

METHACRYLATE PRODUCERS ASSOCIATION, INC.

GLOBAL PRODUCT SUMMARY: BASIC METHACRYLATE CATEGORY

(Last Updated: 10/13/13)

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
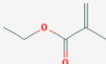
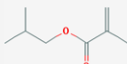

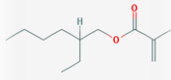
SUBSTANCE NAME

Basic Methacrylate Category

GENERAL STATEMENT

Methacrylate monomers are produced for use as building blocks to make a wide range of polymer-based products that we see and use every day from acrylic glass, car paints, toners and inks, oil additives to dental and medical products to name but a few. They are of low concern to human health and the environment. They are classified as hazardous (skin irritant and sensitizing and, in some cases, highly flammable) but have been handled safely by industry and professionals for over 60 years. These methacrylate-based polymers are inert in the environment and can be recycled.

CHEMICAL IDENTITY

Substance	Methyl Methacrylate	Ethyl Methacrylate	i-Butyl Methacrylate	n-Butyl Methacrylate	2-Ethylhexyl Methacrylate
					
EC number:	201-297-1	202-597-5	202-613-0	202-615-1	211-708-6
EC name:	Methyl methacrylate	ethyl methacrylate	isobutyl methacrylate	butyl methacrylate	2-ethylhexyl methacrylate
CAS number:	80-62-6	97-63-2	97-86-9	97-88-1	688-84-6
IUPAC name:	2-Methyl-propenoic acid, methyl ester	ethyl methacrylate	isobutyl methacrylate	butyl methacrylate	2-ethylhexyl methacrylate
Molecular formula:	C ₅ H ₈ O ₂	C ₆ H ₁₀ O ₂	C ₈ H ₁₄ O ₂	C ₈ H ₁₄ O ₂	C ₁₂ H ₂₂ O ₂

USES AND APPLICATIONS

Methacrylates are produced for use as monomer for production of polymers and as intermediate for synthesis of other methacrylate esters. The substances are manufactured in industrial settings in closed systems and used by industry for manufacture of polymers in closed and semi-closed systems. Downstream use of methacrylates is almost exclusively in the form of polymer although some products used by professionals and hobbyists may contain significant quantities of the liquid monomer.

PHYSICAL/CHEMICAL PROPERTIES

The following table includes information which refers to testing performed with the concentrated substances. It is not intended to be comprehensive or to replace information found in the Safety Data Sheet (SDS). A SDS may be obtained from one of the manufacturers.

Substance	Methyl methacrylate	Ethyl methacrylate	i-Butyl Methacrylate	n-Butyl Methacrylate	2-Ethylhexyl Methacrylate
Physical state	Liquid	Liquid	Liquid	Liquid	Liquid
Color	Colorless	Colorless	Colorless	Colorless	Colorless
Odor	Pungent	Pungent	Pungent	Pungent	Pungent
Density (at 20 °C)	0.94 g/cm ³	0.91 g/cm ³	0.88 g/cm ³ (25°C)	0.89 g/cm ³	0.88 g/cm ³
Melting Point	-48 °C	<-75 °C	-35 °C	-50 °C	<-50 °C
Boiling point (at 1013.25 hPa)	100.36 °C	118 - 119 °C	155 °C	163 °C	227.6 °C
Flammability	Highly flammable	Highly flammable	Flammable	Flammable	Not applicable
Explosive properties	Not explosive	Not explosive	Not explosive	Not explosive	Not explosive
Self-ignition temperature	400 °C	400 °C	385 °C	294 °C	250 °C
Vapor Pressure (at 20 °C)	37 hPa	20 hPa	2.11 hPa	2.12 hPa	0.065 hPa
Molecular Weight	100.1158	114.1424	142.2	142.2	198.3019
Water solubility (at 20 °C)	15.3 g/L	4.69 g/L	0.47 g/L	360 mg/L (25 °C)	3.1 mg/L
Flash point (at 1013 hPa)	10 °C	18 °C	42.5 °C	48.5 °C	97 °C
Octanol-water partition coefficient (LogKow at 20 °C)	1.38	1.87	2.95	3 (25 °C)	4.95

HUMAN HEALTH SAFETY ASSESSMENT

Information for the general population and consumers handling products made with the category substances.

Consumer

Consumer exposure is unlikely due to extremely low levels of residual monomer in polymers used in consumer products (used as monomer in polymerization). Some professional/DIY and hobbyist products may contain liquid monomers. Direct skin contact with liquid monomer could produce skin irritation, and repeated contact could lead to skin sensitization (allergy or dermatitis). Inhalation of high levels of vapors may irritate the respiratory system.

Worker

Workers may come into contact with monomers during polymer production and professional use of products containing liquid monomer. Workers should follow the recommended safety measures as provided by the manufacturer in the Safety Data Sheet. The health effects following skin contact or inhalation of the vapors would be the same as for the consumer.

The following table includes information for someone handling the concentrated substances. The data, while verifiable, are not intended to be comprehensive nor replace the information found in the SDS.

Effect Assessment	Result
Acute Toxicity	Low toxicity after oral, dermal and inhalation exposure.
Irritation	Causes irritation to the skin and respiratory system. Not irritating to the eyes.
Sensitization	Sensitizing by skin contact. Does not cause asthma. Click here for a technical summary.
Mutagenicity	Not mutagenic. Click here for a technical summary. No evidence of carcinogenicity. Click here for a technical summary.
Toxicity after repeated exposure	Inhalation of methacrylate monomers can cause damage to the part of the nose responsible for detection of smell. Other effects in the body are non-specific.
Toxicity for reproduction	Does not selectively harm reproduction or cause birth defects. Click here for a technical summary.

ENVIRONMENTAL SAFETY ASSESSMENT

Based on available data methacrylate monomers are of low toxicity to aquatic organisms and are not classified as hazardous for the environment. These methacrylate monomers are fully and rapidly biodegradable and while they are not intentionally released during manufacturing processes and use, monomer released to air or trace amounts present in waste water streams would rapidly disappear by chemical and biological degradation. These methacrylate monomers do not possess a significant ozone depletion potential and trace emissions will not contribute significantly to global warming.

The following tables include information for testing performed with the concentrated substances. Additional information may be obtained from the SDS supplied by the manufacturer.

Effect Assessment	Result
Aquatic Toxicity	Low toxicity to aquatic organisms.

Fate and behaviour	Result
Biodegradation	Readily biodegradable
Bioaccumulation potential	Low
PBT / vPvB conclusion *	Not considered to be either PBT nor vPvB
Environmental impact	Unlikely to persist in, or have significant impact on, the environment. Click here for a technical summary.

* Persistent/Bioaccumulative/Toxic (PBT) very Persistent-very Bioaccumulative (vPvB)

EXPOSURE

Consumer

Consumer exposure to liquid monomer is unlikely unless they use professional/DIY or hobbyist products that contain significant levels of liquid monomer. Consumer exposure is therefore most likely only to the extremely low levels of residual monomer in polymers used in consumer products (methacrylate monomers are used as monomer in polymerization). [Use of methacrylate monomers in artificial nail products](#) and other non-medical/dental applications involving direct skin/nail contact with the liquid monomer is not recommended.

Worker

Methacrylate monomers are produced in essentially closed systems so significant worker exposure during manufacture is unlikely. Workers may come into contact with monomers during polymer production and professional use of products containing liquid monomer.

RISK MANAGEMENT RECOMMENDATIONS

Consumer

Consumer use of products containing methacrylate-based polymers does not require any risk management measures relating to the monomer residues in those polymers. Use of professional/DIY and hobbyist products that contain liquid methacrylate monomer will require the user to follow the guidance provided by the product manufacturer on the packaging or product label. This will depend upon the product composition, but may include recommendations to avoid skin contact (to prevent skin irritating / sensitizing properties) and to provide good general ventilation (to prevent irritation of the respiratory system by high concentrations of the vapors) when handling the uncured (unpolymerized) product. Uncured (unpolymerized) product should not be poured down the drains or discarded in domestic waste. As noted, [use of methacrylate monomers in artificial nail products](#) and other non-medical/dental applications involving direct skin/nail contact with the liquid monomer is not recommended.

Worker

Workers should follow the recommended safety measures as provided by the manufacturer in the Safety Data Sheet. Considering the skin irritating and sensitizing properties this typically will include avoiding skin contact or the wearing of suitable protective gloves and avoiding inhalation of high concentrations of vapor by use of one or more of the following: engineering controls, good general ventilation or personal protective (respiratory) equipment, depending upon the particular use conditions. Releases to air and water during manufacturing processes and use would rapidly disappear by biodegradation.

REGULATORY INFORMATION / CLASSIFICATION AND LABELLING










All of these substances are subject to a number of federal and international statutes and regulations. Selected U.S. regulatory information is available on the [MPA website](#). Other federal, state and local regulations may apply.

All of these substances have been registered under the EU chemical control law known as REACH (Registration, Evaluation, Authorisation and Restriction of Chemical substances), and is listed on various chemical inventories. They have been reviewed under the OECD SIDS (Screening Information Data Set) program.

While the toxicological data are not specific to a particular region, the regulatory frameworks differ between countries and regions. The Global Harmonized System (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. Under the GHS, substances are classified according to their physical, health, and environmental hazards.

Note: The hazard statements and symbols presented here refer to the hazard properties of the concentrated substances and are meant to provide a brief overview of the substance's labelling. It is not intended to be comprehensive or to replace information found in the SDS.

Classification and Labelling:

Substance	Methyl methacrylate	Ethyl methacrylate	i-Butyl Methacrylate	n-Butyl Methacrylate	2-Ethylhexyl Methacrylate
Classifications					
Flammable liquid	Category 2	Category 2	Category 3	Category 3	
Acute Toxicity	Category 5				
STOT single exposure	Category 3	Category 3	Category 3	Category 3	
Skin corrosion/irritation	Category 2	Category 2	Category 2	Category 2	Category 3
Skin sensitization	Category 1B	Category 1B	Category 1B	Category 1B	Category 1B
Aquatic Acute	Category 3		Category 3	Category 2	Category 2
Labelling					
Signal word:	Danger	Danger	Danger	Danger	Warning
Hazard pictogram: GHS02:					
GHS07: exclamation mark					
Hazard Statements					
H225: Highly flammable liquid and vapor	Yes	Yes			
H226: Flammable liquid and vapor			Yes	Yes	
H315: causes skin irritation	Yes	Yes	Yes	Yes	
H316: Causes mild skin irritation					Yes
H317: May cause an allergic skin reaction	Yes	Yes	Yes	Yes	Yes
H335: May cause respiratory irritation	Yes	Yes	Yes	Yes	
H401: Toxic to aquatic life				Yes	Yes
H402: Harmful to aquatic life	Yes		Yes		

ADDITIONAL INFORMATION

Information on registered substance (ECHA)

<http://echa.europa.eu/web/guest/information-on-chemicals/registered-substances>

EU Risk Assessment

http://esis.jrc.ec.europa.eu/doc/risk_assessment/REPORT/methylmethacrylatereport024.pdf

OECD SIDS

MMA: <http://www.chem.unep.ch/irptc/sids/oecdsids/80625.pdf>

Esters: <http://webnet.oecd.org/hpv/UI/handler.axd?id=2b726a59-b02c-4787-aa8e-125651bc5335>

CONTACT

For further information on this substance or product safety summaries in general, please contact [MPA](#). Click on the logos below to go to the company's website.



Glossary

Acute toxicity - harmful effects after a single exposure

Bioaccumulation - accumulation of substance in an organism

Biodegradation- chemical breakdown of substances by a physiological environment

Carcinogenicity - effects causing cancer

Chronic toxicity - harmful effects after repeated exposures

Clastogen - a substance that causes breaks in chromosomes

Concentrated - Non-formulated undiluted substance

EC – European Commission

ECHA – European Chemicals Agency

Embryotoxicity - harmful effects on fetal health

eSDS -Extended Safety Data Sheet

EU - European Union

GHS - Global Harmonized System

Hazard - situation bearing a threat to health and environment

HPV - High Production Volume

ICCA - International Council of Chemical Associations

IUPAC – International Union of Pure & Applied Chemistry

LogKow - Log Octanol-Water Partitioning Coefficient

Mutagenicity - effects that change genes

PBT/ vPvB - Persistent, Bioaccumulative and Toxic/Very Persistent and Very Bioaccumulative

OECD-Organisation for Economic co-operation and Development

REACH - Registration, Evaluation, Authorisation and Restriction of Chemical substances

Reprotoxicity - combining teratogenicity, embryotoxicity and harmful effects on fertility

SDS - Safety Data Sheet

Sensitizing - causes allergies

SIDS - Screening Inventory Data set

STOT – Specific Target Organ Toxicity

Teratogenic - effects on fetal morphology

Disclaimer

This document is not intended to be comprehensive. It is provided solely as background information and should not substitute for an up-to-date Safety Data Sheet or research should specific regulatory or other legal questions arise. It is not intended to be a statement of legal requirements when using or handling acrylates. Although the information is believed to be accurate as of the last update, new information may become available and regulations frequently change, and no warranty, expressed or implied, is made concerning the contents. In addition, many states and localities adopt their own regulations, which are not covered by this summary or on the [MPA website](#). In all events, the user should consult applicable laws and regulations, as well as their supplier's Safety Data Sheet, for current information and requirements. **NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN.**