Product Safety Assessment
Butyl Methacrylate Monomer

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Names
- CAS No. 97-88-1
- EC No. 202-615-1
- Butyl methacrylate
- Butyl methacrylate
- 2-Methyl butylacrylate
- Butyl, 2-methyl propenoate
- n-Butyl methacrylate
- BMA
- Butyl 2-methacrylate
- 2-Propenoic acid, 2-methyl, butyl ester
- Methacrylic acid, n-butyl ester

Product Overview
- Butyl methacrylate is a clear, colorless liquid with a sweet odor. It is the n-butyl ester of methacrylic acid and contains small amounts of a polymerization stabilizer.¹ For further details, see Product Description.
- Butyl methacrylate is a monomer used to produce acrylic polymers used in molds, extrusions, coatings, and inks.² For further details, see Product Uses.
- Consumer products contain only trace levels of butyl methacrylate, therefore consumers are unlikely to be exposed. Although the potential for exposure exists during manufacture, transportation, and use, the use of closed systems limit the potential for worker exposure. Those working in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Workers can minimize the potential for exposure by carefully following workplace procedures and wearing proper protective equipment.¹ For further details, see Exposure Potential.
- Eye contact can cause slight irritation. Skin contact can cause slight to moderate irritation and may result in sensitization or an allergic response. Inhalation can cause irritation of the nose, throat, and lungs. Repeated or prolonged vapor exposure has been reported to affect the respiratory tract.¹ For further details, see Health Information.
- Butyl methacrylate is readily biodegradable, unlikely to accumulate in the food chain, and is toxic to fish and aquatic organisms on an acute basis.³ For further details, see Environmental Information.
- DOW™ butyl methacrylate is stable under recommended storage conditions. This material can undergo hazardous polymerization, releasing heat, so inhibitor is added to prevent polymerization. For the inhibitor to be effective, the oxygen concentration in the vapor space of the storage container must be at least 5%.¹ For further details, see Physical Hazard Information.
Manufacture of Product

- **Location** – The Dow Chemical Company produces butyl methacrylate in facilities at Deer Park, Texas, USA.
- **Process** – DOW™ butyl methacrylate is prepared by a reaction between methacrylic acid and n-butyl alcohol, as shown below:

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\begin{align*}
\text{H}_2\text{C} & \text{C} = \text{O} + \text{H} - \text{OH} - \text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3 & \rightarrow \text{H}_2\text{C} & \text{C} = \text{O} - \text{O} - \text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3 + \text{H}_2\text{O} \\
\text{Methacrylic acid} & \\n\text{n-Butyl alcohol} & \\n\text{n-Butyl methacrylate} & \\n\text{Water} & 
\end{align*}
\]

Butyl methacrylate can also be manufactured by reacting n-butyl alcohol with methyl methacrylate in a “transesterification” reaction.

Product Description

Butyl methacrylate is a clear, colorless liquid with a sweet odor. The product is greater than 99% pure and contains an inhibitor (typically methoxyphenol; MEHQ) to stabilize it against polymerization during shipment and storage.

Product Uses

Butyl methacrylate is a monomer used to produce acrylic polymers and copolymers for the following applications: acrylic sheet molding, clear plastics, extrusion powders, latex paints, copier toners, printing inks, floor polishes, oil additives, adhesive cements, acrylic surface and paper coatings, and automotive coatings and lacquers.

Exposure Potential

DOW™ butyl methacrylate is used in the production of industrial and consumer products. Based on the uses for this material, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a butyl methacrylate manufacturing facility or in the various industrial or manufacturing facilities that use this material. It is produced, distributed, stored, and consumed in closed systems. Those working with butyl methacrylate in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Each manufacturing facility should have a thorough training program for employees and appropriate work processes, ventilation, and safety equipment in place to limit exposure. See Health Information.

- **Consumer exposure to products containing butyl methacrylate** – Dow does not sell butyl methacrylate for direct consumer use, but it is used to make products handled by consumers. Residual levels of butyl methacrylate in consumer products would be very low and significant contact is unlikely. Always read the product information before use and follow the label/use instructions. Acrylic and methacrylic polymers are used safely in a wide variety of personal-care and hygiene products. Dow does not sell butyl methacrylate for artificial fingernail (acrylic nail) applications, dental adhesives, dental restoration, dental prosthetics, surgical devices, paints,

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implants, or for any application that would result in implantation or prolonged contact within the human body. See Health Information.

- **Environmental releases** – Since DOW™ butyl methacrylate is used in closed systems, the potential for environmental release is low. If released to air, the compound will degrade rapidly from exposure to photochemically-produced hydroxyl radicals. The substance has low solubility in water, and will have a tendency to evaporate from water and degrade in the atmosphere. Butyl methacrylate is readily biodegradable, and will be removed from water and soil environments, including wastewater treatment plants. In the event of a spill, the focus is on containing the spill to prevent contamination of soil and surface or ground water. Contain spills with inert materials such as sand or earth. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a spill occurs, eliminate ignition source immediately. Use only explosion-proof equipment and ground and bond all equipment. Only properly trained and equipped personnel should attempt to isolate or contain a spill. Self-contained positive-pressure, breathing apparatus (SCBA) with an approved full-face mask is recommended for emergency work. Spilled material should be captured, collected, and reprocessed or disposed of according to applicable governmental requirements. Contaminated monomer may be unstable. Add inhibitor to prevent polymerization. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Deny any unnecessary entry into the area and consider the use of unmanned hose holders. Use water fog or spray, dry-chemical or carbon-dioxide extinguishers, or foam to fight the fire. Alcohol-resistant foam is preferred. Use of a direct water stream may spread the fire. Vapors are heavier than air and may travel a long distance and accumulate in low-lying areas. Ignition or flashback could occur. Keep vapors out of sewers. Heat can cause rapid polymerization, evolving much more heat. Heated containers can explode. Immediately withdraw all personnel from the area in case of rising sounds from venting safety device or discolorations of the container. Firefighters should wear self-contained, positive-pressure breathing apparatus (SCBA) with an approved full-face mask and full chemical-resistant firefighting clothing. Contain fire-water run-off if possible to reduce the potential for environmental damage. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.

**Health Information**¹⁴

- **Eye contact** – Contact can cause slight irritation.

- **Skin contact** – Contact can cause slight to moderate irritation and may cause sensitization or an allergic response.

- **Ingestion** – Butyl methacrylate is slightly toxic if swallowed, but may cause irritation to the mouth, throat, esophagus, and stomach.

- **Inhalation** – Exposure to vapors may cause irritation to the respiratory tract (nose and throat) and lungs. Vapor concentrations are attainable that could be hazardous.

- **Repeated exposure** – Prolonged or repeated overexposure may cause adverse effects on the respiratory tract.

- **Other** – Mutagenicity tests have been negative, and based on results from similar compounds, there is no concern that this material causes cancer. Likewise, based on test results for butyl

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methacrylate and similar compounds there is no concern for developmental or reproductive toxicity.

For more information, see the relevant Safety Data Sheet.

**Environmental Information**

Butyl methacrylate has low solubility in water, and will have a tendency to evaporate from water. It has low to moderate tendency to bind to soil or sediment.

Butyl methacrylate is unlikely to persist in the environment. In the atmosphere, the substance will degrade quickly by reaction with photochemically-produced hydroxyl radicals. The compound is readily biodegradable, which suggests it will be removed from water and soil environments, including biological wastewater treatment plants.

Butyl methacrylate has low potential to accumulate in the food chain, and is toxic to fish and other aquatic organisms on an acute basis.

The Organisation for Economic Co-operation and Development (OECD) SIDS Initial Assessment Profile for butyl methacrylate concluded that although the substance has properties indicating a potential hazard for the environment, the chemical is of low priority for further work because of its rapid biodegradation and limited potential for bioaccumulation.

For more information, see the relevant Safety Data Sheet.

**Physical Hazard Information**

DOW™ butyl methacrylate is stable under recommended storage conditions. This material can undergo rapid polymerization, and an uncontrolled polymerization may produce a rapid release of energy in the form of heat, with the potential of an explosion of closed containers. It contains an inhibitor to stabilize it against polymerization during shipment and storage. Do not store this material in an oxygen-free environment. The effectiveness of the inhibitor is dependent on the presence of dissolved oxygen. To maintain sufficient dissolved oxygen in the liquid, the monomer must be stored with a oxygen concentration of 5% or more in the vapor space. Hazardous polymerization could occur not only by depletion of inhibitor or lack of sufficient oxygen, but by overheating or the presence of corrosion or chemical contaminants. Store this material in a cool place out of direct sunlight.

Avoid contact with acids, bases, oxidizing agents, reducing agents, UV light (sunlight), free-radical initiators, and organic peroxides.

For more information, see the relevant Safety Data Sheet.

**Regulatory Information**

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of butyl methacrylate. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet; Technical Data Sheet or Contact Us.

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Additional Information

- Safety Data Sheet (http://www.dow.com/webapps/msds/msdssearch.aspx)
- Technical Data Sheet for Butyl Methacrylate.
- Contact Us (www.dow.com/assistance/thoughts.htm)
- Methacrylic Esters: Safe Handling Guidelines, Methacrylate Producers Association (http://www.mpausa.org/index.html)
- The Methacrylate Producers Association, Inc. (www.mpausa.org/index.html)
- Methacrylates Sector Group, Association of Petrochemical Producers in Europe (APPE) (www.petrochemistry.net/methacrylates.html)


References

1 Butyl Methacrylate Material Safety Data Sheet, The Dow Chemical Company.
3 IUCLID Data Set, Existing Chemical CAS No. 97-88-1, Butyl Methacrylate, February 19, 2000, sections 3.1–3.4, pages 11–17.
NOTICES:

As part of its 2015 Sustainability Goals, Dow has committed to make publicly available safety assessments for its products globally. This product safety assessment is intended to give general information about the chemical (or categories of chemicals) addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the relevant Safety Data Sheet, which should be consulted before use of the chemical. This product safety assessment does not replace required communication documents such as the Safety Data Sheet.

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