GLYCIDYL METHACRYLATE
ACRYLIC MONOMER

ESTRON CHEMICAL
THE EDGE OF INNOVATION

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GENERAL DESCRIPTION

Glycidyl Methacrylate (GMA) provides dual reactive functionality (epoxy and methacrylate) to afford a wide diversity of polymer structures accessible via either ionic or free radical polymerization. The attributes of both acrylic and epoxy chemistries can provide improved synergistic physical functions and properties. Estron offers two grades of Glycidyl Methacrylate, regular grade and high purity.

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TYPICAL PROPERTIES*

	Regular grade	High Purity
Appearance	Clear Liquid	Clear Liquid
APHA Color	30 maximum	75 maximum
Purity, % by Gas Chromatography	97.5% minimum	98.5% minimum
Polymer test **	Pass	Pass
Epichlorohydrin, ppm	3000 maximum	200 maximum
Water, weight %	0.3% maximum	0.3% maximum
Inhibitor, ppm MEHQ	50 – 150	50 - 150

* Not to be used for specification purposes
**No turbidity or polymer formation with methanol

HEALTH PROTECTION

GMA is toxic, corrosive to the skin, and potentially skin sensitizing. Avoid contact with the eyes and skin.

SUGGESTED FORMULATIONS and GUIDELINES – APPLICATION DATA

Glycidyl Methacrylate is used in combination with other monomers to produce polymers with desired properties. The extent to which GMA can internally modify copolymers is in approximate proportion to its content in the final product. Usually 5-20% of GMA is copolymerized with other monomers. Glycidyl Methacrylate offers such properties as strength, hardness, gloss, adhesion, thermal resistance, water and solvent resistance. The copolymers may be prepared by free radical or cationic polymerization. They are used in:

a) Printing inks, hydrogels for contact lenses and membranes.
b) Resins in the electronic industry.
c) Acrylic enamels for auto top-coats & appliances. GMA is said to contribute good solvent resistance, good adhesion and ultra-violet light stability and high gloss to these systems.
d) Thermosetting acrylics for can coatings. The addition of GMA to the usual styrene/ethyl acrylate polymers used in this application, improves both the adhesion of the system and its color retention if the coating is subjected to “oven bake”.
e) Polyethylacrylate elastomers. This use requires an epoxy group. The most streamlined method for the incorporation of such functionality is through the use of GMA.
f) UV absorption. The position of the epoxy group in GMA appears to be of unique importance in the preparation of UV light absorbers and others.

FREE RADICAL POLYMERIZATION

When GMA is reacted in the presence of peroxides or azocompounds, polymers with pendant epoxy groups are obtained. Extensive work has been done on the use of the glycidyl methacrylate for industrial polymerization, especially in combination with acrylic/methacrylic esters, styrene, acrylonitrile, vinyl acetate and vinyl chloride. Below are listed the relative reactive ratios of GMA with these monomers.

GMA	Methyl Methacrylate	0.82	0.75	60
GMA	Methacrylic Acid	0.41	1.98	50
GMA	Styrene	0.63	0.52	65
GMA	Acrylonitrile	1.32	0.14	60
GMA	Vinyl Acetate	31.0	0.02	50
GMA	Vinyl Chloride	8.84	0.04	50

CATIONIC POLYMERIZATION
In the presence of BF3/etherate, glycidyl methacrylate forms a V-type homopolymer containing vinyl groups. The pendant double bonds may be used for copolymerization with various monomers to form a crosslinked structure. The reaction is activated by organic peroxides or radiation.

ESTERIFICATION
Alkyd resins containing carboxylic groups can be reacted with GMA through the oxirane group. So modified alkyds show better drying properties and improved water resistance. By reacting GMA with poly-acids or acid anhydrides, polyesters containing pendant vinyl groups are formed.

UV-CURING
Some di-carboxylic acids reacted with 2 molecules of GMA form liquid difunctional esters suitable for UV-curable systems. The same applies to esters obtained from tri-carboxylic acids and GMA.

GRAFT POLYMERIZATION
Glycidyl Methacrylate can be grafted into cellulose, synthetic fiber, synthetic rubber vinyl chloride, polyolefins and others. The above process is initiated by organic peroxides or radiation. GMA grafted polyethylene shows improved adhesion to metals and polar substrates. Fibers modified with glycidyl methacrylate have better dyeability and higher mechanical strength. Graft polymerization is a practical and economical way for the modification of polymers.

REGULATORY LISTINGS
The components of this material are either listed or exempt from listing due to polymer exemption criteria for the following chemical inventory listings: AICS (Australia), DSL (Canada), ECL (Korea), EINECS (Europe), ENCS (Japan), IECSC (China), PICCS (Philippines), SWISS (Switzerland), TSCA (USA)

PACKAGING (NET WEIGHT)
40 lb. / 18.1 kg in steel pail (standard packaging)
440 lb. / 200 kg in steel drum (standard packaging)

PRODUCT AVAILABILITY
This product is commercially available and may require lead time.

STORAGE AND HANDLING
Store closed containers in a dry, cool area. Keep out of direct sunlight and away from heat and fire. GMA is combustible. Polymerization may occur by contact with peroxides, azo-compounds, S-compounds, amines, light, or due to insufficient inhibitor present. For good stability, aerial oxygen

saturation in the monomer is necessary. Avoid inert blanketing to ensure inhibitor performance. Estron recommends periodic testing of inhibitor level to guard against unwanted polymerization, and provides product support up to 90 days from ship date provided that recommended storage conditions are maintained. *See SDS for additional handling and health information*.

CONTACT INFORMATION

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