

Material Safety Data for: Toluene

1. PRODUCT IDENTIFICATION

Name	methylbenzene
Synonyms	toluene, toluol (outdated)
CAS#	108-88-3
EC#	203-625-9
Product Uses	solvent, chemical feedstock, gasoline additive

2. INGREDIENTS

	%	TWAEV / TLV mg/m ³	LD ₅₀ ORAL	(mg/kg) SKIN	LC ₅₀ ppm INHALATION
methylbenzene	100%	50 / 188 (skin)	640*	12,200	400*

3. (a) HAZARDS SUMMARY

Hazards, Quick Guide: flammable liquid, static accumulator, heavy vapour travels, distant ignition and flashback are possible; central nervous effects on inhalation,

Canada – WHMIS
Key:

B 2, D 2A
B 2 – Flash Point <38°C, **B 3** – Flash Point >38°C & <93°C
D 1 – Immediately Toxic, **D 2** – Chronic Toxicity
C – Oxidising Substance, **E** – Corrosive

U.S.A. – HMIS
Key:

Health – 1, Fire – 2, Reactivity – 0
0=minimal, **1**=slight, **2**=moderate, **3**=serious, **4**=severe

3. (b) HAZARDS – TOXICITY

Effects, Acute Exposure

Skin Contact	irritating if not removed
Skin Absorption	yes; no toxic effects likely by this route, but may add materially to exposure by other routes
Eye Contact	irritating
Inhalation	drowsiness & headache above 50ppm; irritation, fatigue & dizziness above 100ppm
Ingestion	as for inhalation – not a route of industrial exposure

Effects, Chronic Exposure

General	prolonged exposure may cause dermatitis & skin cracking; extreme exposure may damage liver & kidneys & neurological effects – associated with solvent “sniffing” & not industrially relevant (also seen in animal testing); hearing damage reported in workers exposed to 300ppm & noise for 2-20 years
Sensitising	not a sensitiser in humans or animals
Carcinogen/Tumorigen	not considered a tumorigen or a carcinogen in humans or animals
Reproductive Effect	fetotoxic in animals and in humans involved in self administration (“sniffing”)
Mutagen	no known effect on humans or animals
Synergistic With	not known
LD ₅₀ (oral)	640mg/kg (rat); also 3000 – 7500mg/kg (rat, several studies)
LD ₅₀ (skin)	12,250/kg (rabbit)
LC ₅₀ (inhalation)	400 – 8000ppm (mouse), 1600ppm (guinea pig), 13,000ppm (rat), 12,000ppm (rabbit)

***NOTE:** Oral LD₅₀ & LC₅₀ test data vary widely between species, and between tests on the same species. The very low oral LD₅₀ of 640mg/kg and LC₅₀ of 400ppm are out of line with other available values and may have no relevance to human toxicity.

Please ensure that this MSDS is given to, and explained to people using this product.

4. FIRST AID

- SKIN: Wash with soap and plenty of water. Remove contaminated clothing and do not reuse until thoroughly cleaned or laundered.
- EYES: Wash eyes with plenty of water, holding eyelids open. Seek medical assistance promptly if there is irritation.
- INHALATION: Remove from contaminated area promptly. **CAUTION: Rescuer must not endanger himself!** If breathing stops, administer artificial respiration and seek medical aid promptly.
- 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.

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. PHYSICAL PROPERTIES

Odour & Appearance	clear, colourless liquid with strong, pleasant gasoline odour
Odour Threshold	below 40ppm
Vapour Pressure	22mmHg / 2.9kPa (20°C / 68°F)
Evaporation Rate (<i>Butyl Acetate = 1</i>)	2
Vapour Density (air = 1)	3.1
Boiling Point	111°C / 231°F
Freezing Point	-95°C / -139°F
Specific Gravity	0.868 (20/20°C)
Water Solubility	0.6 grams per litre (25°C / 77°F)
Also soluble in	most organic solvents
Viscosity	0.6centipoise (20°C / 68°F)
pH	none – (<i>does not liberate hydrogen ions when dissolved</i>)
Conversion Factor	1ppm = 3.76g/m ³
Molecular Weight	92grams per mole

6. FLAMMABILITY & FIRE FIGHTING

Flash Point	4°C / 40°F (closed cup)
Autoignition Temperature	480°C / 896°F – (<i>also given as 552°C / 1025°F</i>)
Flammable Limits	1.1% – 7.1%
Combustion Products	carbon monoxide, nitrogen oxides, smoke, aldehydes & part oxidised hydrocarbon fragments,
Fire Fighting Precautions	CO ₂ , foam, dry chemical, water fog or spray to cool, product floats on water – water jet spreads flames; fire fighters must wear SCBA
Static Charge Accumulation	readily accumulates a static charge on agitation or pumping – <i>always ground or bond containers & pumps on product transfer</i>

7. STABILITY / REACTIVITY

Dangerously Reactive With	strong oxidising agents, nitric acid, sulphuric acid, nitrogen tetroxide
Also Reactive With	sulphur dichloride, uranium hexafluoride, and tetranitromethane
Stability	stable; will not polymerize
Decomposes in Presence of	not known
Decomposition Products	none apart from Hazardous Combustion Products
Sensitive to Mechanical Impact	no

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8. PROTECTIVE EQUIPMENT / EXPOSURE CONTROL

ACGIH TLV	50ppm / 188mg/m ³ (skin)
OSHA PEL	200ppm / 750mg/m ³
OSHA PEL	300ppm / 1130mg/m ³ (ceiling)
Ventilation	mechanical ventilation may be required to maintain airborne titre below TWAEV; depending on handling procedures; respirators with organic vapour cartridge should be available for "escape" should ventilation fail; store respirators in sealed containers ("Tupperware" or "Zip Lock")
Hands	"Viton" gloves recommended – <i>other types may also protect; consult supplier to confirm suitability</i>
Eyes	safety glasses with side shields – <i>always protect the eyes</i>
Clothing	wear impermeable (above) apron, boots, & long sleeves if there is any danger of splashing

9. HANDLING & STORAGE

Store in a cool, dry environment, away from sources of ignition, heat and oxidising agents. Always use non-sparking bronze or aluminium hand tools. All electrical and mechanical equipment (including lighting, switchgear, pumps and forklift trucks) used with or around this product must be explosion-proof.

This product accumulates and retains a static charge on agitation or transfer from one container to another. Ground or electrically bond both the source container and the receiving container, and the transfer pump before transferring contents. If transferring drum quantities, avoid splashing by ensuring that the product nozzle is below the surface in the receiving container. Empty containers may contain a flammable / explosive vapour. Always ensure that containers, whether empty or full, or part full, are well sealed unless in use.

Avoid breathing product vapour. Use with adequate ventilation. If dealing with a spill, and ventilation is impossible or impractical, wear a suitable respirator (see Part 8).

Never cut, drill, weld or grind on or near this container. Avoid contact with skin and wash work clothes frequently. An eye bath and safety shower must be available near the workplace.

WHEN FILLING STORAGE TANKS WITH THIS PRODUCT, IN ADDITION TO NORMAL GROUNDING PROCEDURES, READ THE FOLLOWING:
This product may form an explosive mixture inside a bulk storage tank. Prior to filling a bulk storage tank with this product, consider ventilating the headspace with nitrogen. In addition, consider asking the supplier to put an anti-static additive in the product when you order. If the bulk tank has a floating product level indicator, this should be inspected regularly. The float MUST HAVE a firmly fixed ground wire connecting it to its support cable. This connection must be free of corrosion.
Consult NFPA 77, 2007: "Recommended Practice on Static Electricity"

10. SPILL PROCEDURES

Serious Fire Potential: blanket spill with foam as a precaution against accidental ignition. Take extreme care to avoid sparks – do not operate (turn on OR off) electrical appliances near spill, unless explosion proof.

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

11. DISPOSAL

Waste Disposal	do not flush to sewer , recycle solvent if possible, may be incinerated in approved facility
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. <i>Never cut, drill, weld or grind on or near this container, even if empty</i>

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12. ENVIRONMENTAL INFORMATION

Bioaccumulation	this product is not a bioaccumulator
Biodegradation	this product degrades readily and rapidly in the presence of oxygen; soil ½-life from hours to 70 days;
Abiotic Degradation	in ground water complete degradation was seen in 8 days; faster degradation likely in sewage sludge
Mobility in soil, water	this product reacts with atmospheric hydroxyl radicals; its estimated half-life in air is 3 days
Aquatic Toxicity	this product is slightly water soluble and move moderately rapidly in soil and water
LC ₅₀ (Fish, 96hr)	66mg/litre (Pimephelas promelas), 13&58mg/litre (Carcassius auratus), 59mg/litre (Lebistes reticulatus), 13mg/litre (Lepomis macrochirus)
EC ₅₀ (Crustacea 24hr)	270mg/litre (Daphnia magna), 24-74mg/litre (Nitocra spinipes), 17mg/litre (Palaemoentes pugio)
EC ₅₀ (Algae)	245mg/litre (Chlorella vulgaris), 125-160mg/litre (Scenedesmus subspicatus)

13. TRANSPORT REGULATIONS

Canada TDG	PIN	UN-1294
	Shipping Name	toluene
	Class	3
	Packing Group	II
U.S.A. 49 CFR	PIN	UN-1294
	Shipping Name	toluene
	Class	3
	Packing Group	II
Marine Pollutant		not a marine pollutant

14. EMERGENCY INFORMATION

Canada	Call CANUTEC (collect)	(613) 996-6666
U.S.A.	Call CHEMTREC	(800) 424-9300

15. REGULATIONS

Canada DSL	on inventory
U.S.A. TSCA	on inventory
Europe EINECS	on inventory (EC# 203-625-9)

Immediately Dangerous to Life or Health: 500 ppm

Allowable Tolerances: Toluene is exempted from the requirement of a tolerance when used as a solvent or cosolvent in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops only.

OSHA Standards: Permissible Exposure Limit: Table Z-2 8-hr Time Weighted Avg: 200 ppm. Permissible Exposure Limit: Table Z-2 Acceptable Ceiling Concentration: 300 ppm. Permissible Exposure Limit: Table Z-2 Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift. Concentration: 500 ppm. Maximum Duration: 10 minutes. Vacated 1989 OSHA PEL TWA 100 ppm (375 mg/cu m); STEL 150 ppm (560 mg/cu m) is still enforced in some states.

NIOSH Recommendations: Recommended Exposure Limit: 10 Hr Time-Weighted Avg: 100 ppm (375 mg/cu m). Recommended Exposure Limit: 15 Min Short-Term Exposure Limit: 150 ppm (560 mg/cu m).

Threshold Limit Values: 8 Hr Time Weighted Avg (TWA): 50 ppm, skin Excursion Limit Recommendation: Excursions in worker exposure levels may exceed 3 times the TLV-TWA for no more than a total of 30 minutes during a work day, and under no circumstances should they exceed 5 times the TLV-TWA, provided that the TLV-TWA is not exceeded. Biological Exposure Index (BEI): Determinant: o-Cresol in urine; Sampling Time: end of shift; BEI: 0.5 mg/L. The determinant may be present in biological specimens collected from subjects who have not been occupationally exposed, at a concentration which could affect interpretation of the result. Such background concentrations are incorporated in the BEI value. Biological Exposure Index: Determinant: Hippuric acid in urine; Sampling Time: end of shift; BEI: 1.6 g/g creatinine. The determinant may be present in biological specimens collected from subjects who have not been occupationally exposed, at a concentration which could affect interpretation of the result. Such background concentrations are incorporated in the BEI value. The determinant is nonspecific, since it is also observed after exposure to other chemicals. Biological Exposure Index: Determinant: toluene in blood; Sampling Time: prior to last shift of workweek; BEI: 0.05 mg/L. A4; Not classifiable as a human carcinogen.

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15. REGULATIONS (cont'd)

Atmospheric Standards: This action promulgates standards of performance for equipment leaks of Volatile Organic Compounds (VOC) in the Synthetic Organic Chemical Manufacturing Industry. The intended effect of these standards is to require all newly constructed, modified, and reconstructed SOCM 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. Toluene is produced, as an intermediate or a final product, by process units covered under this subpart. Listed as a hazardous air pollutant 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. Toluene is included on this list.

Federal Drinking Water Standards: EPA 1000 ug/l

Federal Drinking Water Guidelines: EPA 1000 ug/l

State Drinking Water Standards: California 150 ug/l

State Drinking Water Guidelines: Arizona 2000 ug/l, Florida 40 ug/l, Maine 1400 ug/l, Minnesota 1000 ug/l, Washington 800 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. Toluene 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. For the protection of human health from the toxic properties of toluene ... the ambient water criterion is determined to be 14.3 mg/l. The maximum contaminant level (MCL) set forth by the National Revised Primary Drinking Water Regulations for the organic contaminant toluene in community and non-transient, non-community water systems is 1 mg/l.

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 1000 lb or 454 kg. The toll free number of the NRC is (800) 424-8802; In the Washington D.C. metropolitan area (202) 426-2675. The rule for determining when notification is required is stated in 40 CFR 302.4 (section IV. D.3.b).

TSCA Requirements: Pursuant to section 8(d) of TSCA, EPA promulgated a model Health and Safety Data Reporting Rule. The section 8(d) model rule requires manufacturers, importers, and processors of listed chemical substances and mixtures to submit to EPA copies and lists of unpublished health and safety studies. Toluene is included on this list.

RCRA Requirements: As stipulated in 40 CFR 261.33, when toluene, 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. When toluene 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.

FIFRA Requirements: Toluene is exempted from the requirement of a tolerance when used as a solvent or cosolvent in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops only.

FDA Requirements: Toluene is an indirect food additive for use only as a component of adhesives.

16. PREPARATION INFORMATION

Prepared for Megaloid Laboratories by Peter Bursztyn, (705) 734-1577

File Name: Toluene

Data from RTECS, Haz. Substance Data Base, Cheminfo, manufacturer data, and other source, as available

Preparation Date: **March 2004** Revision Date: **May 2006, November 2008, December 2009**

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