

GPS Safety Summary

Substance Name:

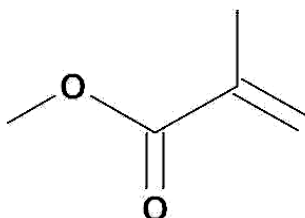
Methyl methacrylate

1. General Statement

Methyl methacrylate is a widely used chemical which readily polymerises if not properly controlled by inhibitors and/or storage conditions. It is primarily used in the manufacturing of polymethyl methacrylate thermoplastic polymers (PMMA) which are used in many applications such as cast and extruded sheet, resins for injection moulding and extrusion. Methyl methacrylate polymers and copolymers are also used in surface coatings (solvent- and emulsion-based), adhesives, polymer concrete and embedding materials.

2. Chemical Identity

Name:	Methyl methacrylate
Brand names:	Norsocryl® MMA
Chemical name (IUPAC):	methyl 2-methylprop-2-enoate
CAS number:	80-62-6
EC number:	201-297-1
Molecular formula:	C ₅ H ₈ O ₂
Structure:	



3. Use and applications

Methyl methacrylate has two main industrial uses:

- **Use as a chemical intermediate:**
Methyl methacrylate is transesterified into higher methacrylates such as n-butyl methacrylate or 2-ethylhexyl methacrylate.
- **Use as monomer for polymerisation:**
The homo- and copolymers derived from Methyl methacrylate are used in the manufacture of products with a wide range of applications:
 - ✓ Acrylic cast and extruded sheet used in architecture and design, construction, transport and sanitary ware;

- ✓ Granules for injection and extrusion blow moulding which for their outstanding optical clarity, weathering and scratch resistance are used in lighting, office equipment and electronics (cell phone displays and hi-fi equipment), building and construction (glazing and window frames), contemporary design (furniture, jewellery and tableware), cars and transportation (lights and instrument panels), health and safety (jars and test tubes) and household appliances (microwave oven doors and mixer bowls);
- ✓ Impact modifiers for clear rigid polyvinyl chloride;
- ✓ Solvent and water-based emulsion polymers used to formulate flocculants, dispersants, detergents, paints, adhesives, and products for the leather finishing, wood and paper industries.

Methyl methacrylate is not sold to consumers.

4. Physical / Chemical properties

Methyl methacrylate is a highly flammable, volatile liquid substance with the following physicochemical properties:

Property	Value
Physical state	Liquid at 20°C and 1013 hPa
Colour	Colourless
Odour	Pungent
Molecular weight	100.1 g/mol
Density	0.94 g/cm ³ at 20°C
Vapour pressure	37 hPa at 20°C
Freezing / boiling points	-48°C / 100°C at 1013 hPa
Flash point – flammability	10°C at 1013 hPa – highly flammable liquid and vapour
Self-ignition temperature	435°C at 1013 hPa
Explosive / oxidizing properties	Not expected based on structure
Water solubility	15.3 g/L at 20°C
Octanol-water partition coefficient (Log K _{ow})	1.38 at 20°C

5. Health Effects

Methyl methacrylate is a hazardous chemical which should be handled with care.

Effect Assessment	Results
Acute Toxicity Oral / inhalation / dermal	Slightly harmful by ingestion, inhalation or contact with skin. Prolonged or widespread skin contact may result in absorption.
Irritation / corrosion Skin / eye/ respiratory tract	Contact causes skin irritation. Causes slight eye irritation. At high concentration, vapour may cause irritation to upper respiratory tract (nose and throat).

Sensitisation	May cause an allergic skin reaction: low sensitizing potential by skin contact.
Toxicity after repeated exposure Oral / inhalation / dermal	The predominant effect is local irritation. Does not cause toxicity to other organs after repeated exposure in animal studies.
Genotoxicity / Mutagenicity	Based on the available <i>in vitro</i> and animal data, not expected to cause genetic effects.
Carcinogenicity	Did not cause cancer in long-term animal studies.
Reproductive / Developmental Toxicity	Did not cause reproductive toxicity in laboratory animals. No adverse effects were seen in fetuses of exposed animals.

6. Environmental Effects

Upon short-term exposure, Methyl methacrylate is harmful to invertebrates and fish but not algae. It is not harmful to aquatic organisms upon long-term exposure.

Methyl methacrylate is unlikely to persist in the environment since it biodegrades rapidly in sewage treatment plants. It is not expected to bind significantly to soil or sediment due to its low adsorption coefficient ($\log K_{oc} = 0.94 - 1.86$). If released to the atmosphere, photochemical degradation is expected to occur within a few days. It is not expected to accumulate in the food chain, *i.e.*, the bioaccumulative potential is low due to the low octanol-water partition coefficient ($\log K_{ow} = 1.38$).

Effect Assessment	Result
Aquatic Toxicity	Acute: harmful. Chronic: not harmful.

Fate and behaviour	Result
Biodegradation	Readily biodegradable
Bioaccumulation potential	Not expected to bioaccumulate
PBT / vPvB conclusion	Not considered to be PBT* or vPvB**

*: Persistent, Bioaccumulative and Toxic (PBT)

** : very Persistent and very Bioaccumulative (vPvB)

7. Exposure

7.1 Human health

Consumers:

Consumers are not directly exposed to Methyl methacrylate as all its uses involve its transformation into other substances.

Indirect exposure via the environment is negligible due to the volatility, quick degradation in water and atmosphere, and low bioaccumulative potential.

Workers:

Methyl methacrylate is industrially manufactured and used predominantly within closed systems, minimizing the occupational exposure potential. Exposure may occur either in manufacturing facilities or in facilities using Methyl methacrylate. Workers may be exposed during cleaning, maintenance, transfer, sampling and analysis. There is also a professional use of formulated Methyl methacrylate.

Procedures, controls, collective and personal risk management measures are in place, which limit the occupational exposure during the manufacture and use of the substance. Workers who might accidentally come into contact with the substance should follow the safety measures recommended in the Extended Safety Data Sheet.

Based on the risk assessment, the risk is controlled when activities are carried out under conditions recommended in the Extended Safety Data Sheet (see Chap. 8 and Exposure Scenarios).

7.2 Environment

Methyl methacrylate is industrially manufactured and used predominantly within closed systems in a continuous or batch process. The final use always involves consumption by polymerisation or transformation into other monomers, minimizing release to the environment. Potential releases may occur via wastewater and exhaust gases.

Procedures, controls and risk management measures are in place, which limit the environmental exposure.

The main expected release compartment is the atmosphere due to the volatility. Any released amount is expected to be photodegraded. Distribution to wastewater is expected to be moderate and any release would biodegrade rapidly in waste water treatment plants while the remainder would evaporate to the atmosphere.

Based on the risk assessment, the risk is controlled when activities are carried out under conditions recommended in the Extended Safety Data Sheet (see Chap. 8 and Exposure Scenarios).

8. Risk Management recommendations

Human health measures		
Organizational	Collect the latest available Safety Data Sheet. Implement good basic standards of occupational hygiene. Ensure operatives are well informed of the hazards and trained to minimise exposures. Handle and store according to the indications of the Safety Data Sheet.	
Engineering controls	Should be handled in well ventilated areas. Prevention of inflammation and unscheduled polymerisation should be in place. Provide appropriate general or local exhaust ventilation at points of emission. Ensure that eye- and handwash stations and safety showers are close to workstation locations.	
Protection	Eye/Face protection:	Safety glasses with sideshields
	Skin protection:	Protective suit
	Hand protection:	Gloves tested to EN374
	Respiratory protection:	Respirator if ventilation is insufficient. Self-contained breathing apparatus in case of high or prolonged exposure.
Environment protective measures		
Do not release into the environment. Do not let product enter drains. Incinerate any waste. Use waste water treatment systems.		

9. Regulatory Information / Classification and Labelling



9.1 Regulatory Information

This substance has notably been registered and assessed under:

- EU Regulation EC 1907/2006 (REACH)
- OECD SIDS (Screening Information Data Set) program
- US EPA IRIS program

9.2 Classification and labelling

Under GHS, substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the eSDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers and emergency responders) can better understand the hazards of the chemicals in use. Substances registered for REACH are classified according to CLP (EC) 1272/2008, implementation of the GHS in the European Union.

Classification	
<ul style="list-style-type: none">– Flammable liquids: Category 2– Skin irritation: Category 2– Specific target organ toxicity - single exposure (inhalation): Category 3– Skin sensitization: Category 1	
Signal word	
Danger	
Pictograms	
<ul style="list-style-type: none">– GHS02: Flame	
<ul style="list-style-type: none">– GHS07: Exclamation mark	
Hazard statements	
<ul style="list-style-type: none">– H225: Highly flammable liquid and vapour,– H315: Causes skin irritation,– H335: May cause respiratory irritation,– H317: May cause an allergic skin reaction.	
Additional classification according to Globally Harmonized System (GHS)	
Acute aquatic toxicity: Category 3; Harmful to aquatic life.	

10. Contact Information within Company

For further information on this substance or product safety summary in general, please contact:

- **ICCA portal where the GPS Safety Summary is posted:**
<http://www.icca-chem.org/en/Home/ICCA-initiatives/global-product-strategy/>

11. Date of Issues / Revision

- Date of issue: 2013/07/15
- Date of revision:

12. Disclaimer

The information contained in this paper is intended as advice only and whilst the information is provided in utmost good faith and has been based on the best information currently available, is to be relied upon at the user's own risk.

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