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1. PRODUCT IDENTIFICATION

Name: *Trichloroethylene*

Synonyms: *1,1,2-trichloroethylene, acetylene trichloride, TCE & trade names*

CAS# 79-01-6

Product Uses: *Vapour degreasing solvent.*

Supplier Identifier: *Megaloid Laboratories Limited
5515 North Service Road, Suite 306
Burlington, Ontario, Canada
L7L 6G4
Phone: 905-337-7411 / Fax: 905-337-1686*

EMERGENCY INFORMATION Call CHEMTREC - (800) 424-9300 (CCN # 693764)

2. HAZARDS

GHS Class <i>(category)</i>	Skin irritant <i>(2)</i>	Eye irritant <i>(2)</i>	STOT <i>(3)</i>	Carcinogen <i>(1B)</i>	Mutagen <i>(3)</i>	Aquatic chronic <i>(3)</i>
Signal Words	DANGER					
Hazard Statements	<i>Causes skin irritation (H315)</i>	<i>Cause serious eye irritation (H319)</i>	<i>May cause dizziness or drowsiness (H336)</i>	<i>May cause cancer (H350)</i>	<i>Suspected of causing genetic defects (H341)</i>	<i>Harmful to aquatic life with long-lasting effects (H412)</i>



Label Pictograms

GHS Precautionary Statements for Labelling

Prevention

P260, P262, P264 Do not breathe vapours. Do not get in eyes, on skin or on clothing. Wash thoroughly after handling.

P273 Avoid release to the environment.

P280	Wear eye protection, protective gloves and clothing of butyl rubber
Response	
P301, P310	If swallowed, immediately call a Poison Center or Doctor.
P304, P340	IF INHALED: remove person to fresh air and keep comfortable for breathing.
P305, P351, P338	IF IN EYES: rinse continuously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P313, P333	If skin irritation or rash occurs, get medical advice/attention.
P331	Do not induce vomiting.
Storage	
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
Disposal	
P501	Dispose of contents and container in accordance with local, regional, national and international regulations.

3. COMPOSITION

Chemical Name:	CAS No.	%	Other Identifiers
Trichloroethylene	79-01-6	100	EC # 201-167-4

4. FIRST AID

Inhalation

Remove from contaminated area promptly. CAUTION: Rescuer must not endanger himself! If breathing stops, administer artificial respiration and seek medical aid promptly.

Skin Contact

Wash with soap and plenty of water. Remove contaminated clothing and do not reuse until thoroughly laundered.

Eye Contact

Wash eyes with plenty of water, holding eyelids open. Seek medical assistance if there is any irritation.

Ingestion

Give plenty of water to dilute product. Do not induce vomiting (NOTE below). Keep victim quiet. If vomiting occurs, lower victim's head below hips to prevent inhalation of vomited material. Seek medical help promptly.

First-aid Comments

Inadvertent inhalation of vomited material may seriously damage the lungs. The danger of this is greater than the risk of poisoning through absorption of this relatively low-toxicity substance. The stomach should only be emptied under medical supervision, and after the installation of an airway to protect the lungs.

5. FIRE FIGHTING & FLAMMABILITY

Extinguishing Media

Suitable Extinguishing Media

Foam, dry chemical, water fog, carbon dioxide, water spray only to cool & dilute, water jet spreads flames

Combustion Products

Depending on conditions, decomposition products may include the following materials: carbon oxides, halogenated compounds, carbon halides, hydrogen chloride, and possible traces of phosgene.

Special Protective Equipment and Precautions for Fire-fighters

Firefighters must wear SCBA. Fire-fighters may enter the area if positive pressure SCBA and full Bunker Gear is worn.

NOTE: *Trichloroethylene may ignite in the presence of a welding torch. Burning trichloroethylene produces highly toxic & corrosive vapours.*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures

Evacuate the area immediately. Isolate the hazard area. Keep out unnecessary and unprotected personnel. Eliminate all ignition sources. Use grounded, explosion-proof equipment. Increase ventilation to area or move leaking container to a well-ventilated and secure area.

Environmental Precautions

If the spill is inside a building, prevent product from entering drains, ventilation systems and confined areas.

Methods and Materials for Containment and Cleaning Up

*Leak Precaution: dyke to control spillage and prevent environmental contamination
Handling Spill: Ventilate contaminated area; recover free liquid with suitable pumps; absorb residue on an inert sorbent, sweep & pick up using plastic or aluminium shovel, & store in closed containers for recycling or disposal.*

Other Information

Report spills to local health, safety and environmental authorities, as required.

7. HANDLING & STORAGE

Precautions for Safe Handling

Avoid generating or breathing product vapour. Product should only be used in equipment designed for the purpose such as a vapour degreaser. Install adequate ventilation to maintain air concentrations below regulated limits (Part 8, below). If dealing with a spill, and ventilation is impossible or impractical, wear a suitable respirator with organic vapour cartridge (see Part 8). Never wear a respirator routinely for handling this product! Effective engineering control of vapour is the ONLY acceptable way to protect people working with this product. Avoid contact with skin & wash work clothes frequently; if there is any danger of contact, wear appropriate protective clothing (Part 8, below). An eye bath & safety shower must be available near the workplace.

Never cut, drill, weld or grind on or near this container. Avoid contact with skin & wash work clothes frequently.

Conditions for Safe Storage

Store & use in a cool, dry environment, away from sources of ignition & oxidizing agents.

NOTE: *Trichloroethylene is hard to ignite, however fire can convert vapours into highly toxic & corrosive gases – Part 5, above.*

8. EXPOSURE CONTROL & PERSONAL PROTECTION

Ontario TWAEV 10ppm / 55mg/m³
 ACGIH TLV 10ppm / 55mg/m³
 OSHA PEL 100ppm / 536mg/m³

Ontario STEV 25ppm / 135mg/m³
 ACGIH STEL 25ppm / 135mg/m³
 OSHA STEL 200ppm / 1070mg/m³

Ventilation	product must be used in specially designed equipment (eg: vapour degreaser); mechanical ventilation may not be required if the equipment is working properly; never use this product in open air relying on exhaust ventilation make respirators (organic vapour cartridge) available for escape in case of spill or equipment failure (store respirators in airtight containers [eg: “Tupperware”, “Zip lock”] to maintain cartridge “freshness”)
Hands	“Viton” gloves – other types also protect, always confirm suitability with supplier
Eyes	Safety glasses with side shields or chemical goggles – always protect eyes!
Clothing	impermeable (hands, above) apron, boots, long sleeves, if splashing is anticipated

9. PHYSICAL PROPERTIES

Appearance	Clear colourless liquid.
Odour	mild, sweet, pleasant ether odour
Odour threshold	80ppm – 100ppm – well above the TLV; hazardous well below the odour threshold!
pH	>= 6.7
Melting Point/Freezing Point	-86.4 °C(-123.52 °F)
Initial Boiling Point/Range	86 to 90 °C(186.8 to 194 °F)
Flash Point	Will not flash
Evaporation Rate	4.5-4.9 (Butyl Acetate =1)
Flammability (Solid, Gas)	Not available
Upper/Lower Flammability or Explosive Limit	8% – 50% – can burn in a fire; trichloroethylene cannot sustain combustion on its own
Vapour Pressure	60mmHg / 8kPa (20°C/ 68°F); also 74.5mmHg / 9.9kPa (25°C / 77°F)
Vapour Density (air = 1)	4.5
Relative Density (water = 1)	1.46 to 1.47 @ 20 °C(68 °F)
Solubility	Slightly Soluble 0.1 to 1 %
Partition Coefficient, n-Octanol/Water (Log Kow)	2.53
Auto-ignition Temperature	410°C & 420°C / 770°F & 788°F
Conversion Factor	1 ppm = 5.36 mg/m ³

Viscosity	0.58centipoise (20°C / 68°F) ¹ – thin, mobile liquid
Physical State	Liquid
Molecular Weight	131 grams per mole
Molecular Formula	C ₂ HCl ₃

10. REACTIVITY

Dangerously Reactive with strong oxidising agents or reducing agents; reactive metals (eg: Na, K, Ca, Ba)

Also Reactive with strong alkalies forming explosive dichloroacetylene gas; copper reacts with any dichloroethylene present to form explosive acetylates; reactive with epoxides; unstabilised trichloroethylene may corrode aluminium, copper, zinc in presence of moisture.

Chemical Stability

Stable; will not polymerize – except under x-ray or other radiation source, or in the presence of aluminium chloride.

Possibility of Hazardous Reactions

Under normal conditions of storage and use, hazardous polymerization will not occur.

Conditions to Avoid

Decomposes in presence of iron, copper, zinc or aluminium at 250-600°C cause decomposition to phosgene; reactive metals cause decomposition to dichloroacetylene.

Mechanical Impact

Not sensitive

11. TOXICITY

Acute Toxicity	
LD₅₀ (oral)	4920, 5400 & 5620mg/kg (rat), 2400mg/kg (mouse), >7330mg/kg (rabbit)
LD₅₀ (skin)	>20,000, & >29,280mg/kg (rabbit), >7800mg/kg (guinea pig) – no mortality reported
LC₅₀ (inhalation)	7175, 7440, 8450, 40,920 & 48,730ppm (mouse), 7250, 12,000, 12,500 & 26,170ppm (rat)

Skin Corrosion/Irritation

Severely irritating if not removed promptly; chemical burns if contact is prolonged (>5 minutes)

Serious Eye Damage/Irritation

Liquid severely irritating, may damage eyes; vapour irritates some above 160ppm, others at 350ppm blurred vision & other disturbances have been reported following contact with eyes

STOT (Specific Target Organ Toxicity) - Single Exposure

Inhalation

Headache, dizziness, drowsiness; intoxication above 350ppm; irritating above 1000ppm; higher levels can lead to numbness, muscle weakness, unconsciousness & even death

Skin Absorption

Slight – no systemic toxic effects by this route

Ingestion

Burning sensation in mouth & throat; headache, dizziness, drowsiness, intoxication & vomiting, followed by muscle weakness, plus possible delayed heart, kidney & liver damage

STOT (Specific Target Organ Toxicity) - Repeated Exposure

Prolonged/repeated exposure may cause dermatitis; neurological issues: headache, sleeplessness, mood change, blurred or tunnel vision, loss of sensation in hands & feet

Respiratory and/or Skin Sensitization

Skin sensitizer in rabbits; despite decades of industrial use, there are almost no cases of human sensitisation

Carcinogenicity

A carcinogen: IARC, Group 1 & NTP; suspected carcinogen ACGIH – A2

NOAEC (carcinogen)

100, 300, 500 & 600ppm (rat, mouse, hamster – exposure for 1.5 to 2 years)

Reproductive Toxicity

Reproductive Effect

no known effect on humans or animals

Mutagen/Teratogen

mutagen in a few animal tests, but not in others¹; not known to be a mutagen or teratogen in humans

Synergistic With

alcohol – exposure to trichloroethylene followed by alcohol ingestion causes upper body flush (“degreasers flush”)

12. ECOLOGICAL INFORMATION

Bioaccumulation	<i>trichloroethylene metabolised & excreted (½-life ~40hr) and will not bioaccumulate</i>
Persistence and Degradability	Biodegradation - <i>aerobic: 19% in 28days (OECD 301D); only in the presence of other carbon sources; anaerobic: 90% in 60days</i> Abiotic Degradation - <i>reacts with atmospheric hydroxyl (OH) radicals; estimated ½-life in air 5-8 days</i>
Mobility in soil, water	<i>shown to have moderate mobility in soil and the water column</i>
Aquatic Toxicity	
LC50 (Fish, 96hr)	<i>28 & 63mg/litre (Jordanella floridae), 41, 44, 47 & 67mg/litre (Pimephelas promelas), 45mg/litre (Lepomis macrochirus) 16mg/litre Limada limada), 52 & 99mg/litre (Cyprinodon variegatus)</i>
EC50 (Crustacea, 48hr)	<i>56mg/litre (Daphnia cucullata), 2.2, 8, 18, 21 & 42-97mg/litre (Daphnia magna), 14mg/litre (Americamysis bahia)</i>
EC50 (Algae)	<i>43 & 450mg/litre (Desmodesmus subspicatus), 95 & 150mg/litre (Skeletonema costatum), 37mg/litre (Chlamydomonas reinhardtii), 175mg/litre (Pseudokirchnerella subcapitata)</i>
EC50 (Bacteria)	<i>235mg/litre (Bacillus subtilis), >400mg/litre (Chilomonas paramecium), 260mg/litre (sewage sludge), 115, 190, 602 & 960mg/litre (Photobacterium phosphoreum), 65 & 547mg/litre (Pseudomonas putida)</i>

13. DISPOSAL

Water Disposal

Do not flush to sewer, recycle solvent if possible, may be incinerated in approved facility with flue gas monitoring and scrubbing after mixing with a suitable flammable waste solvent


Containers

Drums should be reused. Recondition and pressure test by a licensed reconditioner prior to re-use.

Pails must be vented and thoroughly dried prior to crushing and recycling.
IBCs (intermediate bulk containers): polyethylene bottle must be pressure tested & recertified at 30 months. Replace at 60 months (5yrs).
Steel containers must be inspected, pressure tested & recertified every 5 years.

**Never cut, drill, weld or grind on or near this container,
 even if empty**

14. TRANSPORT CLASSIFICATION

Canada TDG	PIN	UN1710	
AND	Shipping Name	Trichloroethylene	
U.S.A. 49 CFR	Class & Packing Group	6.1, PG III	
Marine Pollutant ERAP Required Reportable Quantity E R G No.	Not a Marine Pollutant NO 100lbs (45kg) 160		

15. REGULATIONS

Canada DSL U.S.A. TSCA Europe EINECS	On Inventory On Inventory On Inventory
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U.S.A. Regulations

Immediately Dangerous to Life or Health: 1000 ppm; NIOSH considers trichloroethylene to be a potential occupational carcinogen.

Allowable Tolerances: Tolerances are established for residues of trichloroethylene resulting from its use as a solvent in the manufacture of foods – see FDA Requirements, below.

OSHA Standards: Permissible Exposure Limit: Table Z-2 8-hr Time Weighted Avg: 100 ppm. Permissible Exposure Limit: Table Z-2 Acceptable Ceiling Concentration: 200 ppm. Permissible Exposure Limit: Table Z-2 Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift. Concentration: 300 ppm. Maximum Duration: 5 minutes in any 2 hours. Vacated 1989 OSHA PEL TWA 50 ppm (270 mg/cu m); STEL 200 ppm (1080 mg/cu m) is still enforced in some states.

NIOSH Recommendations: NIOSH considers trichloroethylene to be a potential occupational carcinogen. NIOSH usually recommends that occupational exposures to carcinogens be limited to the lowest feasible concentration. Recommended Exposure Limit: 60 Minute Ceiling Value: 2 ppm. /During the usage of trichloroethylene as an anesthetic agent/ Recommended Exposure Limit: 10 Hour Time-Weighted Average: 25 ppm. /During exposures to trichloroethylene other than as an anesthetic agent

Threshold Limit Values: 8 hr Time Weighted Avg (TWA): 10 ppm; 15min Short Term Exposure Limit (STEL) 25 ppm A2: Suspected human carcinogen.

Atmospheric Standards: This action promulgates standards of performance for equipment leaks of Volatile Organic Compounds (VOC) in the Synthetic Organic Chemical Manufacturing Industry (SOCMI). The intended effect of these standards is to require all newly constructed, modified, and reconstructed SOCMI process units to use the best demonstrated system of continuous emission reduction for equipment leaks of VOC, considering costs, non-air quality health and environmental

impact and energy requirements. Trichloroethylene is produced, as an intermediate or a final product, by process units covered under this subpart. Listed as a hazardous air pollutant (HAP) generally known or suspected to cause serious health problems. The Clean Air Act, as amended in 1990, directs EPA to set standards requiring major sources to sharply reduce routine emissions of toxic pollutants. EPA is required to establish and phase in specific performance based standards for all air emission sources that emit one or more of the listed pollutants. Trichloroethylene is included on this list.

Federal Drinking Water Standards: Maximum contaminant level goals for organic contaminants: Trichloroethylene, MCLG: zero. Maximum contaminant levels (MCL) for organic contaminants apply to community and non-transient, non-community water systems: Trichloroethylene, MCL 0.005 mg/L. EPA 5 ug/l

Clean Water Act Requirements: Toxic pollutant designated pursuant to section 307(a)(1) of the Federal Water Pollution Control Act and is subject to effluent limitations. Trichloroethylene is designated as a hazardous substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance. This designation includes any isomers and hydrates, as well as any solutions and mixtures containing this substance.

CERCLA Reportable Quantities: Persons in charge of vessels or facilities are required to notify the National Response Center (NRC) immediately, when there is a release of this designated hazardous substance, in an amount equal to or greater than its reportable quantity of 100 lb or 45.4 kg. The toll free number of the NRC is (800) 424-8802. The rule for determining when notification is required is stated in 40 CFR 302.4 (section IV. D.3.b).

RCRA Requirements: As stipulated in 40 CFR 261.33, when trichloroethylene, as a commercial chemical product or manufacturing chemical intermediate or an off-specification commercial chemical product or a manufacturing chemical intermediate, becomes a waste, it must be managed according to Federal and/or State hazardous waste regulations. Also defined as a hazardous waste is any residue, contaminated soil, water, or other debris resulting from the cleanup of a spill, into water or on dry land, of this waste. Generators of small quantities of this waste may qualify for partial exclusion from hazardous waste regulations (40 CFR 261.5). A solid waste containing trichloroethylene may or may not become characterized as a hazardous waste when subjected to the Toxicity Characteristic Leaching Procedure listed in 40 CFR 261.24, and if so characterized, must be managed as a hazardous waste. When trichloroethylene is a spent solvent, it is classified as a hazardous waste from a nonspecific source, as stated in 40 CFR 261.31, and must be managed according to state and/or federal hazardous waste regulations.

FDA Requirements: Trichloroethylene is an indirect food additive for use as a component of adhesives. Tolerances are established for residues of trichloroethylene resulting from its use as a solvent in the manufacture of foods as follows:

<u>Food</u>	<u>Parts per million (ppm)</u>
Decaffeinated ground coffee	25
Decaffeinated soluble (instant) coffee extract	10
Spice oleoresins	30 (provided that if other chlorinated solvent residues are also present, the total of such residues in spice oleoresins shall not exceed 30 ppm).

U.S. State Regulations

New Jersey Right-To-Know:

The following materials are non-hazardous, but are among the top five components in this product. No NJ Right-To-Know components exist in this product.

Pennsylvania Right-To-Know

The following non-hazardous ingredients are present in the product are at or greater than 3%. No PA Right-To-Know components exist in this product.

State Drinking Water Standards

Delaware 1 ug/L Florida 3 ug/l New Jersey 1 ug/l

State Drinking Water Guidelines

Arizona 3.2 ug/l Connecticut 5 ug/l Maine 32 ug/l Minnesota 5 ug/L

California Proposition 65 Carcinogens

Warning: The following ingredients present in the product are known to the state of California to cause Cancer:

Chemical Name CAS-No.

Trichloroethylene, stabilized 79-01-6

California Proposition 65 Reproductive Toxins

Warning: The following ingredients present in the product are known to the state of California to cause birth defects, or other reproductive hazards.

No Proposition 65 Reproductive Toxins exist in this product.

16. OTHER INFORMATION

NFPA RATING	Health 2	Flammability 1	Instability 0
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Prepared for Megaloid Laboratories Limited by Richard Koscher
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Key to Abbreviations	ACGIH® = American Conference of Governmental Industrial Hygienists AIHA® = AIHA® Guideline Foundation HSDB® = Hazardous Substances Data Bank IARC = International Agency for Research on Cancer NFPA = National Fire Protection Association NIOSH = National Institute for Occupational Safety and Health NTP = National Toxicology Program OSHA = US Occupational Safety and Health Administration RTECS® = Registry of Toxic Effects of Chemical Substances
References	CHEMINFO database. Canadian Centre for Occupational Health and Safety (CCOHS). HSDB® database. US National Library of Medicine. Available from Canadian Centre for Occupational Health and Safety (CCOHS). NIOSH Pocket Guide database. National Institute for Occupational Safety and Health. Available from Canadian Centre for Occupational Health and Safety (CCOHS). Registry of Toxic Effects of Chemical Substances (RTECS®) database. Dassault Systèmes/BIOVIA ("BIOVIA"). Available from Canadian Centre for Occupational Health and Safety (CCOHS).
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