

MATERIAL SAFETY DATA SHEET

TOLUENE

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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WHMIS Number: 00060271
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Website: <http://www.brenntag.ca>

EMERGENCY TELEPHONE NUMBERS (FOR EMERGENCIES INVOLVING CHEMICAL SPILLS OR RELEASE)

Toronto, ON (416) 226-6117	Montreal, QC (514) 861-1211	Winnipeg, MB (204) 943-8827
Edmonton, AB (780) 424-1754	Calgary, AB (403) 263-8660	Vancouver, BC (604) 685-5036

PRODUCT IDENTIFICATION

Product Name: Toluene.
Chemical Name: Methylbenzene.
Synonyms: Toluol.
Chemical Family: Aromatic Hydrocarbon.
Molecular Formula: C₇H₈.
Product Use: Industrial solvent, cleaner, degreaser.
CAS #: 108-88-3.
WHMIS Classification / Symbol: B-2: Flammable Liquid, D-2B: Toxic (Skin and Eye Irritant).



READ THE ENTIRE MSDS FOR THE COMPLETE HAZARD EVALUATION OF THIS PRODUCT.

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Harmful if inhaled or swallowed. Causes skin and eye irritation. High vapour concentrations may cause drowsiness. See "Other Health Effects" Section. Flammable liquid and vapour. May cause flash fire or explosion. Can decompose at high temperatures forming toxic gases.

POTENTIAL HEALTH EFFECTS

- . Inhalation: Product is irritating to the nose, throat and respiratory tract. See "Other Health Effects" Section.
- . Skin Contact: May cause defatting, drying and cracking of the skin. Prolonged and repeated contact may lead to dermatitis. Skin contact can cause irritation, especially under the finger nails (and other confined spaces such as under rings or watch bands).
- . Skin Absorption: A single, prolonged skin exposure is not likely to result in the absorption of toxic amounts of the material.
- . Eye Contact: Splashes to the eye may cause irritation, redness and pain. Vapours from this product are irritating to the eyes.
- . Ingestion: This product causes irritation, a burning sensation of the mouth and throat and abdominal pain.

Other Health Effects: Effects (irritancy) on the skin and eyes may be delayed, and damage may occur without the sensation or onset of pain. Strict adherence to first aid measures following any exposure is essential.

May cause hearing loss and central nervous system (CNS) depression. CNS depression is characterized by headache, dizziness, drowsiness, nausea, vomiting and incoordination. Severe overexposures may lead to coma and possible death due to respiratory failure. Intentional misuse of organic solvents (eg. "glue sniffing") over prolonged periods of time may be habit forming and lead to behavioural changes. Aromatic hydrocarbons pose potential human health risks which may vary from person to person. Solvent abusers exposed to high doses of aromatic solvents show signs of hearing loss as well as damage to the brain, liver and kidney. (3)

3. COMPOSITION, INFORMATION ON INGREDIENTS (Not Intended As Specifications)

Hazardous Ingredients	CAS No.	ACGIH TLV	%
Toluene	000108-88-3	50 ppm *A4 (Skin)	99 - 100
Benzene	000071-43-2	0.5 ppm *A1	Trace

A1 = Confirmed Human Carcinogen (ACGIH-A1).

A4 = Not classifiable as a human carcinogen. (ACGIH-A4)

Skin Notation: Contact with skin, eyes and mucous membranes can contribute to the overall exposure and may invalidate the TLV. Consider measures to prevent absorption by these routes.

4. FIRST AID MEASURES

FIRST AID PROCEDURES

- . Inhalation: Move victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give cardiopulmonary resuscitation (CPR) if there is no breathing AND no pulse. Obtain medical attention IMMEDIATELY.
- . Skin Contact: Start flushing while removing contaminated clothing. Wash affected areas thoroughly with soap and water. If irritation, redness, or a burning sensation develops and persists, repeat flushing and obtain medical attention.
- . Eye Contact: Immediately flush eyes with running water for a minimum of 20 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY.
- . Ingestion: Do not attempt to give anything by mouth to an unconscious person. If victim is alert and not convulsing, rinse mouth out and give 1/2 to 1 glass of water to dilute material. IMMEDIATELY contact local Poison Control Centre. Vomiting should only be induced under the direction of a physician or a poison control centre. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water. IMMEDIATELY transport victim to an emergency facility.

Note to Physicians: Medical conditions that may be aggravated by exposure to this product include diseases of the skin, eyes or respiratory tract. This product contains materials that may cause severe pneumonitis if aspirated. If ingestion has occurred less than 2 hours earlier, carry out careful gastric lavage; use endotracheal cuff if available, to prevent aspiration. Observe patient for respiratory difficulty from aspiration pneumonitis. Give artificial resuscitation and appropriate chemotherapy if respiration is depressed.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

Flammability Class (WHMIS): B-2: Flammable Liquid.

Flash Point (TCC, Deg. Celsius): 4. (3)
Autoignition Temperature (Deg. Celsius): 535. (3)
Flammability Limits in Air (%): LEL: 1.0. (3) UEL: 8.0. (3)

Hazardous Combustion Products: Thermal decomposition products are toxic and may include oxides of carbon and irritating gases.

Unusual Fire or Explosion Hazards: Vapours from this product are heavier than air, and may "travel" to a source of ignition (eg. pilot lights, heaters, electric motors) some distance away, and then "flash back" to the point of product discharge causing an explosion and fire. Closed containers exposed to heat may explode. Spilled material may cause floors and contact surfaces to become slippery. Enforce NO SMOKING rules in area of use.

Sensitivity to Mechanical Impact: Not expected to be sensitive to mechanical impact.

Rate of Burning: Not available.

Explosive Power: Not available.

Sensitivity to Static Discharge: Expected to be sensitive to static discharge when vapours are present between the lower and upper explosive limits.

EXTINGUISHING MEDIA

Fire Extinguishing Media: Use carbon dioxide or dry chemical media for small fires. If only water is available, use it in the form of a fog. This material may produce a floating fire hazard in extreme fire conditions.

FIRE FIGHTING INSTRUCTIONS

Instructions to the Fire Fighters: Use water spray to cool fire-exposed containers or structures. Use water spray to disperse vapours; re-ignition is possible. Isolate materials that are not involved in the fire and protect personnel. Cool containers with flooding quantities of water until well after the fire is out.

Fire Fighting Protective Equipment: Use self-contained breathing apparatus and protective clothing.

6. ACCIDENTAL RELEASE MEASURES

Information in this section is for responding to spills, leaks or releases in order to prevent or minimize the adverse effects on persons, property and the environment. There may be specific reporting requirements associated with spills, leaks or releases, which change from region to region.

Containment and Clean-Up Procedures: In all cases of leak or spill contact vendor at Emergency Number shown on the front page of this MSDS. Wear protective clothing. Do not use combustible materials such as sawdust as an absorbent. Eliminate all sources of ignition. Collect product for recovery or disposal. For release to land, or storm water runoff, contain discharge by constructing dykes or applying inert absorbent; for release to water, utilize damming and/or water diversion to minimize the spread of contamination. Ventilate enclosed spaces. Notify applicable government authority if release is reportable or could adversely affect the environment.

7. HANDLING AND STORAGE

HANDLING

Handling Practices: Ground and bond equipment and containers to prevent a static charge buildup. Use spark-resistant tools and avoid "splash-filling" of containers. Use normal "good" industrial hygiene and housekeeping practices. Drums which have been exposed to heat may be under internal pressure. These should be cooled and carefully vented before opening. A face shield and apron should be worn. Vent container frequently, and more often in warm weather, to relieve pressure.

Ventilation Requirements: See Section 8, "Engineering Controls".

Other Precautions: Use only with adequate ventilation and avoid breathing vapours or mists. Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after

handling. Wash contaminated clothing thoroughly before re-use. Do not use cutting or welding torches on empty drums that contained this material/product. Absorption via contact with skin, eyes and mucous membranes can contribute to the overall exposure. Consider measures to prevent absorption by these routes. Store wiping rags and similar material in metal cans with tight fitting lids.

STORAGE

Storage Temperature (Deg Celsius): See below.
Ventilation Requirements: See below.

Storage Requirements: Store in a cool, well-ventilated area. Keep away from heat, sparks and flames. Keep containers closed. Do not expose sealed containers to temperatures above 40 Deg. Celsius. Protect from direct sunlight. Protect against physical damage.

Special Materials to be Used for Packaging or Containers: Materials of construction for storing the product include: stainless steel and mild steel. Attacks some types of rubber, plastics and coatings. Confirm suitability of any material before using.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Recommendations listed in this section indicate the type of equipment, which will provide protection against overexposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

ENGINEERING CONTROLS

Engineering Controls: Local exhaust ventilation required. Ventilation should be explosion proof. Make up air should be supplied to balance air that is removed by local or general exhaust ventilation. Ventilate low lying areas such as sumps or pits where dense vapours may collect.

For personnel entry into confined spaces (i.e. bulk storage tanks) a proper procedure must be followed. It must include consideration of, among other things, ventilation, testing of tank atmosphere, provision and maintenance of SCBA, and emergency rescue. Use the "buddy" system. The second person should be in view and trained and equipped to execute a rescue.
(4)

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Contact with skin, eyes and mucous membranes can contribute to the overall exposure and may invalidate the TLV. Consider measures to prevent absorption by these routes.

Eye Protection: Use full face-shield or chemical safety goggles when there is potential for contact. Contact lenses should not be worn when working with this material.

Skin Protection: Gloves and protective clothing made from viton, polyvinyl alcohol (PVA) or nitrile rubber should be impervious under conditions of use. Prior to use, user should confirm impermeability. Attacks some types of rubber, plastics and coatings.

Respiratory Protection: A NIOSH/MSHA-approved air-purifying respirator equipped with organic vapour cartridges for concentrations up to 500 ppm toluene vapours. An air-supplied respirator if concentrations are higher or unknown.

If while wearing a respiratory protection, you can smell, taste or otherwise detect anything unusual, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator to face seal is still good. If it is, replace the filter, cartridge or canister. If the seal is no longer good, you may need a new respirator. (4)

Immediately Dangerous to Life and Health (IDLH) value: 500 ppm. The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory equipment. In the event of failure of respiratory protective equipment, every effort should be made to exit immediately. (4)

Other Personal Protective Equipment: Wear an impermeable apron and boots. Locate safety

laboratory animals.

Respiratory / Skin Sensitization Data: None known.
Synergistic Materials: None known.

Other Studies Relevant to Material: Human toxicity: In two cases of occupational exposure, there were no blood disorders, liver or kidney damage. Historical reports of blood effects caused by Toluene are more than likely due to benzene contamination. Liver and kidney effects, as well as heart disturbances, have been reported in cases of solvent abuse. Reversible kidney failure has resulted from a severe occupational exposure in a paint factory. (4)

Ingestion of Toluene was fatal to an adult within 30 minutes in one reported case. The probable cause of death was depression of the central nervous system (CNS). However, it is possible that the Toluene was aspirated and death was caused by aspiration. (4)

Numerous studies of printers, painters and rubberized-matting workers with chronic exposure to Toluene are inconclusive about chronic CNS damage. Some studies report changes such as memory loss, sleep disturbances, loss of ability to concentrate or inco-ordination, while other studies have reported no effects. Recent studies using neurobehavioural tests have shown altered scores for exposed workers, but whether or not these indicate CNS damage is unclear. (4)

Alterations in vision have been documented following mixed exposure to solvents. It is not possible to attribute these effects to Toluene directly. There is some evidence to suggest that long term exposure to Toluene may effect hearing. However, the limited information available does not allow a conclusion to be drawn. (4)

Most studies reporting kidney damage in people result from solvent abuse. These extreme exposures are not relevant to occupational situations. In epidemiological studies of workers exposed long term to levels up to 200 ppm, no clear evidence of kidney damage was observed. (4)

Minor changes in blood parameters have been observed, but it is generally excepted that Toluene does not cause any significant blood disorders. (4)

Occupational exposure to Toluene (up to 500 ppm) has not been associated with liver effects. (4)

Teratogenic concerns regarding Toluene have arisen due to the effects of solvent abuse. These extreme exposures to Toluene are not relevant in an occupational setting. In epidemiological studies of women who had children with birth defects or had increased spontaneous abortions, it was discovered that these women were exposed to organic solvent, including Toluene, during their pregnancy. However no conclusion can be drawn from these studies because of mixed exposures, small number of cases and the appropriateness of the control group. It is not possible to conclude that Toluene is teratogenic, embryotoxic or fetotoxic based on the available evidence. (4)

One epidemiological study suggests that menstrual function is not affected by exposure to Toluene. There is one report of testicular atrophy and reduced spermatogenesis in one man who abused Toluene for 10 years. (4)

Animal Studies: Application of 0.1 ml undiluted Toluene into rabbit eyes caused slight irritation, when rinsed with a borate solution, and irritation when not rinsed. Application of 2 drops of undiluted Toluene caused slight irritation with no corneal injury. Application of 0.005 mL Toluene (greater than 15 %) caused severe irritation. (4)

Application to the skin of rabbits (0.5 mL) of undiluted Toluene for 4 or 23 hours caused slight to moderate irritation. (4)

The major effect is on the CNS system. Studies with rats have shown that up to approximately 1,000 ppm cause excitation and increased activity. At 2,000 ppm, there is CNS depression with drowsiness, inco-ordination and unconsciousness. Death at higher concentrations is from respiratory failure. Animal studies have indicated that Toluene is not directly toxic to the cardiovascular system. Recovery is rapid following cessation of exposure and studies indicate no permanent damage to the body systems. (4)

No significant toxicity was seen after oral administration of up to 590 mg/Kg to female rats for up to six months. Daily inhalation by rats of concentrations below 400 ppm for up to 24 months also resulted in no significant toxicity. (4)

Studies in rats have shown hearing loss at high frequencies following Toluene exposure both by inhalation (threshold concentration between 700 and 1,000 ppm and orally (620 mg/Kg/day for 4 weeks). This effect has also been observed in a mouse strain with a genetic predisposition to hearing loss. (4)

There is inconclusive evidence for chronic CNS neurotoxicity. Numerous studies on rats and mice have shown reduced performance on some neurobehavioural tests but not others, both during and after Toluene inhalation exposures (usually greater than 500 ppm). Where tests were repeated after an exposure free period, most results were the same as controls. The significance of minor changes in brain cells or in behavioral tests is not known. (4)

Toluene was not carcinogenic in mice and rats exposed by inhalation to 1,200 ppm for 24 months. (4)

Toluene does not appear to be teratogenic, embryotoxic or fetotoxic based on the available information. Several studies have evaluated the potential effects of Toluene on the offspring of rats, mice or rabbits, primarily following inhalation exposure. In one well conducted study, no effects on the offspring were observed in rabbits exposed to 30, 100 or 300 ppm or to 100 or 500 ppm during days 6 - 18 of pregnancy. Maternal toxicity was not observed. In another study, fetotoxicity (reduced fetal weight) was observed in the offspring of rats following exposure to 2,000 ppm for 80 days prior to mating through lactation. Maternal toxicity was observed. (4)

Subtle behavioral effects have been observed in mice and rats after oral or inhalation exposure to Toluene during mating, pregnancy and lactation and/or up to day 48 of life. (4)

No adverse reproductive effects were observed in several studies involving rats or mice, even at maternally toxic doses. Two generations of mice exposed intermittently by inhalation to 2,000 ppm (6 hours/day, 7 days/week) had no reproductive effects. (4)

Toluene was not mutagenic in most of the in vivo and in vitro tests. There is some evidence that it can cause chromosomal damage when injected in vivo into mice, but conflicting results have been obtained. Negative results were obtained following oral administration. (4)

12. ECOLOGICAL INFORMATION

Ecotoxicity: Aromatic hydrocarbons may be bioaccumulative but they have no food chain concentration potential. (3) Harmful to aquatic life at low concentrations.

Toluene Fish toxicity:

24-hour TLm (Fathead Minnow)	= 56	mg/L	(4)
24-hour TLm (Guppy)	= 63	mg/L	(4)
96-hour TLm (Fathead Minnow)	= 34	mg/L	(4)
96-hour TLm (Guppy)	= 59	mg/L	(4)
LC50 24-hour (Bluegill)	= 17	mg/L	(4)
LC50 96-hour (Bluegill)	= 13	mg/L	(4)
LC50 96-hour (Fathead Minnow)	= 34.37	mg/L	(4)
EC50 96-hour (Fathead Minnow)	= 14.6	mg/L	(4)

Environmental Fate: Biodegrades slowly. Volatilizes rapidly. (3)

Can be dangerous if allowed to enter drinking water intakes. Product has an unaesthetic appearance and can be a nuisance. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers.

Toluene released into soil will be lost by evaporation from near surface soils and by leaching into groundwater. Biodegradation occurs in both soil and groundwater, but its apt to be slow especially at high concentrations, which may be toxic to microorganisms. The presence of acclimated microbial populations may allow rapid biodegradation. Toluene will not significantly hydrolyze in soil or water under normal environmental conditions. If Toluene is released into water, its concentration will decrease due to evaporation and biodegradation. This removal could be rapid or take several weeks, depending on temperatures, mixing conditions and acclimation of microorganisms. Toluene will not significantly absorb to sediment or bioconcentrate in aquatic organisms. If released into the atmosphere, Toluene will degrade by reactions with photochemically produced hydroxyl

radicals (half life of 3 hour to slightly over a day) or be washed out by rain. Toluene will not be subjected to direct photolysis. (4)

13. DISPOSAL CONSIDERATIONS

Deactivating Chemicals: Not applicable.

Waste Disposal Methods: This information applies to the material as manufactured. Dispose of waste material at an approved (hazardous) waste treatment/disposal facility in accordance with applicable local, provincial and federal regulations. Do not dispose of waste with normal garbage, or to sewer systems. Reevaluation of the product may be required by the user at the time of disposal since the product uses, transformations, mixtures and processes may influence waste classification.

Safe Handling of Residues: See "Waste Disposal Methods".

Disposal of Packaging: Empty containers retain product residue and can be dangerous. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. Do not expose such containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death. Do not dispose of package until thoroughly washed out.

14. TRANSPORTATION INFORMATION

Please consult the North American Emergency Guidebook, via the UN#, for guidance on addressing spills.

CANADIAN TDG ACT SHIPPING DESCRIPTION:

Toluene, Class 3, UN1294, Pk Gp II.
Label(s)/Placard(s): Flammable Liquid. Exemptions: None known.
ERAP Index: Not applicable.

US DOT CLASSIFICATION (49CFR 172.101, 172.102):

Toluene, Class 3, UN1294, Pk Gp II.
Label(s)/Placard(s): Flammable Liquid.
Reportable Quantity (CERCLA-RQ): 1,000 lbs / 454 Kg. Exemptions: Not applicable.

15. REGULATORY INFORMATION

CANADA

CEPA - NSNR: This material is included on the DSL under the CEPA.
CEPA - NPRI: This material is on the NPRI list of substances.
Controlled Products Regulations Classification (WHMIS): B-2: Flammable Liquid, D-2B: Toxic (Skin and Eye Irritant).

USA

Environmental Protection Act: This material is included on the TSCA Inventory.
OSHA Hazard Communication (29CFR 1910.1200) Classification: Flammable Liquid, Skin and Eye Irritant.

NFPA: 2 Health, 3 Fire, 0 Reactivity. (4)

INTERNATIONAL: This product or its components are on the European inventory of existing commercial chemicals (EINECS).

16. OTHER INFORMATION

ADDITIONAL INFORMATION AND SOURCES USED

1. RTECS-Registry of Toxic Effects of Chemical Substances, Canadian Centre for Occupational Health and Safety RTECS database.
2. Clayton, G.D. and Clayton, F.E., Eds., Patty's Industrial Hygiene and Toxicology, 3rd ed.,

- Vol. IIA,B,C, John Wiley and Sons, New York, 1981.
3. Supplier's Material Safety Data Sheet(s).
 4. "CHEMINFO", through "CCINFODisc", Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada.
 5. Guide to Occupational Exposure Values, 2004, American Conference of Governmental Industrial Hygienists, Cincinnati, 2004.
 6. Lewis, Sr., Richard J., Carcinogenically Active Chemicals, Van Nostrand Reinhold, 1991, ISBN 0-442-31875-8.
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To obtain revised copies of this or other Material Safety Data Sheets, contact your nearest Brenntag Canada Regional office.

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