

Material Safety Data for: Methyl Methacrylate

1. PRODUCT IDENTIFICATION

Name	methyl 2-methyl-2-propenoate
Synonyms	methyl methacrylate, methyl alpha-methyl methacrylate, methylpropylene-2-carboxylate
CAS#	80-62-6
Product Uses	monomer for acrylic polymers; clear acrylic plastics (Lucite, Perspex, Plexiglass, etc)

2. INGREDIENTS

	%	TWAEV / TLV mg/m ³	LD ₅₀ ORAL	(mg/kg) SKIN	LC ₅₀ ppm INHALATION
methyl 2-methyl-2-propenoate	100%	50 / 205	3625	>5000	3205

3. (a) HAZARDS SUMMARY

Hazards, Quick Guide: flammable liquid, heavy vapour may travel, distant ignition and flashback are possible, mildly irritating to skin and eyes; possible human mutagen; *highly reactive if adequate inhibitor is not present*

Canada – WHMIS

Key:

B 2, D 2B, F* (* in the absence of inhibitor)

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, **F** – Dangerously Reactive

U.S.A. – HMIS

Key:

Health – 2, Fire – 3, Reactivity – 3

0=minimal, 1=slight, 2=moderate, 3=serious, 4=severe

3. (b) HAZARDS – TOXICITY

Effects, Acute Exposure

Skin Contact	mild skin irritant – (slight redness observed after 48 hour skin contact)
Skin Absorption	yes, but no toxic effects likely by this route
Eye Contact	not known – animal tests suggest product is a mild eye irritant
Inhalation	probably irritating; readily forms vapour which may cause headache, dizziness, nausea, and incoordination; higher concentrations may cause pulmonary oedema
Ingestion	not known; effects probably like those of inhalation – not a route of industrial exposure

Effects, Chronic Exposure

General	prolonged exposure may cause pulmonary effects including airways obstruction and coughing; chronic headache, dizziness & nausea may occur
Sensitising	skin & respiratory sensitiser
Carcinogen/Tumorigen	not considered a tumorigen or a carcinogen in humans or animals
Reproductive Effect	no known effect in humans or animals
Mutagen	animal mutagen; equivocal evidence for mutagenicity in humans
Synergistic With	not known
LD ₅₀ (oral)	7870mg/kg (rat), 3625mg/kg (mouse), 4725mg/kg (dog), 8700mg/kg (rabbit), 5950mg/kg (guinea pig)
LD ₅₀ (skin)	>5000mg/kg (rabbit), >7550mg/kg (rabbit)
LC ₅₀ (inhalation)	7090ppm (rat), 3205ppm (mouse)

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

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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 a pungent, acrid, fruity odour
Odour Threshold	below 0.03ppm
Vapour Pressure	29mmHg / 3.87kPa (20°C / 68°F)
Evaporation Rate (<i>Butyl Acetate = 1</i>)	3.1
Vapour Density (air = 1)	3.5
Boiling Range	100-101°C / 212-214°F
Freezing Point	-48°C / -54°F
Specific Gravity	0.944 (20/20°C)
Water Solubility	15grams/litre (20°C / 68°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 = 4.09mg/m ³
Molecular Weight	100grams per mole

6. FLAMMABILITY & FIRE FIGHTING

Flash Point	2°C / 36°F (closed cup); 10°C / 50°F (open cup)
Autoignition Temperature	435°C / 815°F
Flammable Limits	1.7% – 12.5%
Combustion Products	methacrylic acid, carbon monoxide, nitrogen oxides, part-oxidised hydrocarbon fragments
Fire Fighting Precautions	alcohol or polymer foam, dry chemical, carbon dioxide; water fog or spray to cool intact containers, product floats on water – water jet spreads flames; fire fighters must wear SCBA probably will not accumulates a static charge on agitation or pumping
Static Charge Accumulation	

7. STABILITY / REACTIVITY

Dangerously Reactive With	strong oxidising agents; strong acids; strong alkalis; amines, halogens, iron or copper may cause explosive polymerisation; propionaldehyde may cause explosion
Also Reactive With	none known
Stability	vapour and liquid may polymerise explosively in the absence of inhibitor, if heated, if exposed to either incompatible materials or to ultraviolet light; inhibitor only effective in the presence of oxygen
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 / 205mg/m ³
OSHA PEL	100ppm / 410mg/m ³
STEL	100ppm / 410mg/m ³
Ventilation	mechanical ventilation is required to maintain airborne titre below regulated limits; alternatively, processing should be carried out in a sealed reaction vessel
Hands	“Responder” or “Tychem” gloves – <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. Maximum storage time is one year. If storing for longer than a month, test product regularly to ensure that an adequate concentration of polymerisation inhibitor is present. These include: *hydroquinone, 22-65 ppm; hydroquinone methyl ether, 22-120 ppm; dimethyl tert-butylphenol, 45-65 ppm*. Do not store under an inert gas. The inhibitors are only effective in the presence of oxygen. Ensure that storage containers have adequate pressure/vacuum relief valves to prevent positive or negative pressure build-up.

Use non-sparking bronze or aluminium hand tools. All electrical and mechanical equipment (including lighting, switchgear and forklift trucks) used with or around this product must be explosion-proof. Although this product cannot retain a static charge on agitation or transfer from one container to another, its flash point is low and it is prudent to ground or electrically bond both the source container and the receiving container, and transfer pump before transferring contents. Avoid splashing by ensuring that the product nozzle is below the surface in the receiving container.

Avoid breathing product vapour. Use with adequate ventilation. If dealing with a spill, and ventilation is impossible or impractical, wear a suitable respirator with organic vapour cartridge.

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.

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 Containers	do not flush to sewer , recycle solvent if possible, may be incinerated in approved facility 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 in the presence of oxygen; 42-66% biodegradation in ~20 days; other tests show even more rapid and complete biodegradation
Abiotic Degradation	this product reacts with atmospheric hydroxyl radicals; estimated half-life in air is around one day
Mobility in soil, water	this product is water soluble and will move readily in soil and water
Aquatic Toxicity	
LC ₅₀ (Fish, 96hr)	191, 232 & 283mg/litre (Iepomis macrochirus), >79mg/litre (oncorhynchus mykiss), 277mg/litre (carassius auratus), 368mg/litre (Iebistes reticulatus), 130, 160, 311 & 410mg/litre (pimephelas promelas) & others
EC ₅₀ (Crustacea, 48hr)	69mg/litre (daphnia magna)
EC ₅₀ (Algae)	170mg/litre (selenastrum capricornutum)
EC ₅₀ (Bacteria)	178mg/litre (chilomonas paramecium)

13. TRANSPORT REGULATIONS

<i>Canada TDG</i>	PIN	UN-1247
<i>AND</i>	Shipping Name	methyl methacrylate monomer, stabilised
<i>U.S.A. 49 CFR</i>	Class	3
	Packing Group	II
Marine Pollutant		not a marine pollutant

14. EMERGENCY INFORMATION

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

15. REGULATIONS

Canada DSL	on inventory
U.S.A. TSCA	on inventory
Europe EINECS	on inventory (EC# 201-297-1)

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15. REGULATIONS, USA, cont'd

Immediately Dangerous to Life or Health: 1000 ppm

Acceptable Daily Intakes: AN ADI /ACCEPTABLE DAILY INTAKE/ OF 0.1 MG/KG/DAY WAS CALCULATED ON BASIS OF AVAILABLE CHRONIC TOXICITY DATA.

Allowable Tolerances: Methyl methacrylate is exempted from the requirement of a tolerance when used as a surfactant or a related adjuvant 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-1 8-hr Time Weighted Avg: 100 ppm (410 mg/cu m).

NIOSH Recommendations: Recommended Exposure Limit: 10 hr Time-Weighted avg: 100 ppm (410 mg/cu m).

Threshold Limit Values: 8 hr Time Weighted Avg (TWA): 50 ppm; 15 min Short Term Exposure Limit (STEL): 100 ppm. Sensitization. A4; Not classifiable as a 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. Methyl methacrylate 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. Methyl methacrylate is included on this list.

State Drinking Water Guidelines: Maine 560 ug/l, Florida 210 ug/l

Clean Water Act Requirements: 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.

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. Methyl methacrylate is on this list.

RCRA Requirements: As stipulated in 40 CFR 261.33, when methyl methacrylate, 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).

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

FDA Requirements: Homopolymers and copolymers of Methyl methacrylate are an indirect food additive for use only as a component of adhesives. Substances used in the manufacture of paper & paperboard products used in food packaging shall incl methyl methacrylate copolymers of itaconic acid ... for use only on paper & paperboard which is waxed. Under the conditions of normal use, these substances would not reasonably be expected to migrate to food, based on available scientific information & data. /Methyl methacrylate copolymers/

16. PREPARATION INFORMATION

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

File Name: **methyl methacrylate**

With data from RTECS, Haz. Substance Data Base, Cheminfo (CCOHS), IUCLID Datasheets (European Chem. Substance Info. System), & others, as available

Preparation Date: **December 2006** Revision Date: **November 2009**

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