Product Safety Assessment

**Glycidyl Methacrylate**


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Names
- CAS No. 106-91-2
- Glycidyl methacrylate
- Glycidol methacrylate
- Glycidyl alpha-methylacrylate
- EC No. 203-441-9
- 2,3-Epoxypropyl methacrylate
- 2-Propenoic acid, 2-methyl, 2-oxyranylmethyl ester
- GMA

Product Overview
- Glycidyl methacrylate is used in the production of polymer coatings and finishes, adhesives, plastics and elastomers.† See Product Uses.
- Acrylic and methacrylic esters, including glycidyl methacrylate, have a sharp odor that may be bothersome. However, the smell does not necessarily indicate a health risk.‡ Skin or eye contact with glycidyl methacrylate liquid or vapor could result in severe injury. Glycidyl methacrylate can be absorbed through the skin in potentially harmful amounts and can cause an allergic skin reaction. Vapors can be toxic, and vapor exposure could result in severe irritation to the upper respiratory tract. Glycidyl methacrylate has a low oral toxicity, but can cause burns to mouth and throat and irritation to the gastrointestinal tract. See Health Information.
- Consumer exposure to glycidyl methacrylate is unlikely. Those working with glycidyl methacrylate in manufacturing operations could be exposed during maintenance, sampling, testing, manual transfer, or other procedures. See Exposure Potential.
- Glycidyl methacrylate is a combustible liquid and vapor. It is stable under recommended storage conditions. Elevated temperatures can cause hazardous polymerization, so glycidyl methacrylate has inhibitors added to reduce the probability of polymerization. See Product Description and Physical Hazard Information.

Manufacture of Product
- **Capacity** – Dow is a major global producer of glycidyl methacrylate, with manufacturing facilities located in Freeport, Texas, in the United States.
Process – Glycidyl methacrylate is produced by reacting methacrylic acid (CAS No. 79-41-4) with epichlorohydrin (CAS No. 106-89-8) to form the chlorohydrid ester, followed immediately by removal of hydrogen chloride (CAS No. 7647-01-0). The reaction sequence is shown below:

\[
\begin{align*}
\text{Methacrylic acid} & \quad + \quad \text{Epichlorohydrin} \\
\text{Glycidyl methacrylate} & \quad + \quad \text{Hydrogen chloride}
\end{align*}
\]

Product Description

Glycidyl methacrylate is a clear, colorless liquid with a sharp odor. It is readily miscible with most organic solvents. Glycidyl methacrylate contains 45 to 150 ppm (parts per million) of the monomethyl ether of hydroquinone (MEHQ, CAS No. 150-76-5) added as an inhibitor to prevent polymerization under recommended storage conditions. Glycidyl methacrylate may contain as much as 100 ppm of residual epichlorohydrin.

Product Uses

Glycidyl methacrylate is primarily used as a reactive building block to produce polymer coatings, finishes, and adhesives. DOW glycidyl methacrylate is used to manufacture:

- High performance automotive coatings for automotive applications
- Powder coatings
- Radiation-curable coatings
- Waterborne coatings
- Industrial and protective coatings
- Appliance and hardware finishes
- Adhesives
- Electrical laminates
- Multifunctional acrylates
- Hydrogenated Liquid Epoxy Resin (LER) substitutes
- Plastic modifiers (PVC, PET, engineering thermoplastics, rubber)

Exposure Potential

Glycidyl methacrylate is used in the production of industrial and consumer products. Based on these uses, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a glycidyl methacrylate manufacturing facility or in the various industrial or manufacturing facilities that use glycidyl methacrylate. It is produced, distributed, stored and consumed in closed systems. Those working with glycidyl methacrylate in manufacturing operations could be exposed during maintenance, sampling, testing, manual transfer, or other procedures. Each manufacturing facility should have a thorough training program for employees, appropriate work processes and safety equipment in place to limit unnecessary glycidyl methacrylate exposure. Preferred glove barrier materials include chlorinated polyethylene, polyethylene, ethyl vinyl alcohol laminate (EVAL), polyvinyl alcohol (PVA), or styrene/butadiene rubber. Consult the relevant Safety Data Sheet (SDS) or see **Health Information**.

- **Consumer exposure to products containing glycidyl methacrylate** – Dow does not sell glycidyl methacrylate for direct consumer use, but it is used as a raw material to make a

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variety of goods used by consumers or construction personnel and could be present in trace amounts as residual monomer in consumer products. See Health Information.

- **Environmental releases** – In the event of a spill, the focus is on containing the spill to prevent contamination of soil, ditches, sewers, or surface or ground water. Evacuate the area and stay upwind of the spill. Ventilate the area of leaks or spills. Only trained and properly protected personnel should be involved in clean-up operations. To avoid fire or explosion, eliminate all sources of ignition in vicinity of the spill or released vapor. Ground and bond all containers and handling equipment. Use appropriate safety and protective equipment. Absorb with noncombustible material such as dirt, sand, polyethylene or polypropylene fiber products. Do not use clay, cellulose, sawdust, or Drierite absorbents. Consult the relevant Safety Data Sheet (SDS) for more information about protective equipment and procedures. See Environmental, Health and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and are generally contained. If a large spill does occur, dike area to contain spill. Contain the spilled material if possible and keep it out of sewers. Ground and bond all containers and handling equipment and avoid all ignition sources. Pump with explosion-proof equipment. If available, use foam to smother or suppress vapors. The material should be captured, collected and reprocessed, or disposed of according to applicable governmental requirements. For emergency and other conditions where the exposure guideline may be exceeded, use an approved positive-pressure self-contained breathing apparatus or positive-pressure air line with auxiliary self-contained air supply. In confined or poorly ventilated areas, use an approved self-contained breathing apparatus (SCBA) or positive pressure air line with auxiliary self-contained air supply. Follow emergency procedures carefully. See Environmental, Health and Physical Hazard Information.

### Health Information

Acrylic and methacrylic esters, including glycidyl methacrylate, have a distinctive odor that may be bothersome. However, the smell alone does not necessarily indicate a health risk. These esters have an extremely low odor "threshold," meaning that even very small amounts in the air can be detected by smell.5

Glycidyl methacrylate liquid and vapors may cause severe eye irritation with corneal damage. Injuries may be slow to heal.

Brief skin contact may cause burns with pain, severe local redness and tissue damage. Prolonged or widespread skin contact may result in absorption of harmful amounts and may cause an allergic skin reaction.

Prolonged exposure to glycidyl methacrylate vapors may cause severe irritation to upper respiratory tract (nose and throat). Symptoms of exposure may include dizziness or drowsiness.

Glycidyl methacrylate has low toxicity if swallowed, but may result in gastrointestinal irritation or ulceration. Swallowing glycidyl methacrylate may result in burns of the mouth and throat. Vomiting should not be induced as it could result in aspiration of the material into the lungs.

Glycidyl methacrylate does not cause birth defects in laboratory nor is it considered a carcinogen. However, a metabolite has caused cancer and has been shown to interfere with fertility in animal studies. For specific health information, review the SDS.
Environmental Information\textsuperscript{3,9}

The bioconcentration potential for glycidyl methacrylate is low, and is considered readily biodegradable. Glycidyl methacrylate is considered moderately toxic to aquatic organisms.

For specific environmental information, review the Safety Data Sheet (SDS).

Physical Hazard Information\textsuperscript{3,10}

Because of its low volatility, glycidyl methacrylate is not considered an unusual fire hazard. However, it is combustible and should be kept away from heat, sparks, flame and any sources of ignition.

Fire Fighting Instructions

Should ignition occur, extinguish with water fog or fine spray, dry chemical fire extinguisher, carbon dioxide fire extinguisher, or foam.

- Alcohol-Type Concentrate (ATC) foams (also called alcohol-resistant foams) are preferred. General purpose synthetic foams (including aqueous film-forming foams, also called AFFFs) or protein foams may function, but will be less effective.
- Personal protection for fire fighters should include positive-pressure, self-contained breathing apparatus (SCBA) and protective fire-fighting clothing includes fire fighting helmet, coat, trousers, boots, and gloves.
- Avoid contact with this material during fire-fighting operations. If contact is likely, change to full chemical-resistant fire-fighting clothing with SCBA. If this is not available, wear full chemical-resistant clothing with SCBA and fight fire from a remote location.

Reactivity/Stability

Glycidyl methacrylate is stable under recommended storage conditions. Elevated temperatures can cause hazardous polymerization. Polymerization can be catalyzed by the absence of air, the presence of free radical initiators and peroxides, acids, UV light, bases, or high temperature.

Glycidyl methacrylate contains an inhibitor to minimize polymerization under recommended storage conditions. See Product Description or SDS. Maintain inhibitor concentration and dissolved oxygen level. Uninhibited monomer vapors can polymerize and plug relief devices.

Avoid unintended contact with activated carbon or silica gel, which may cause polymerization. Avoid contact with cellulose- or clay-based absorbents, and with incompatible materials, such as:

- Oxidizing or reducing materials
- Strong acids
- Strong bases
- Metals (cast iron, mild steel, copper, brass) and metal oxides

Additional physical property information for glycidyl methacrylate is available on the SDS.

Regulatory Information

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

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Additional Information

- Safety Data Sheet

For more business information about glycidyl methacrylate, visit Dow’s Functional Monomers web site

References

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3 Glycidyl Methacrylate, Safety Data Sheet, The Dow Chemical Company
4 Glycidyl Methacrylate, Technical Data Sheet, The Dow Chemical Company, Form No. 296-01330-1205
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