Safety Data Sheet

1. **PRODUCT IDENTIFICATION**

- **Name**: Methyl Methacrylate
- **Synonyms**: methyl 2-methyl-2-propenoate; 2-methyl propenoic acid, methyl ester; methyl-alpha-methyl acrylate; MMA; methacrylic acid, methyl ester
- **CAS#**: 80-62-6
- **Europe EC#**: 201-297-1
- **Product Uses**: monomer for manufacture of acrylic plastics & coating resins

2. **HAZARDS**

**Quick Guide**: flammable liquid, heavy vapour may travel, distant ignition and flashback are possible, irritating to skin and eyes; skin sensitiser; central nervous depressant

- **Canada – WHMIS**: B 2, D 2B, F* (*in the absence of inhibitor)
  - **Key**: 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 – Reactive Substance

- **U.S.A. – HMIS**: Health – 2/3, Fire – 3, Reactivity – 2 (4*) (*reactive if not stabilised)
  - **Key**: 0=minimal, 1=slight, 2=moderate, 3=serious, 4=severe

3. **COMPOSITION**

<table>
<thead>
<tr>
<th>%</th>
<th>TWAEV / TLV mg/m³</th>
<th>LD₅₀ (mg/kg) ORAL</th>
<th>LD₅₀ (mg/kg) SKIN</th>
<th>LC₅₀ ppm INHALATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>50 / 205</td>
<td>3625</td>
<td>&gt;5000</td>
<td>3205</td>
</tr>
</tbody>
</table>

methyl 2-methyl-2-propenoate

4. **FIRST AID**

- **SKIN**: Wash with plenty of water. Remove contaminated clothing and do not reuse until thoroughly 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.

*Please ensure that this MSDS is given to, and explained to people using this product.*
5. **FIRE FIGHTING & FLAMMABILITY**

Flash Point 2°C / 36°F (closed cup); 10°C / 50°F (open cup)
Autoignition Temperature 435°C / 815°F
Flammable Limits 1.7% – 8.2%
Combustion Products carbon monoxide, nitrogen oxides, smoke, part oxidised hydrocarbon fragments
Firefighting Precautions alcohol or polymer foam, dry chemical, water fog or spray, product floats on water; firefighters must wear SCBA
Static Charge Accumulation probably not a static accumulator – *esters tend to have high electric conductivity*

6. **ACCIDENTAL RELEASE MEASURES**

**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

7. **HANDLING & STORAGE**

Store – no longer than 6 months – below 25°C, & away from substances named in Part 10. *Take extreme care to avoid sparks. Use only non-sparking bronze or aluminium hand tools. All electrical and mechanical equipment (including lighting, switchgear & 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 & it is prudent to ground or electrically bond the source container, receiving container, & transfer pump before transferring contents. Avoid splashing by ensuring the product nozzle is below the surface in the receiving container.

*Never use compressed air to transfer this product.*

If stored over one month, check titre of inhibitor (*hydroquinone 100-200ppm is often used*). Replenish as necessary. *The inhibitor requires oxygen to work properly! Never store the product under nitrogen!*

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

Never cut, drill, weld or grind on or near this container. *Empty containers may contain a flammable vapour! Avoid contact with skin and wash work clothes frequently.* An eye bath and safety shower must be available near the workplace.

8. **EXPOSURE CONTROL & PERSONAL PROTECTION**

<table>
<thead>
<tr>
<th>Ontario TWAEV</th>
<th>50ppm / 205mg/m³</th>
<th>Ontario STEV</th>
<th>100ppm / 410mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH TLV</td>
<td>50ppm / 205mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OSHA PEL</td>
<td>100ppm / 410mg/m³</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ventilation mechanical ventilation may be needed to control airborne titre to regulated limits
Hands “Tychem” or “Responder” gloves – *others may also protect; consult supplier to confirm suitability*
Eyes safety glasses with side shields – *always protect the eyes*
Clothing wear impermeable (above) apron, boots, & long sleeves if there is any danger of splashing,

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9. **PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odour &amp; Appearance</td>
<td>clear, colourless liquid with fruity but pungent, acrid odour</td>
</tr>
<tr>
<td>Odour Threshold</td>
<td>0.05ppm</td>
</tr>
<tr>
<td>Vapour Pressure</td>
<td>29mmHg / 3.9kPa (20°C / 68°F)</td>
</tr>
<tr>
<td>Evaporation Rate (Butyl Acetate=1)</td>
<td>3.1</td>
</tr>
<tr>
<td>Vapour Density (air = 1)</td>
<td>3.5</td>
</tr>
<tr>
<td>Boiling Range</td>
<td>100-101°C / 212-214°F</td>
</tr>
<tr>
<td>Freezing Point</td>
<td>-48°C / -54°F</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>0.944 (20/20°C)</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>15 grams per litre (20°C / 68°F)</td>
</tr>
<tr>
<td>Also soluble in</td>
<td>most organic solvents, limited solubility in glycols and methanol</td>
</tr>
<tr>
<td>Viscosity</td>
<td>0.6centipoise (20°C / 68°F) – thin mobile liquid</td>
</tr>
<tr>
<td>pH</td>
<td>none – (does not liberate hydrogen ions when dissolved)</td>
</tr>
<tr>
<td>Conversion Factor</td>
<td>1ppm = 4.09mg/m³</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>100grams per mole</td>
</tr>
</tbody>
</table>

10. **REACTIVITY**

- Dangerously Reactive With
  - strong oxidising agents, alkalies, acids; azo-compounds, catalytic metals (copper or iron), reducing agents, amines, halogens & propionaldehyde can cause dangerous, rapid polymerisation
- Also Reactive With
  - none known
- Stability
  - stable in presence of inhibitor; *NOTE:* methyl methacrylate vapour is inhibitor-free & prone to polymerise in storage tank vents; vapour may also polymerize dangerously
- Decomposes in Presence of
  - sunlight, ultraviolet light, ionising radiation may decompose or cause polymerisation
- Decomposition Products
  - auto-oxidation in air may form explosive polyperoxides
- Sensitive to Mechanical Impact
  - no

11. **TOXICITY**

### Effects, Acute Exposure

- Skin Contact: moderate irritant
- Skin Absorption: slight; no toxic effects likely by this route
- Eye Contact: moderate irritant
- Inhalation: irritating above 170ppm; may cause headache, dizziness, drowsiness, intoxication, shortness of breath, chest pain, pulmonary oedema, eventual collapse
- Ingestion: may cause headache, dizziness, drowsiness, intoxication – not a route of industrial exposure

### Effects, Chronic Exposure

- General: pulmonary & neurotoxic effects are proven (*other observations remain unconfirmed*):
  - coughing & mild chronic obstructive pulmonary disease; persistent headaches, dizziness
- Sensitising: skin sensitiser in humans; *not* recognised as a respiratory sensitisere
- Carcinogen/Tumorigen: not considered a tumorigen or a carcinogen in humans or animals
- Reproductive Effect: no known effect in humans or animals
- Mutagen: no known effect on humans or animals
- Synergistic With: not known

| LD₅₀ (oral)     | 7900-9400mg/kg (rat, several tests), 3625 & 5300mg/kg (mouse), 5955mg/kg (guinea pig), 6000 & 8700mg/kg (rabbit), 4725mg/kg (dog) |
| LD₅₀ (skin)     | >5000 & >7550mg/kg (rabbit)                                      |
| LC₅₀ (inhalation) | 7090 & 19,000ppm (rat), 3205 & 4500ppm (mouse)                  |

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12. ECOLOGICAL INFORMATION

Bioaccumulation
this product is rapidly metabolised and is not a bioaccumulator

Biodegradation
this product degrades readily and rapidly in the presence of oxygen; >90% biodegradation in 2 weeks other tests show slower rates of biodegradation

Abiotic Degradation
this product reacts with atmospheric hydroxyl radicals; its estimated ½-life in air is 15hr

Mobility in soil, water
this product is sufficiently water soluble to move readily in soil and water

Aquatic Toxicity

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC₅₀ (Fish, 96hr)</td>
<td>191 &amp; 232-357mg/litre (Lepomis macrochirus), &gt;79mg/litre (Oncorhynchus mykiss), 277mg/litre (Carcassius auratus), 368mg/litre (Lebistes reticulatus), 130-460mg/litre (Pimephales promelas), &amp; others</td>
</tr>
<tr>
<td>EC₅₀ (Crustacea, 48hr)</td>
<td>69 &amp; 720mg/litre (Daphnia magna)</td>
</tr>
<tr>
<td>EC₅₀ (Algae)</td>
<td>170mg/litre (Selenastrum capricornutum)</td>
</tr>
<tr>
<td>EC₂₀ (Bacteria)</td>
<td>&gt;1000mg/litre (&quot;other bacteria&quot;) NOTE: LC₂₀ – only 20% inhibition of growth rate</td>
</tr>
</tbody>
</table>

13. DISPOSAL

Waste Disposal do not flush to sewer, incinerate in approved facility with flue gas monitoring & scrubbing

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.

IBC (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

<table>
<thead>
<tr>
<th>Country</th>
<th>PIN</th>
<th>UN</th>
<th>U.S.A. 49 CFR Class &amp; Packing Group</th>
<th>Marine Pollutant</th>
<th>ERAP Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>PIN</td>
<td>UN - 1247</td>
<td>Class &amp; Packing Group</td>
<td>not a marine pollutant</td>
<td>NO</td>
</tr>
<tr>
<td>AND</td>
<td>Shipping Name</td>
<td>methyl methacrylate monomer, stabilised</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S.A. 49 CFR</td>
<td>3 (II)</td>
<td></td>
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</tbody>
</table>

EMERGENCY INFORMATION

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

15. REGULATIONS

<table>
<thead>
<tr>
<th>Region</th>
<th>Inventory</th>
<th>Classification</th>
<th>Risk Phrases</th>
<th>Safety Phrases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada DSL</td>
<td>on inventory</td>
<td>Harmful</td>
<td>R: 11, 37/38, 43 – Highly flammable. Irritating to respiratory system and skin. May cause sensitization by skin contact</td>
<td>S: 24, 37, 46 – Avoid contact with skin. Wear suitable gloves. If swallowed, seek medical advice immediately</td>
</tr>
<tr>
<td>U.S.A. TSCA</td>
<td>on inventory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe EINECS</td>
<td>on inventory</td>
<td></td>
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</table>

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Product Name: Methyl Methacrylate

15. REGULATIONS, 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.

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: Florida 25 ug/L

Clean Water Act Requirements: Methyl methacrylate 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 1000 lb or 454 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).

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 included on this list. Effective date 4/13/89; Sunset date: 6/30/98.

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).

FDA Requirements: Homopolymers and copolymers of methyl methacrylate are an indirect food additive for use only as a component of adhesives.

16. OTHER INFORMATION

Prepared for Megaloid Laboratories by Peter Bursztyn, (705) 734-1577
Data from RTECS, HSDB (Haz. Substance Data Base), Cheminfo (CCOHS), IUCLID Datasheets (ESIS – European Chem. Substance Info. System), & others.
Preparation Date: December 2006  Revision Date: November 2009, November 2012

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