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Aminoalkyl Methacrylate Monomers, Imparting Hydrophilic and Antistatic Properties, and an Adsorptive Property for Anionic Compounds

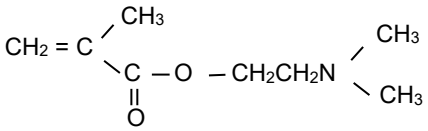
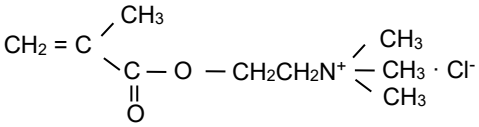
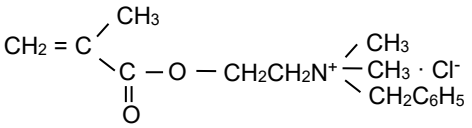
METHACRYLATE Products

Preface

METHACRYLATE products are aminoalkyl methacrylate monomers having double bonds, and either tertiary amino groups or quaternary ammonium groups in their molecules.

Polymers obtained by homopolymerization or copolymerization with other vinyl monomers have water solubility, hydrophilic and antistatic properties, conductivity, and an adsorptive property and reactivity for anionic compounds. Therefore, METHACRYLATE products are suitable as polymer modifiers to impart such properties and are particularly used as raw materials for polymer flocculants, electro-dialysis, reverse osmosis membranes, ion-exchange resins, paper strength additives, and drainage/retention aids used in paper making processes.

We offer the following METHACRYLATE products.

Product Name	Structural Formula (Chemical Name)	Remarks
METHACRYLATE DMA	 [2-(Dimethylamino)ethyl methacrylate]	MEHQ * content: 1,000 ppm
METHACRYLATE DMC-80	 [Methacryloyl oxyethyl trimethyl ammonium chloride]	Approx. 78.5 wt % aqueous solution MEHQ * content: 2,000 ppm
METHACRYLATE DMB-60	 [Methacryloyl oxyethyl dimethylbenzyl ammonium chloride]	Approx. 59 wt % aqueous solution MEHQ * content: 290 ppm

* Hydroquinone monomethyl ether (radical polymerization inhibitor)

Notice: As a sister product of METHACRYLATE DMA, we offer METHACRYLATE DMA-200 containing 2,000 ppm of MEHQ. All values described in this brochure are representative.

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Typical Properties

1. Physical Properties

Table 1 shows typical properties of METHACRYLATE products.

Table 1. Physical Properties

Property \ Product Name	METHACRYLATE DMA	METHACRYLATE DMC-80	METHACRYLATE DMB-60
Appearance	Colorless liquid	Colorless liquid	Pale yellow liquid
Color (Hazen)	10	10	20
Purity wt %	99.8	78.5	59.0
pH (undilution)	–	6.0	8.0
Specific gravity (20 °C/4 °C)	0.94	1.11	1.09

2. Chemical Properties

All METHACRYLATE products can be polymerized by themselves or copolymerized with other vinyl monomers. Normal free-radical initiators (azo or peroxide type), ultraviolet rays and heat allow these products to easily begin to be polymerized.

Table 2 shows Q and e values of METHACRYLATE DMA and METHACRYLATE DMC-80. In addition, Table 3 shows copolymerization reactivity ratio (r_1 and r_2) with various vinyl monomers.

Table 2. Q and e Values

Value \ Product Name	METHACRYLATE DMA	METHACRYLATE DMC-80
Q value	0.68	1.49
e value	0.48	0.27

Table 3. Copolymerization Reactivity Ratio

Monomer 1	Monomer 2	r_1	r_2
METHACRYLATE DMA	Styrene	0.37	0.53
	Vinyl acetate	15.6	0.035
	n-Butyl acrylate	1.61	0.61
	2-Ethylhexyl acrylate	1.59	0.63
	Methyl methacrylate	0.88	1.12
	Vinyl chloride	29.7	0.03
METHACRYLATE DMC-80	Acrylamide	1.71	0.25

Notice: Amino alcohol and methacrylic acid may be formed by hydrolyzing METHACRYLATE products. Also, the double bonds of these products may cause an addition reaction just like other chemicals such as acrylate and methacrylate.

Applications

METHACRYLATE products have double bonds and cationic groups in their molecules.
Polymers obtained by homopolymerization or copolymerization with other vinyl monomers have the following properties due to their cationic groups.

METHACRYLATE products impart…

- A hydrophilic property to polymers, making them possible to be water-soluble and also control hydrophilic and lipophilic properties.
- A reactivity and adsorptive property for anionic compounds (e.g., acid dye) to polymers.
- A cohesive property for negative colloid (e.g., sewage sludge and cellulose) to polymers.
- Electrical properties (e.g., antistatic property and conductivity) to polymers.

The following applications of METHACRYLATE products are introduced in Japanese patent publications and references.

- Polymers obtained by polymerizing cationic monomers are suitable as polymer flocculants.
- Cross-linked polymers are used for electrodialysis, reverse osmosis membranes and ion-exchange resins.
- Graft polymers produced using cellulose (e.g., pulp) are suitable as wastewater treatment materials.
- Polymers obtained by polymerizing cationic monomers are particularly suitable for paper strength additives, and agents for papermaking, such as drainage/retention aids used in paper making processes.

Precaution Against Mishandling

- If METHACRYLATE products are left in pipes and other equipment, the equipment may be clogged with these products gelled by incidental polymerization. Rinse or wash the equipment well after use.

Important: Before handling these products, refer to the Safety Data Sheet for recommended protective equipment, and detailed precautionary and hazards information.

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