1. Identification

Product name: Methyl Methacrylate
Supplier: Sumitomo Chemical Singapore Pte Ltd
Supplier’s address: 150 Beach Road #19-05 Gateway West Singapore 189720
Office No.: +65 6499 4306
(For all other enquiries)
Manufacturer: Singapore Methyl Methacrylate Pte. Ltd.
Manufacturer’ address: 17 Sakra Road #01-02 Singapore 627886
24-hour Emergency No: NCEC
(For advice on chemical emergencies, spillages, fires or First Aid)
+ 44 (0) 1235 239 670 [Europe, Americas, Israel]
+ 44 (0) 1235 239 671 [Middle East/Africa]
+ 65 3158 1074 [Asia Pacific region (excluding China)]
+ 86 10 5100 3039 [China]
Office Fax No.: +65 6867-6749
Recommended use and restriction for use: Precautions are for general use only. For special handling, use only after implementing the safety measure appropriate for the application and usage.

2. Hazard(s) Identification

Most important hazards and effects
Adverse human health effects: Irritation to eyes, skin, and airway. Sensitization to skin and airway. High level or prolonged exposure may affect central nerve system.
Environmental effects: May contain formulations harmful to aquatic life. Readily biodegradable.
Physical and chemical hazards: Flammable liquid. Heat, spark, or flame may cause combustion. Vapor-air mixtures are explosive. Keep Fire Away. Elevated temperatures, sunlight, low-oxygen atmosphere, or coexisting catalytic substances such as peroxides may cause polymerization or other self-reaction followed by exothermic, combustive or explosive events.
Specific hazards: No information available.

GHS Classification
Physical hazards: Highly flammable liquids Category 2
Self-reactive substances and mixtures Classification not possible
Pyrophoric liquid Not classified
Self-heating substances and mixtures Classification not possible
Corrosive to metals Classification not possible
Health hazards: Acute toxicity, oral Not classified
Acute toxicity, dermal Not classified
Acute toxicity, inhalation (vapor) Category 4
Acute toxicity, inhalation (mist) Classification not possible
Skin corrosion/irritation Category 2
Serious eye damage/eye irritation Category 2A
**Sensitisation, respiratory** Category 1  
**Sensitisation, skin** Category 1  
**Germ cell mutagenicity** Classification not possible  
**Carcinogenicity** Not classified  
**Reproductive toxicity** Category 2  
**Specific target organ toxicity, single exposure** Category 3 (respiratory tract irritation, narcotic effects)  
**Specific target organ toxicity, repeated exposure** Category 1 (organ of respiration, central nerve system)  

**Aspiration hazard** Classification not possible

**Environmental hazards**

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous to the aquatic environment, acute toxicity</td>
<td>Not classified</td>
</tr>
<tr>
<td>Hazardous to the aquatic environment, chronic toxicity</td>
<td>Not classified</td>
</tr>
</tbody>
</table>

**Label elements**

### Pictogram

![Pictogram](image)

**Signal word** Danger

**Hazard statements**

- Highly flammable liquid and vapor
- Harmful if inhaled
- Cause skin irritation
- Cause serious eye irritation
- May cause allergy or asthma symptoms or breathing difficulties if inhaled
- May cause an allergic skin reaction
- Suspected of damaging fertility or the unborn child
- May cause respiratory irritation
- May cause drowsiness or dizziness
- Cause damage to organ of respiration and central nerve system through prolonged or repeated exposure
- Harmful to the aquatic life

### Precautionary statements

**[Prevention]**

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep container tightly closed. Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Wear protective gloves/eye protection/face protection. Use personal protective equipment as requested. Ground/Bond container and receiving equipment. Use explosive-proof electrical/ventilating/lighting equipment. Take precautionary measures against static discharge. Use only non-sparking tools. Wash thoroughly after handling. Avoid breathing mist/vapors/spray. In case of inadequate ventilation; wear respiratory protection. Contaminated work clothing should not be allowed out of the workplace. Use only outdoors or in a well-ventilated area. Do not eat, drink or smoke when using this product. Avoid release to the environment.

**[Response]**

In case of fire: use appropriate media for extinction. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with plenty of soap and water/shower. IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in...
a position comfortable for breathing. Call a doctor/physician if you feel unwell or experiencing respiratory symptoms. If skin irritation or rash occurs: Get medical advice/attention. Take of contaminated clothing and wash before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If exposed or concerned: Get medical advice/attention. Get medical advice/attention if you feel unwell.

[Storage]
Store in a well-ventilated place. Store locked up. Keep cool.

[Disposal]
Dispose of contents/container in accordance with local/regional/national/international regulations.

### 3. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Substance</th>
<th>Single product</th>
</tr>
</thead>
<tbody>
<tr>
<td>General information</td>
<td>Methyl methacrylate</td>
</tr>
<tr>
<td>Common chemical name</td>
<td>Methyl methacrylate</td>
</tr>
</tbody>
</table>
| Synonyms | Methacryl acid, methyl ester  
2-Propenoic acid, 2-methyl-, methyl ester  
Methyl-2-methyl-2-propenoate |
| Chemical formula | CH₂C(CH₃)COOCH₃ |
| CAS number | 80-62-6 |
| Concentration | 99.8% ≤ |

### 4. First-aid Measures

**Inhalation**
Remove victim to fresh air immediately and keep him at rest in a relaxed position. Wrap him in blankets, keep him warm and at rest. Make him blow and gargle. Call a physician in case respiratory symptoms are noted. Keep him in a semi-sitting position in case breathlessness or emphysema is suspected. Get medical attention immediately. If breathing is difficult, give oxygen. If no breathing, give artificial respiration. In any case, loose clothing of the victim so that his airway is open enough. Turn his head sideways when he is vomiting while breathing. To an unconscious person, never give anything by mouth, never make him vomit.

**Skin contact**
Remove contaminated clothing and shoes immediately. In case of contact, immediately flush the part of skin with plenty of water and wash with soap. Get medical attention immediately. Note the contaminant is flammable, keep away from fire sources. In case of skin contact, wash the contaminant out completely as soon as possible. Late or incomplete rinse may cause skin problems. In case clothing is sticking closely to the skin after washing, never manage to remove it. Never break blisters, never peel and remove the injured skin. Never scrub or press the injured part. Wash contaminated clothing before use.

**Eye contact**
After flushing eyes with clean water for at least 15 minutes, get
ophthalmic attention immediately. Open the eyes widely by fingers so that eyeballs and eyelids should be completely flushed. Contact lens are to be detached and then washed if not attached closely. Late or incomplete rinse may cause eye problems.

Ingestion
Flush inside the mouth with water. May give one or two glasses of water or milk to dilute the ingestion in the stomach. Wrap him in blankets, keep him warm and at rest. Get medical attention immediately. Give oxygen or artificial respiration, if necessary. Turn his head sideways when he is vomiting while breathing. To an unconscious person, never give anything by mouth, never make him vomit. Never pass medical attention just in case delayed symptoms may occur.

Expected acute symptoms and delayed symptoms
Inhalation: irritation to nasopharyngeal mucosa, burning sensation of airway, dizziness, narcolepsy, headache, nausea, breathlessness, pharyngalgia, unconsciousness, suffocation, and asthmatic symptoms. Delayed symptoms may appear.

Skin: irritation, reddening, and chemical wound. Note dermal absorption.

Eye: serious irritation, reddening, and chemical wound.

Ingestion: nausea and other related symptoms to “inhalation”

Most important symptoms and effects

Protection to first-aiders
First-aiders should wear proper and necessary protective equipment such as gloves and a mask to avoid contact with the harmful chemical.

5. Fire Fighting Measures

**Extinguishing media**
- Powder, foam, AFFF (aqueous film-forming foam), CO₂
- Small fire: powder, CO₂, alcohol-resistant foam
- Large fire: sprinkled water, sprayed water, alcohol-resistant foam

**Extinguishing media that are NOT suitable**
Highly flammable. Heat, spark and flame may cause ignition easily.
Engulfed in fire, explosive polymerization may occur.
Temperature increase or water contamination may explode the container.
Firefighter should wear proper protective equipment to avoid smoke inhalation. The combustion gas may contain irritating, corrosive, or toxic vapor such as CO.
Vapors are heavier than the air, can drift around low empty spaces or ditches indoors and outdoors, and my cause vapor explosion.

**Specific methods of fire-fighting**
Remove nearby sources of ignition, use proper extinguishing media.
Start firefighting from accessible upwind of fire. Use unattended hose holder and monitored nosepiece from a long but effective distance.
Keep away personnel except for authorized ones from the fire area and its vicinity.
Wear respiratory protective equipment. Toxic gas such as CO may be generated by combustion or high temperature.
### 6. Accidental Release Measures

| Personal precautions, protective equipment and emergency measures | Keep away personnel except for authorized ones from the area around the leakage. All directions of the area should be clearly separated with proper distance by signs such as rope. Workers should wear proper protective equipment to avoid contact with eye and skin or inhalation. See 8. Exposure controls/personal protection. Ventilate indoor air thoroughly until the release measures finish. Workers should wear proper protective equipment to avoid skin contact with spill or inhaling mist and gas. Never touch the broken container or the leakage without proper protective clothing. Evacuate personnel from downwind of the leakage, start release measures from upwind. Leave low empty spaces. Eliminate nearby ignition sources promptly. Keep extinguisher/extinguishing media for fear of spontaneous combustion. |
| Environmental precautions | Never release the leakage to the environment. |
| Recovery and neutralization | In case of minor release, recover the leakage as much as possible in an sealed vessel employing dry soil/sand or other noncombustible absorbing materials. Use clean antistatic tools for the recovery. The remaining liquid should be wiped out by dry soil/sand or other noncombustible absorbing materials, and removed to safety places. In case of major release, evacuate from the dangerous area. Defend the flow of leakage by banking, recover the leakage after guiding the flow to a safety place. Never release the leakage in sewage. |
| Methods and materials for containing and cleanup | Stop the leak if not dangerous. Use explosion-proof electric equipments. Earth all fixtures when handling the leakage. Eliminate nearby ignition sources promptly. Keep extinguisher/extinguishing media. Prevent the leakage from flowing in drain, drain sewer, basement, and other closed spaces. |

### 7. Handling and Storage

| Handling Technical measures | Workers should wear protective equipment to avoid contact with |
eye and skin or inhalation. For measures for fixtures and systems in workplace, read 8. Exposure controls/personal protection.
Establish a fixture near the workplace to wash eyes and body in an emergency. Workers should wear proper protective equipment to avoid contact with clothing, skin, mucosa and eyes while handling. Establish a fixture to wash hands and eyes in resting areas.
Handle in a closed system. Release the harmful vapor by ventilation. Use explosion-proof electric equipments and lighting systems. Danger flammable! Never apply compressed-air while packing, dispensing, and other handling.
For partial and total ventilation, read 8. Exposure controls/personal protection.

**Local and general ventilation**

**Safe handling advice**
Obtain special instructions before use. Do not handle until all safety precautions have been read and understood.
Handle outdoors or where total ventilation system is fixed. When handling outdoors, work with your back to the wind as much as possible. Keep away personnel except for authorized ones from the workplace.
Avoid rough handling such as upsetting, dropping, dragging and other impacts on the container. Keep container tightly closed.
Never handle high temperature, spark, and fire near the area.
Do not eat, drink or smoke while handling this chemical.
Never touch, inhale, or ingest.
Wash hands and face and other body parts carefully after handling. Contaminated protective equipments should not be allowed in resting area. Contaminated work clothing should not be allowed out of the workplace.
Avoid release to the environment.

**Avoidance of contact**
See 10. Stability and reactivity.

**Storage**

**Technical measures**
Avoid direct sunlight, keep in dark and cool (below 30°C) spaces. Avoid contamination, keep in sealed containers in well-ventilated spaces.
Storage should be equipped with fireproof walls, pillars, and floors. Beams should be made of fireproof materials. The roof of storage should be slated by metal or other lightweight fireproof materials without ceiling. The floor of the storage should be water-proof or impermeable. Also, the floor, with proper slope and reservoir, should have structures that prevent chemical leak.
Establish fixture for daylighting, lighting and ventilating while handling in storage. The oxygen level should be managed between 6-7%. Danger, flammable! Keep Fire Away.

**Storage conditions**
Remove inflammables nearby. Keep away from fire or heat source. No smoking.
Keep away from incompatible chemicals. Avoid direct sunlight on containers or fire. Keep containers in closed, well-ventilated, cool conditions. Store locked up. Add stabilizer (such as hydroquinone monomethyl ether -10ppm) for storage. Note that the level of stabilizer may decrease during long term storage. The toxicity of the chemical may be affected by stabilizing or polymerization-inhibiting additives, consult expert opinions.

**Incompatible products**
Polymerizing catalysts such as organic peroxides and azobis (isobutyronitrile), oxidizers, peroxides, strong acids, and strong
8. Exposure Controls/Personal Protection

Control level
Not established

Control parameters
ACGIH (2011) 50 ppm (TWA), 100 ppm (STEL)
Permissible Exposure Level (Singapore)
100 ppm (Long term)

Engineering measures
Handle in workplace where total ventilation system is fixed. Otherwise, Closed system / equipment or partial ventilation system should be fixed.
Establish a fixture to shower body and to wash hands and eyes near the workplace.
Use explosive-proof electrical/ventilating/lighting equipment.
Take precautionary measures against static discharge.

Personal protective equipment
Respiratory protection
Wear proper respiratory protective equipments.
Chemical-cartridge respirator (for organic gas). If necessary, air-supplying respirator, oxygen-supplying respirator.

Hand protection
Protective gloves (solvent proof)

Eye protection
Chemical goggles

Skin and body protection
Impervious clothing, antistatic clothing, full protective clothing, protective cap, face shield, protective shoes, and so on

Hygiene measures
Handle the chemical wearing proper protective equipment not to inhale dispersed vapor and mist.
Avoid exposure to pregnant women.
Wash hands carefully after handling.
Contaminated work clothing should not be allowed out of the workplace.

9. Physical and Chemical Properties

Appearance (physical state, form, color, etc.)
Colorless liquid

Odor
Sharp odor

pH
4.4 as a saturated solution in water

Melting point and freezing point
-50°C

Boiling point, initial boiling point and boiling range
101.0°C

Flash point
10.0°C (O.C.)

Ignition or explosion range
LEL: 1.7% (v/v)
UEL: 12.5% (v/v)

Vapor pressure
3.7 kPa (20°C)

Vapor density
3.45 (air = 1.0)

Specific gravity
0.936 (20/4)
Methyl Methacrylate

Solubility
1.5 g in 100 g water
Soluble in most organic solvents
Less soluble in ethylene glycol or glycerol

$log\text{ Pow} = 1.38$

$n\text{-octanol/water partition coefficient}$

Spontaneous ignition temperature
430°C

Decomposition temperature
80.3°C (in the air) or 81.5°C (in \text{N}_2) measured by ARC

(accelerating rate calorimeter)

10. Stability and Reactivity

Stability
Add polymerization inhibitors (hydroquinone, hydroquinone monomethyl ether, and so on) for long term storage.
Inherent self-polymerization can be accelerated by light.

Hazardous reaction potentials
Methacrylic acid is produced by hydrolysis.
Polymerization induced by elevated temperatures, light, catalysts, or strong oxidizers may cause dangerous fire and explosive events.
Drastic polymerization can be induced by the contact with polymerizing catalysts such as organic peroxides and azobis(isobutyronitrile).
Oxidizers, peroxides, strong acids, or strong bases are reactive.
Mixing with oxidizers may cause dangerous exothermic and combustive events. Some formulations containing such oxidizers may be combustive or explosive.

Conditions to avoid
Contact with high temperatures, light, or incompatible materials

Incompatible products
polymerizing catalysts such as organic peroxides and azobis(isobutyronitrile), oxidizers, peroxides, strong acids, and strong bases

Hazardous decomposition products
CO generated by thermal decomposition.

11. Toxicological Information

Acute toxicity
Oral:
Rat $LD_{50}$ 8,400-9,400 mg/kg
Dog $LD_{50}$ 4,700 mg/kg

Dermal:
Rabbit $LD_{50}$ >9,400 mg/kg

Inhalation:
Rat $LC_{50}$ 15,300 mg/m³ (8 hours)
Rat $LC_{50}$ 3,750 - 7,093 ppm (4 hours)
The average of the highest and lowest $LC_{50}$ 5,332ppm (22mg/L) in the 4 hour test was less than 90% of saturated level (36,525ppm).
“Vapor which almost contains no mist”

Skin corrosion property
Rabbit: Moderate irritant
Human: Occupational exposure caused contact dermatitis characteristic of pupule and phlyctenule.
Cause skin irritation (Category 2)

Critical damage and stimulativeness to eye
Moderate irritation on rabbit was caused by 5% solution.
No effect was observed in iris and cornea in a rabbit eye irritation
test. After 24 hours, grade 2 reddening changes were observed in chemosis and conjunctiva. Weak or moderate irritation on eyes was observed. Moderate irritation by a diluted solution and no irreversible effect. Cause serious eye irritation (Category 2A)

Respiratory organs sensitization or skin sensitization
Sensitization was reported in repeated occupational exposures.
Respiratory sensitization:
May cause allergy or asthma symptoms or breathing difficulties if inhaled (Category 1)
Skin sensitization:
Guinea Pig Maximization Test: positive (5% solution)
May cause an allergic skin reaction (Category 1)

Generative cell mutagenicity
Ames test: negative (Not classified)

Carcinogenicity
(Rat) 2 years diet - not carcinogenic
(Evidence for carcinogenicity)
IARC: group 3
Not classifiable as to its carcinogenicity (Not classified)

Reproductive toxicity
(Rat, mouse) inhalation teratogenic study: gestation day 6-15: not teratogenic
(Rat) teratogenic study: Fetal toxicity (early fetal death, decreased crown-rump length, hematoma) was observed at the dose where the maternal toxicity (death, body weight loss, and so on) was manifested.
Suspected of damaging fertility or the unborn child (Category 2)

Specific target organ / general toxicity – single exposure
In a voluntary inhalation study (197 - 1970mg/m³, 20 - 90 minutes) irritation on eye and nasal mucosa, dizziness and drowsiness were observed. Airway irritation, muscle weakness, pyrexia, dizziness, nausea, cephalgia and drowsiness were also reported. Transient anesthetic action caused by methanol was suggested as the test compound was metabolized to methanol that could negatively regulate central nerve system.

Specific target organ / general toxicity – repetitive exposure
In an epidemiologic study on long-term exposure, cephalgia, limb pain, serious exhaustion, disordered sleep, memory disorder and hypersensitivity were observed. Atrophic rhinitis, laryngitis dysautonomia, nervous breakdown, cephalgia, dizziness, hypersensitivity, loss of concentration and memory disorder were also observed. (Category 1; organ of respiration and central nerve system)
(Rat) inhalation study exposed levels 0, 25, 100, 400 ppm. 6 hours/day, 5 days week, 105 weeks effects: Nasal inflammation in epithelial mucosa of concha of the nasal cavity was observed at 25ppm and higher. Histopathological observation showed degeneration and atrophy at 100ppm and 400ppm. Target is organ of respiration. The effects are observed at concentration lower than guidance value to assist in Category 1 classification. Target is organ of respiration and central nerve system.

Aspiration respiratory organs hazard
No data available

12. Ecological Information
Ecotoxicity
Hazardous to the aquatic environment – acute toxicity

Fish

- *Pimephales promelas* (fathead minnow) \( LC_{50}(96 \text{ hour}) \) 130-460 ppm
- *Lepomis macrochirus* (bluegill) \( LC_{50}(96 \text{ hour}) \) 232-283 ppm
- *Lebistes reticulatus* (guppies) \( LC_{50}(96 \text{ hour}) \) 368 ppm

Crustacea

- *Daphnia magna* \( EC_{50}(48 \text{ hour}) \) 69 mg/L

Algae or other aquatic plants

- Fish: Not classified
- Crustacea: Category 3
- Algae: Not classified

Hazardous to the aquatic environment, acute toxicity (Category 3)

Hazardous to the aquatic environment – chronic toxicity

- Persistence /degradability 94%
- Bioaccumulation Partition coefficient \((n\text{-octanol/water})\): \( \log K_{ow} = 1.38 \)
  Bioconcentration factor: 2.3 (calculated by BCFWIN)
  Readily biodegradable and low potential for bioaccumulation (Not classified)

- Mobility in soil No information available
- Other hazardous effect No information available
- Ecological limit value No information available

13. Disposal Considerations
Comply with the applicable laws and regulations regarding this product in each country.

14. Transport Information

International regulations

- Sea transport Comply with IMO regulations.
  - UN No. 1247
  - Proper Shipping Name METHYL METHACRYLATE, MONOMER, STABILIZED
  - UN Hazard Class 3 (Flammable liquids)
  - UN Subsidiary Risk
  - UN Packing Group II
  - Marine Pollutant Not applicable

- Air transport Comply with ICAO/IATA regulations
  - UN No. 1247
  - Proper Shipping Name METHYL METHACRYLATE, MONOMER, STABILIZED
  - UN Hazard Class 3 (Flammable liquids)
  - UN Subsidiary Risk
UN Packing Group II
Land transport

The road transportation of petroleum and flammable materials in Singapore is regulated under the Fire Safety (Petroleum and Flammable Materials) Regulations 2005. All local and foreign-registered vehicles such as road tankers, prime movers, trailers and lorries carrying scheduled petroleum and flammable materials are subject to the transport licensing scheme and all other requirements stipulated under the regulations.

Special safety measures

Cover, for example, with sheets to avoid direct sunlight. Keep below 30°C during transport. Before transport, confirm that there is no breakage, corrosion or leakage over containers. Load carefully so that there will be no falling, dropping or damage. Make sure that cargos do not collapse. Transport carefully to avoid significant swinging or grinding. Vehicles and vessels should have protective equipments (ex., gloves, glasses, masks) and also fire extinguishers and tools in case of emergency. If there is a potential disaster such as tremendous leakage during transportation, take immediate actions to prevent it and report to relevant authorities such as a nearby fire station.

15. Regulatory Information

Comply with the applicable laws and regulations regarding this product in each country.

16. Other Information

Disclaimer:
This data sheet is based on currently available documents, information, and data, and does not provide definitive information on any of the contents, physicochemical properties, hazards, toxicity, or other details of the product. In addition, the precautions given in this document are based on ordinary handling. In special handling situations, implement safety measures suitable to the purpose and usage.