**

Flammability Limits in Air:	Not Determined
Flash Point (closed cup):	62.6°F/17°C (Seta Closed Cup)
Autoignition Temperature:	Not Determined
Extinguishing Media:	On large fires use medium expansion (>30:1) AFFF alcohol compatible foam or water spray. On small fires use medium expansion (>30:1) AFFF alcohol compatible foam or CO2 or water spray. Water can be used to cool fire exposed containers.
Unusual Fire Hazards:	Fire burns more vigorously than would be expected. Static electricity will accumulate and may ignite vapors. Prevent a possible fire hazard by bonding and grounding or inert gas purge. Vapors are heavier than air and may travel to a source of ignition and flash back.
Fire Fighting Procedures:	Self-contained breathing apparatus and protective clothing should be worn in fighting large fires involving chemicals. Determine the need to evacuate or isolate the area according to your local emergency plan. Use water spray to keep fire exposed containers cool.
Hazardous Decomposition products:	Thermal breakdown of this product during fire or very high heat conditions may evolve the following hazardous decomposition products: Carbon oxides and traces of incompletely burned carbon compounds. Silicon dioxide. Metal Oxides. Formaldehyde.

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**Section 5 - Health Hazard Data****Effects of Overexposure-  
Acute Effects:**

Eye: Direct contact may cause mild irritation.

Skin: No significant irritation expected from a single short term exposure..

Inhalation: Vapor may irritate nose and throat. Vapor overexposure may cause drowsiness.

Oral: Swallowing large amounts may cause drowsiness.

**Emergency First Aid Measures**

Eye: Immediately flush with water for 15 minutes. Get medical attention.

Skin: Remove from skin and wash thoroughly with soap and water or waterless cleanser. Get medical attention if irritation or other ill effects develop or persist.

Inhalation: Remove to fresh air. Get medical attention if ill effects persist.

Oral: Get medical attention.

Comments: Treat according to person's condition and specifics of exposure.

**Prolonged/Repeated Exposure Effects**

Skin: Repeated or prolonged contact may cause defatting and drying of skin which may result in skin irritation and dermatitis.

Inhalation: Product generates methyl alcohol which may cause blindness and damage to nervous system. Overexposure by inhalation may injure the following organ(s): Liver, kidneys.

Oral: Product generates methyl alcohol which may cause blindness and possibly death if swallowed.

Signs and symptoms of overexposure No known applicable information

Medical Conditions Aggravated by Exposure. No known applicable information.

The above listed potential effects of overexposure are based on actual data, results of studies performed upon similar compositions, component data and/ or expert review of the product. Please refer to Section 11 for detailed toxicology information.

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**Section 6 - Reactivity Data**

Chemical Stability:	Stable
Hazardous Polymerization:	<u>4</u> Will not occur.
Conditions to Avoid:	None.
Materials to Avoid:	Oxidizing materials can cause a reaction. Water, moisture, or humid air can cause hazardous vapors to form as described in Section 2 and 8.

**Section 7 - Spill or Leak Procedures**

Containment/Clean-up:	Remove possible ignition source. Determine whether to evacuate or isolate the area according to your local emergency plan. Observe all personal protection equipment recommendations described in Sections 4 and 8. For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbent. Clean area as appropriate since some silicone materials, even in small quantities, may present a slip hazard. Final cleaning may require use of steam, solvents or detergents. Dispose of saturated absorbent or cleaning materials appropriately, since spontaneous heating may occur. Local, state, and federal laws and regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which federal, state and local laws and regulations are applicable. Sections 9 and 10 of this MSDS provide information regarding certain federal and state requirements.
Personal Protective Equipment for Spills	
Eye:	Use full face respirator.
Skin:	Wash at mealtime and end of shift. Contaminated clothing and shoes should be removed as soon as practical and thoroughly cleaned before reuse. Chemical protective gloves are recommended.
Inhalation/Suitable Respirator:	Respiratory protection recommended. Follow OSHA Respirator Regulations (29 CFR 1910.134) and use NIOSH/MHSA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air purifying respirators may not provide adequate protection.

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**Precautionary Measures:** Avoid eye contact. Avoid skin contact. Avoid breathing vapor, mist dust or fumes. Keep container closed. Do not take internally. Use reasonable care.

**Comments:** Product evolves flammable methyl alcohol when exposed to water or humid air. Provide ventilation during use to control exposure within Section 2 and 8 guidelines or use air-supplied or self-contained breathing apparatus. Traces of Benzene (carcinogen) may form if heated in air above 300° F (149° C). Provide ventilation to control vapor exposure within inhalation guidelines when handling at elevated temperatures. Review the OSHA benzene regulation for detailed information on safe handling requirements.

**Note:** These precautions are for room temperature handling. Use at elevated temperature, or aerosol/spray applications, may require added precautions.

<b>Section 8 - Special Protection Information</b>
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**Component Exposure Limits:**

Component Name	CAS#	Exposure Limits
Octamethyltrisiloxane	107-51-7	TWA 200ppm.
Dimethyl methylphenylmethoxy siloxane	68952-93-2	See methyl alcohol comments.
Methyltrimethoxysilane	1185-55-3	TWA 50ppm. Also see methyl alcohol comments.
Toluene	108-88-3	OSHA PEL (final rule): 8 hour TWA 200 ppm. Ceiling 300 ppm, 10 minutes maximum duration 500 ppm. ACGIH TLV-skin: TWA 50 ppm.

Methyl alcohol forms on contact with water or humid air. Provide adequate ventilation to control exposures within guidelines of OSHA PEL: TWA 200 ppm and ACGIH TLV-skin: TWA 200 ppm, STEL 250 ppm  
 Engineering Controls

Local exhaust: Recommended  
 General Ventilation: Recommended

**Personal Protective Equipment for Routine Handling**

**Eye:** Use proper protection – safety glasses as a minimum.  
**Skin:** Wash at mealtime and end of shift. Contaminated clothing and shoes should be removed as soon as practical and thoroughly cleaned before reuse. Chemical protective gloves are recommended.  
**Suitable Gloves:** Butyl Rubber, Nitrile Rubber, Silver Shield® 4H®  
**Inhalation:** Use respiratory protection unless adequate local exhaust ventilation is provided or air sampling data show exposures are within recommended exposure guidelines. Industrial Hygiene Personnel can assist in judging the adequacy of existing engineering controls.

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**Suitable Respirator:**

General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits as determined by air sampling or are unknown, appropriate respiratory protection should be worn. Follow OSHA Respirator Regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators.

<b>Section 9 – Special Precautions</b>
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**Handling and Storage:**

Use with adequate ventilation. Product evolves flammable methyl alcohol when exposed to water or humid air. Provide ventilation during use to control exposure within Section 2 and 8 guidelines or use air-supplied or self-contained breathing apparatus. Traces of benzene (carcinogen) may form if heated in air above 300°F (149°C). Provide ventilation to control vapor exposure within inhalation guidelines when handling at elevated temperatures. Review the OSHA benzene regulation for detailed information on safe handling requirements. Avoid breathing vapor, mist, dust and fumes. Keep container closed. Avoid eye contact. Do not take internally. Avoid skin contact.

Static electricity will accumulate and may ignite vapors. Prevent a possible fire hazard by bonding and grounding or inert gas purge. Keep container closed and store away from water, moisture, heat, sparks or flame.

**Disposal Considerations**

RCRA Hazard Class (40 CFR 261)

When a decision is made to discard this material, as received, is it classified as a hazardous waste? Yes

Federal Hazardous Waste Code:

NA

Characteristic Waste:

Ignitable: D001

State or local laws may impose additional regulatory requirements regarding disposal.

NA= Not Applicable

<b>Section 10 - Regulatory Information</b>
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Contents of this MSDS comply with the OSHA Hazard Communication Standard 29CFR 1910.1200

TSCA Status: All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of chemical Substances.

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## EPA SARA Title III chemical Listings:

	Cas#	Wt.	Component Name
Section 302 Extremely Hazardous Substances:	None		
Section 304 CERCLA Hazardous Substances:	108-88-3	3.0	Toluene

## Section 311/312 Hazard Class (40CFR370):

Acute: Y  
 Chronic: Y  
 Fire: Y  
 Pressure: N  
 Reactive: N  
 Y= Yes N= No

## Section 313 Toxic Chemicals (40CFR372):

Cas#	Wt. %	Component Name
108-88-3	3.0	Toluene

## Supplemental State Compliance Information

Warning: This product contains the following chemical (s) listed by the State of California under the Safe Drinking Water and Toxic Enforcement Act 1986 (Proposition 65) as being known to cause cancer, birth defects or other reproductive harm.

	Cas #	WT%	Component
California	108-88-3	3.0-7.0	Toluene Developmental Toxin
Massachusetts	108-88-3	3.0-7.0	Toluene
New Jersey	107-51-7	>60.0	Octamethyltrisiloxane
	68952-93-2	15.0-40.0	Dimethyl methylphenylmethoxy siloxane
	1185-55-3	1.0-5.0	Methyltrimethoxysilane
	108-88-3	3.0-7.0	Toluene
Pennsylvania	CAS#	Wt%	Component
	107-51-7	>60.0	Octamethyltrisiloxane
	68952-93-2	15.0-40.0	Dimethyl methylphenylmethoxy siloxane
	108-88-3	3.0-7.0	Toluene

## Ocean Shipment (IMDG)

Proper Shipping Name:

Flammable Liquid N.O.S.

Hazardous Technical Name:

Octamethyltrisiloxane/Toluene

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Hazard Class:	3
UN/NA #:	UN1993
Packing Group:	II
Hazard Label:	Flammable Liquid
Marine Pollutant:	N/A
Air Shipment (IATA)	
Proper Shipping Name:	Flammable Liquid, N.O.S.
Hazard Technical Name:	Octamethyltrisiloxane/Toluene
Hazard Class:	3
UN#:	UN1993
Packing Group:	II
Hazard Label(s):	Flammable Liquid

**Section 11 - Other Information****Toxicological Information****Component Toxicology Information**

This material contains methyltrimetoxysilane (MTMS) MTMS was evaluated in a combined repeated-dose toxicity study that included screening tests for reproductive and developmental toxicity (OECD 422) Sprague-Dawley rats were treated (oral route, corn oil as carrier) daily at dose levels of 0, 50, 250, and 1000 mg MTMS/kg body weight. Test article effects on organ weight were limited to increased liver weight for both males and females in the top two dose levels. Histomorphological findings included increased hepatocellular hypertrophy (both sexes) and increased periportal vacuolation (females only) in the top two dose levels. Thymus weight was decreased in males in the top two dose groups. The thymus appeared normal histomorphologically. Other test article related histomorphological changes included increased incidence of thyroid follicular cell hyperplasia/hypertrophy and severity in male and females in the top two dose levels. There was also an increased incidence of hyperplasia/hypertrophy, apoptosis, and lymphocytic infiltration in the zona reticularis of the adrenal glands in high-dose females and acanthocytosis in high-dose males and females. Clinical pathology evaluations demonstrated a marked prolongation in prothrombin time for males in the top two dose levels. Marked elevation in blood platelet count was observed in both males and females at the high dose.

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Serum total protein was elevated in high-dose males and in females from the top two dose levels. Serum total cholesterol was elevated in females from the top two dose levels. There were no test article related effects on any of the reproductive and reproductive/developmental toxicity. Because this study is considered to be a screening of repeated-dose and reproductive/development toxicity, the results do not provide sufficient information needed to interpret potential relevance to human health and are not indicative of a specific toxicity. This type of study is commonly used as a screening study to determine whether further testing should be conducted. Also, this study was conducted via the oral route of exposure, which is not a typical route of exposure for either manufacturing or end use applications of MTMS. A longer-term study by a more relevant route of exposure (inhalation) is being conducted to understand these preliminary findings.

Toxicology studies with laboratory animals and occupational evaluations with humans have found limited evidence of birth defects, low birth weights and delayed growth in offspring resulting from repeated exposure to toluene during pregnancy.

**Special Hazard Information On Components**

Evidence of reproductive effects in humans

CAS#	Wt%	Component Name
108-88-3	3-7	Toluene

**Ecological Information**

Environmental Fate and Distribution  
 Environmental Effects  
 Fated Effects in Waste Water Tretment Plant

Complete information is not yet available.  
 Complete information is not yet available.  
 Complete information is not yet available.

**Ecotoxicity Classification Criteria**

Hazard Paramaters (LC50 or EC 50)	High	Medium	Low
Acute Aquatic Toxicity (mg/L)	<=1	>1 and <=100	>100
Acute Terrestrial Toxicity (mg/kg)	<=100	>100 and <=2000	>2000

This table is adapted from "Environmental Toxicology and Risk Assessment", ASTM STP 1179, p.34, 1993.

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This table can be used to classify the ecotoxicity of this product when ecotoxicity data is listed above. Please read the other information presented in the section concerning the overall ecological safety of this material.

**Transport Information**

Dot Road Shipment Information (49CFR 172.101)

Proper Shipping Name:	FLAMMABLE LIQUID, N.O.S.
Hazard Technical Name:	OCTAMETHYLTRISILOXANE/TOLUENE
Hazard Class:	3
UN/NA Number:	UN1993
Packing Group:	II
Hazard Label:	Flammable liquid

0000 and NA= Not Applicable

<b>Disclaimer</b>
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**Product Name: Print Kote Solvent**  
MSDS Number: 214  
Revision Date: 1/19/04  
Supersedes Date: 1/24/03

## MATERIAL SAFETY DATA SHEET

Complies with OSHA Hazard Communication Standard 29 CFR 1910.1200

Product Type: Thinners/Solvent  
Product Name: **Print Kote Solvent**  
Part Number(s): **22-209**

**Emergency Contact: Chemtrec**  
**Phone (24 hours): (800) 424-9300**

### Section 1 - Identification of Product

HMIS Ratings:	NFPA Ratings:	Least	0
Health 2	2	Slight	1
Flammability 3	3	Moderate	2
Reactivity 0	0	High	3
		Extreme	4
		Gloves, Safety Glasses	B

WHMIS Class/Description: Class B2 Flammable Liquid  
Class D2B Other Toxic effects - Skin irritant

### Section 2 - Hazardous Ingredients

Hazardous Component	CAS#	% Range	ACGIH (skin) TLV/TWA	WHMIS Controlled	OSHA Z1A	
					TWA	STEL
Toluene*	108-88-3	100	50 ppm	Yes	100 ppm 375 mg/m3	150 ppm 560 mg/m3

\* Regulated under Section 313 of SARA

Warning: This product contains Toluene, a chemical known to the State of California to cause birth defects or other reproductive harm.

### Section 3 - Physical Data

Physical Description: Mobile Liquid Aromatic Hydrocarbon  
Colorless Aromatic Odor

Physical State: Mobile Liquid Aromatic Hydrocarbon  
Appearance: Colorless  
Odor: Aromatic Odor  
Odor Threshold: 1.74 ppm  
Melting/Freezing Point: Typical -95°C/-139°F  
Boiling Point: Typical 110 - 111°C/230 - 232°F

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MSDS Number: 214  
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Explosion/Flammability Limits in Air	1.2 – 8% (V)
Volatile Organic Carbon Content:	100%
Surface Tension:	Typical 28.5 mN/m at 20°C/68°F (ASTM D-971)
Density:	Typical 871 kg/m <sup>3</sup> @ 15°C/59°F
Vapor Density (air = 1):	3.1 mg/m <sup>3</sup>
Vapor Pressure:	Typical 1 kPa at 0°C/32°F Typical 3 – 3.5 kPa at 20°C/68°F Typical 12 kPa at 50°C/122°F
Kinematic Viscosity:	0.63 mm <sup>2</sup> /s at 25°C/77°F
Evaporation Rate (nBuAc=1): n-octanol/Water Partition Coefficient (log Pow):	6.1 (DIN 53170, di-ethyl ether=1)/2 (ASTM D-3539, nBuAc=1) 2.65
Water Solubility:	0.515 Kg/m <sup>3</sup>
Molecular Weight:	92 g/mol
Electrical Conductivity:	Typical 8pS/m at 20°C/68°F (ASTM D-971)
Dielectric Constant:	Typical 2.4
Auto-Ignition Temperature:	480 - 536°C/896 - 997°F (ASTM E-659)

**Section 4 - Fire & Explosion Hazard Data**

Clear fire area of all non-emergency personnel.

Flash Point Deg C:	Method Tag Closed Cup 4°C/39°F (Abel)
Lower Flammability Limit:	1.2% (V)
Upper Flammability Limit:	8% (V)
Auto-ignition Temperature:	480°C - 536°C/896 - 997°F (ASTM E-659)
Extinguishing Media:	Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable Extinguishing Media:	Do not use water in a jet. The vapor is heavier than air, spreads along the ground and distant ignition is possible. Will float and can be reignited on surface water. Carbon monoxide may be evolved if incomplete combustion occurs.
Specific Hazards:	
Protective Equipment for Firefighters:	Wear full protective clothing and self-contained breathing apparatus.
Additional Advice:	Keep adjacent containers cool by spraying with water.
Hazardous Combustion Products:	Carbon monoxide and carbon dioxide are produced on combustion.

**Section 5 - Health Hazard Data**

Emergency Overview:	
Routes of Exposure:	Inhalation is the primary route of exposure although absorption may occur through skin contact or following accidental ingestion.
Health Hazards:	Vapors may cause drowsiness and dizziness. Irritating to eyes. Harmful: may cause lung damage if swallowed.

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Safety Hazards:	Flammable. Vapors are heavier than air. Vapors may travel across the ground and reach remote ignition sources causing a flashback fire danger. Electrostatic charges may be generated during pumping. Electrostatic discharge may cause fire.
Environmental Hazards:	Toxic to aquatic organisms.
Health Hazards:	
Inhalation:	Slightly irritating to respiratory system. Vapors may cause drowsiness and dizziness.
Ingestion:	Harmful: may cause lung damage if swallowed.
Eyes:	Irritating to eyes.
Skin:	May cause moderate irritation to skin. Repeated exposure may cause skin dryness or cracking.
Other Information:	Possibility of organ or organ system damage from prolonged exposure; see Chapter 11 for details. Target organ(s): Cardiovascular system Central nervous system (CNS) Auditory system Kidney Liver Respiratory system
Signs and Symptoms:	Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision. Defatting dermatitis signs and symptoms may include a burning sensation and/or a dried/cracked appearance. If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever. The onset of respiratory symptoms may be delayed for several hours after exposure. Breathing of high vapor concentrations may cause central nervous system (CNS) depression resulting in dizziness, light-headedness, headache, nausea and loss of coordination. Continued inhalation may result in unconsciousness and death.
Aggravated Medical Condition:	Pre-existing medical conditions of the following organ(s) or organ system(s) may be aggravated by exposure to this material: Auditory system, Cardiovascular system, Central nervous system (CNS), Kidney, Liver, Respiratory system, Eyes, Skin.
Environment Hazards	Toxic to aquatic organisms.
First Aid Measures:	
General Information:	Keep victim calm. Obtain medical treatment immediately.
Inhalation:	DO NOT DELAY. Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment.
Skin Contact:	Remove contaminated clothing. Immediately flush skin with large amounts of water for at least 15 minutes. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.

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**Eye Contact:** Immediately flush eyes with large amounts of water for at least 15 minutes while holding eyelids open. Transport to the nearest medical facility for additional treatment.

**Ingestion:** If swallowed, do not induce vomiting: transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration.

**Advice to Physician:** Potential for chemical pneumonitis. Consider: gastric lavage with protected airway, administration of activated charcoal. Potential for cardiac sensitisation, particularly in abuse situations. Hypoxia or negative inotropes may enhance these effects. Consider oxygen therapy.

**Section 6 - Reactivity Data**

**Chemical Stability:** Stable under normal conditions of use. Reacts violently with strong oxidizing agents.

**Conditions to Avoid:** Avoid heat, sparks, open flames and other ignition sources. Prevent vapor accumulation.

**Materials to Avoid:** Strong oxidizing agents.

**Hazardous Decomposition Products:** Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases, including carbon monoxide, carbon dioxide and other organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation.

**Section 7 - Spill or Leak Procedures**

Avoid contact with spilled or released material. Immediately remove all contaminated clothing. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. Observe all relevant local and international regulations.

**Protective Measures:** Isolate hazard area and deny entry to unnecessary or unprotected personnel. Stay upwind and keep out of low areas. Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. Attempt to disperse the vapor or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Ventilate contaminated area thoroughly.

**Clean Up Methods:** For large liquid spills (>1 drum), transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.

For small liquid spills (<1 drum), transfer by mechanical means to a labelled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.

**Additional Advice:** Notify authorities if any exposure to the general public or the environment occurs or is likely to occur. Local authorities should be advised if significant spillages cannot be contained. The vapor is heavier than air, spreads along the ground and distant ignition is possible. Vapor may form an explosive mixture with air. U.S. regulations may require reporting releases of this material to the environment which exceed the reportable quantity (refer to Chapter 15) to the National Response Centre at (800) 424-8802.

**Disposal Considerations:**

**Material Disposal:** Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations.

**Container Disposal:** Drain container thoroughly. After draining, vent in a safe place away from sparks and fire. Residues may cause an explosion hazard. Do not puncture, cut or weld uncleaned drums. Send to drum recoverer or metal reclaimer.

**Local Legislation:** Disposal should be in accordance with applicable regional, national, and local laws and regulations.

<b>Section 8 - Special Protection Information</b>
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The following information, while appropriate for the product, is general in nature. The selection of personal protective equipment will vary depending on the conditions of use.

**Exposure Controls**

**Occupational Exposure Limits:** Toluene (skin): 50 ppm, (TLV/TWA) ACGIH  
OSHA Z1A TWA 100 ppm, 375 mg/m<sup>3</sup>/STEL 150 ppm, 560 mg/m<sup>3</sup>

**Skin Notation:** Means that significant exposure can also occur by absorption of liquid through the skin and of vapor through the eyes or mucous membranes.

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances.

Appropriate measures include: Use sealed systems as far as possible. Adequate ventilation to control airborne concentrations below the exposure guidelines/limits. Local exhaust ventilation is recommended. Firewater monitors and deluge systems are recommended. Eye washes and showers for emergency use.

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**Personal Protective Equipment**

Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

**Respiratory Protection**

If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for organic gases and vapors (boiling point >65°C (149°F)). Where respiratory protective equipment is required, use a full-face mask. Where air-filtering respirators are unsuitable (e.g., airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus. Respirator selection, use and maintenance should be in accordance with the requirements of the OSHA Respiratory Protection Standard, 29 CFR 1920.134.

**Eye Protection:**

Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes.

**Hand Protection:**

Where hand contact with the product may occur, the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: Longer term protection: Viton. Incidental contact/Splash protection: Nitrile rubber. Suitability and durability of a glove is dependent on usage, e.g., frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced.

**Protective Clothing:**

Chemical resistant gloves/gauntlets. Where risk of splashing or in spillage clean up, use chemical resistant one-piece overall with integral hood.

**Environmental Exposure Controls:**

Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapor.

<b>Section 9 – Special Precautions</b>
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**Precautions To Be Taken in Handling And Storage****General Precautions:**

Avoid breathing of or contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Section 8 of this Material Safety Data Sheet. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

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**Handling:** Avoid contact with skin, eyes, and clothing. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Electrostatic charges may be generated during pumping. Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge ( $\leq 1$  m/sec until fill pipe submerged to twice its diameter, then  $\leq 7$  m/sec). Avoid splash filling. Do NOT use compressed air for filling, discharging, or handling operations. Handle and open container with care in a well-ventilated area.

**Storage:** Vapors from tanks should not be released to atmosphere. Breathing losses during storage should be controlled by a suitable vapor treatment system. Bulk storage tanks should be diked (bundled). Must be stored in a diked (bundled) well-ventilated area, away from sunlight, ignition sources and other sources of heat. Keep away from aerosols, flammables, oxidizing agents, corrosives and from other flammable products which are not harmful or toxic to man or to the environment. The vapor is heavier than air. Beware of accumulation in pits and confined spaces.

**Product Transfer:** Keep containers closed when not in use. Do not use compressed air for filling, discharging or handling.

**Recommended Materials:** For containers, or container linings use mild steel, stainless steel.

**Unsuitable Materials:** Natural, butyl, neoprene or nitrile rubbers.

**Container Advice:** Containers, even those that have been emptied, can contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers.

**Additional Information:** Ensure that all local regulations regarding handling and storage facilities are followed.

<b>Section 10 - Regulatory Information</b>
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This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations. The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Federal Regulatory Status

Notification Status

AICS	Listed
DSL	Listed
INV (CN)	Listed
ENCS (JP)	Listed (3)-2
TSCA	Listed

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EINECS	Listed 203-625-9
KECI (KR)	Listed 97-1-298
KECI (KR)	Listed KE-33936
PICCS (PH)	Listed

Comprehensive Environmental Release  
 Compensation & Liability Act (CERCLA)

Toluene (108-88-3) Reportable quantity: 1,000 lbs

Toluene (108-88-3) Reportable quantity: 1,000 lbs  
 Benzene (71-43-2) Reportable quantity: 10 lbs

Clean Water Act (CWA) Section 311

Toluene (108-88-3) Reportable quantity: 1,000 lbs

Toluene (108-88-3) Reportable quantity: 1,000 lbs  
 Benzene (71-43-2) Reportable quantity: 10 lbs

SARA Hazard Categories (311/312)

Immediate (Acute) Health Hazard,  
 Fire Hazard  
 Delayed (Chronic) Health Hazard

SARA Toxic Release Inventory (TI) (313)

Toluene (108-88-3)	100.00%
Benzene (71-43-2)	0.09%

WHMIS Class/Description: Class B2 Flammable Liquid  
 Class D2B Other Toxic Effects - Skin Irritant

DSL/NDSL Status: This product, or all components, are listed on the Domestic Substances List, as required under the Canadian Environmental Protection Act.

Other Regulatory Status:

Warning: This product contains a chemical known to the state of California to cause birth defects or other reproductive harm.

*Toluene	108-88-3	100.00%	Development toxin, Carcinogenic
Benzene	71-43-2	0-09%	Development toxin, Male Reproductive Toxin

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## New Jersey Right-to-Know Chemical List

Toluene	108-88-3	100.00%
Benzene	71-43-2	0.09%

## Pennsylvania Right-to-Know Chemical List

Toluene	108-88-3	100.00%	Environmental hazard Listed.
Benzene	71-43-2	0.09%	Special hazard Environmental hazard Listed

<b>Section 11 - Other Information</b>
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## Transportation Information

## Canadian Road and Rail Shipping Classification

UN/NA Number:	UN1294
Proper Shipping Name:	Toluene
Hazard Class:	Class 3
Subsidiary Class:	9.2 Hazardous to the Environment
Label Required:	Flammable Liquid
Packing Group:	PG II
Shipping Description:	Toluene, Class 3, UN 1294, PGII
Emergency Response Guide No.	130

## WHMIS Label Statements

Hazard Statements:	Flammable Liquid. Irritating to skin.
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## Handling Statements:

Eliminate all ignition sources.  
 Avoid prolonged exposure to vapors.  
 Wear suitable gloves and eye protection.  
 Bond and ground transfer containers and equipment to avoid static accumulation.  
 Empty containers are hazardous, may contain flammable/explosive dusts, liquid residue or vapors. Keep away from sparks and open flames.

## First Aid Statements:

Wash contaminated skin with soap and water.  
 Flush eyes with water.  
 If overcome by vapors remove to fresh air.  
 Do not induce vomiting.  
 Obtain medical attention.

## Uses &amp; Restrictions:

Raw material for use in the chemical industry. Use as a solvent only in industrial manufacturing process.

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US Department of Transportation  
 Classification (49CFR)

Identification number	UN 1294
Proper shipping name	Toluene
Class/Division	3
Packing group	II
Hazardous subst/material RQ:	Toluene/1,000 lb
Emergency Response Guide No.	130

**IMDG**

Identification number	UN 1294
Proper shipping name	Toluene
Class/Division	3
Packing group	II
Marine pollutant:	No

**IATA (Country variations may apply)**

Identification number	UN 1294
Proper shipping name	Toluene
Class/Division	3
Packing group	II

**Toxicological Information**

Basis for Assessment:	Information given is based on product data
Acute Oral Toxicity	Low toxicity: LD50 >2000 mg/kg, Rat Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.
Acute Dermal Toxicity	Low toxicity: LD50 >2000 mg/kg, Rabbit

Acute Inhalation Toxicity	Low toxicity: LC50 >5000 ppm/1 hours, Rat High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness and/or death.
Skin Irritation:	May cause moderate irritation to the skin. Prolonged/repeated contact may cause defatting of the skin which can lead to dermatitis.
Eye Irritation:	Irritating to eyes.
Respiratory Irritation:	Inhalation of vapors or mists may cause irritation to the respiratory system.
Sensitisation:	Not a skin sensitiser.
Repeated Dose Toxicity:	Central nervous system: repeated exposure affects the nervous system. Effects were seen at high doses only. Respiratory system: repeated exposure affects the respiratory system. Effects were seen at high doses only. Kidney: can cause kidney damage.

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Liver: can cause liver damage.

Cardiovascular system: chronic abuse of similar materials has been associated with irregular heart rhythms and cardiac arrest.

Auditory system: prolonged and repeated exposures to high concentrations have resulted in hearing loss in rats. Solvent abuse and noise interaction in the work environment may cause hearing loss.

Repeated inhalation exposure of toluene to animals caused histological changes in the brain, degeneration of the heart tissue, and possible immune suppression.

Intentional abuse of toluene vapors has been linked to damage of brain, liver, kidney and to death.

Mutagenicity:

Not mutagenic

Carcinogenicity:

Not carcinogenic in animal studies.

Material

Toluene

Toluene

Carcinogenicity Classification

ACGIH Group A4; Not classifiable as a human carcinogen

IARC 3: Classification not possible from current data

Reproductive and Development  
Toxicity:

Causes foetotoxicity in animals at doses which are maternally toxic.

Many case studies involving abuse during pregnancy indicate that toluene can cause birth defects, growth retardation and learning difficulties.

There are occupational studies which report an association between inhalation exposure to toluene and adverse effects on reproduction (including spontaneous abortions and birth defects). The methodology of these studies and the reliability of their results have been questions. In a study in rats, inhalation of toluene did not have adverse effects on reproduction.

Ecological Information

Acute Toxicity

Fish:

Aquatic Invertebrates:

Algae:

Toxic:  $1 < LC/EC/IC50 \leq 10$  mg/l

Harmful:  $10 < LC/EC/IC50 \leq 100$  mg/l

Low toxicity:  $LC/EC/IC50 > 100$  mg/l

Mobility

Floats on water. If product enters soil, it will be highly mobile and may contaminate groundwater.

Persistence/degradability:

Readily biodegradable meeting the 10 day window criterion. Oxidises rapidly by photo-chemical reactions in air.

Bioaccumulation:

Does not bioaccumulate significantly.

Other Adverse Effects:

Disposal should be in accordance with applicable regional, national, and local laws and regulations.

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