METHACRYLIC MONOMERS

SPECIFICATIONS AND HANDLING

MITSUBISHI RAYON CO.,LTD.

WHAT IS METHACRYLIC MONOMERS

Mitsubishi Rayon Co., Ltd. is one of the leading manufacturers of METHACRYLIC Monomers.
Methyl methacrylate monomer is popularly known as a basic raw material for methyl methacrylate sheet and moulding resin commonly used as signs, lighting diffusers, windows, automobile lenses and other so many applications.
In general, methacrylate polymer having variable excellent properties is produced by selecting an ester residue group of $CH_2=C(CH_3)-COOR$.

METHACRYLIC MONOMERS

NON FUNCTIONAL MONOMERS

Abbreviations	Chemical name of monomer
MMA	Methyl Methacrylate
EMA	Ethyl Methacrylate
BMA	n-Butyl Methacrylate
IBMA	iso-Butyl Methacrylate
TBMA	tert-Butyl Methacrylate
EHMA	2-Ethylhexyl Methacrylate
LMA	Lauryl Methacrylate
SLMA	Alkyl Methacrylate
TDMA	Tridecyl Methacrylate
SMA	Stearyl Methacrylate
CHMA	Cyclohexyl Methacrylate
BZMA	Benzyl Methacrylate

FUNCTIONAL MONOMERS

Abbreviations	Chemical name of monomer
MAA	Methacrylic Acid
HEMA	2-Hydroxyethyl Methacrylate
HPMA	Hydroxypropyl Methacrylate
DMMA	Dimethylaminoethyl Methacrylate
DEMA	Diethylaminoethyl Methacrylate
DMCMA	Dimethylaminoethyl Methacrylate Methylchloride Salt
GMA	Glycidyl Methacrylate
THFMA	Tetrahydrofurfuryl Methacrylate
AMA	Allyl Methacrylate
EDMA	Ethyleneglycol Dimethacrylate
3EDMA*	Triethyleneglycol Dimethacrylate
4EDMA*	Tetraethyleneglycol Dimethacrylate
BDMA	1, 3-Butyleneglycol Dimethacrylate
HXMA*	1, 6-Hexanediol Dimethacrylate
TMPMA*	Trimethylolpropane Trimethacrylate
ETMA*	2-Ethoxyethyl Methacrylate
MTMA*	2-Methoxyethyl Methacrylate

* produced on request

NON FUNCTIONAL MONOMERS

	Chemical name of monomer		Methyl Methacrylate		Ethyl Methacrylate		n-Butyl Methacrylate	
	Abbreviations		MMA		EMA		n-BMA	
	Chemical Formula		$CH_2=C(CH_3)COOCH_3$		$CH_2=C(CH_3)COOCH_2CH_3$		$CH_2=C(CH_3)COO-CH_2(CH_2)_2CH_3$	
Specifications & Typical Properties			Specifications	Typical properties	Specifications	Typical properties	Specifications	Typical properties
	Color when shipped (APHA)		5 max.	5 max.	20 max.	10 max.	20 max.	5 max.
	Specific Gravity (20°C/4°C)		0.942~0.946	0.944	0.910~0.916	0.914	0.893~0.899	0.896
	Acidity (as methacrylic acid) %		0.005 max.	0.001	0.01 max.	0.001	0.005 max.	0.001
	Purity %	PSDB						
		Bromination						
		Gaschromatography	99.8 min.	99.9	99.0 min.	99.8	99.5 min.	99.9
		Others						
	Water when shipped (by karl Fisher) %		0.05 max.	0.01	0.1 max.	0.02	0.1 max.	0.01
	Inhibitors	HQ ppm	100		300		100	
		MEHQ ppm	100				25, 100	
		IA ppm	20					
	Package & Net Weight*		190 Kg Iron Drum		180 Kg Iron Drum		180 Kg Iron Drum	
General Properties	Formula Weight		100.12		114.15		142.20	
	Refractive Index (n_D^{20})		1.4152		1.4157		1.4253	
	Viscosity (mPa·s, 20°C)		0.56		0.62		0.92	
	Freezing Point °C		–48		below –60		below –60	
	Specific Heat J/(g·°C)		1.89		1.93		1.84	
	Heat of Polymerization kJ/mol		54.4		59.1		56.6	
	Boiling Point °C/hPa		100.8/1013, 61/267, 46/133, 29/67		118/1013, 77/267, 58/133, 42/67		163.5/1013, 117/267, 102/133, 83/67	
	Solubility % 20°C	Water in	0.99		0.64		0.30	
		In Water	1.72		0.46		0.04	
	Flash Point °C		11		20.5		51	
	Toxity (Acute oral LD_{50}, rats, mg/kg)		7,872		14,800		22,600	
	Tg of Polymer		105		65		20	
	Uses		• Sheets, rod, pipe • Molding material • Coating • Dental material • Adhesives • Textile treatment agent • Leather treatment agent • Lube oil additives • etc.		• Coating • Molding material • Adhesives • Textile treatment agent • etc.		• Lube oil additives • Coating • Adhesives • Textile treatment agent • Paper processing agent • Paper coating • Plastisizer • Leather and metal treatment agent • etc.	
	CAS No.		80–62–6		97–63–2		97–88–1	
	TSCA No.		80–62–6		97–63–2		97–88–1	
	EINECS No.		2012971		2025975		2026151	

	Chemical name of monomer		iso-Butyl Methacrylate		Tert-Butyl Methacrylate		2-Ethylhexyl Methacrylate	
	Abbreviations		IBMA		TBMA		EHMA	
	Chemical Formula		$CH_2=C(CH_3)COO-CH_2CH(CH_3)_2$		$CH_2=C(CH_3)COO-C(CH_3)_3$		$CH_2=C(CH_3)COO-CH_2CH(C_2H_5)(CH_2)_3CH_3$	
Specifications & Typical Properties			Specifications	Typical properties	Specifications	Typical properties	Specificaltions	Typical properties
	Color when shipped (APHA)		20 max.	5 max.	20 max.	5 max.	20 max.	10 max.
	Specific Gravity (20°C/4°C)		0.884~0.890	0.887	0.874~0.880	0.878	0.881~0.887	0.884
	Acidity (as methacrylic acid)	%	0.005 max	0.001	0.05 max.	0.01	0.01 max.	0.001
	Purity %	PSDB						
		Bromination						
		Gaschromatography	99.0 min.	99.7	98.0 min.	99.7	99.0 min.	99.7
		Others						
	Water when shipped (by karl Fisher)	%	0.1 max.	0.01	0.1 max.	0.01	0.1 max.	0.01
	Inhibitors	HQ ppm	100					
		MEHQ ppm	25, 100		200		25	
		IA ppm						
	Package & Net Weight*		180 Kg Iron Drum		170 Kg Iron Drum		180 Kg Iron Drum	
General Properties	Formula Weight		142.20		142.20		198.31	
	Refractive Index (n_D^{20})		1.4216		1.4196		1.4398	
	Viscosity (mPa·s, 20°C)		0.88		0.93		1.85	
	Freezing Point	°C	-33		below -60		below -60	
	Specific Heat	J/(g·°C)	1.88		2.01		2.01	
	Heat of Polymerization	kJ/mol	59.9		54.4			
	Boiling Point	°C/hPa	155/1013, 107/267, 87/133, 72/67		67/93, 52/47		229/1013, 172/267, 150.5/133, 101/67	
	Solubility % 20°C	Water in	0.30		0.30		0.14	
		In Water	0.04		0.05		below 0.01	
	Flash Point	°C	45		29.5		100	
	Toxity (Acute oral LD_{50}, rats, mg/kg)		11,990 (mouse)		8,549 (mouse)		13,000	
	Tg of Polymer		48		107		-10	
	Uses		• Coating • Printing ink • Adhesives • Lube oil additives • Dental material • Textile treatment agent • Paper coating • etc.		• Coating • Dispersion material • Textile treatment agent • Covering material • etc.		• Textile treatment agent • Dental material • Coating and covering • Dispersion material • Lube oil additives • Adhesives • Plastisizer • etc.	
	CAS	No.	97-86-9		585-07-9		688-84-6	
	TSCA	No.	97-86-9		585-07-9		688-84-6	
	EINECS	No.	2026130		2095487		2117086	

Lauryl Methacrylate		Alkyl Methacrylate		Tridecyl Methacrylate		Stearyl Methacrylate	
LMA		SLMA		TDMA		SMA	
$CH_2=C(CH_3)COO-CH_2(CH_2)_{10}CH_3$		$CH_2=C(CH_3)COO-C_nH_{2n+1}$ (n=12,13)		$CH_2=C(CH_3)COO-CH_2(CH_2)_{11}CH_3$		$CH_2=C(CH_3)COO-CH_2(CH_2)_{16}CH_3$	
Specifications	Typical properties	Specifications	Typical properties	Specificaltions	Typical properties	Specificaltions	Typical properties
20 max.	15 max.	20 max.	15 max.	50 max.	10 max.	40 max.	15 max.
0.869~0.875	0.873	0.871~0.877	0.872	0.876~0.882	0.879	0.859~0.865 (30°C/4°C)	0.862 (30°C/4°C)
0.01 max.	0.001	0.01 max.	0.001	0.01 max.	0.001	0.01 max.	0.001
99.0 min.	99.8	99.0 min.	99.7	98.5 min.	99.8	99.0 min.	99.8
0.1 max.	0.01	0.1 max.	0.01	0.1 max.	0.01	0.1 max.	0.01
1000		100		1000		250	
160 Kg Iron Drum		180 Kg Iron Drum		180 Kg Iron Drum		140 Kg Iron Drum	
254.5		263 (average)		268.44		338.58	
1.4470		1.4480		1.4518		1.4503 (at 30°C)	
4.60		5.06		5.81		8.21 (at 30°C)	
–20		–19.4		below –60		19.8	
1.97				1.80		2.77	
160/9.3		142/2.7		222/267, 195/67, 150/13.3, 141/6.7		270/67, 252/13.3, 205/6.7	
0.09		0.08		0.07		0.08	
below 0.01		below 0.01		below 0.01		below 0.01	
154		150		150		198	
over 5,000							
–65		–62		–46		–100	
• Deodorant • Lube oil additives • Lacquer • Leather and textile finisher • Additives • Paper processing agent • Plastisizer • etc.		• Lube oil additives • Coating • Textile treatment agent • Adhesives • Paper coating • etc.		• Lube oil additives • Coating • Textile treatment agent • Adhesives • etc.		• Textile treatment agent • Coating • Adhesives • Lube oil additives • Paper coating • etc	
142-90-5		142-90-5 / 2495-25-2		2495-25-2		32360-05-7	
142-90-5		142-90-5 / 2495-25-2		2495-25-2		32360-05-7	
2055706		2055706 / 2196718		2196718		2510135	

	Chemical name of monomer		Cyclohexyl Methacrylate		Benzyl Methacrylate		Methacrylic Acid	
	Abbreviations		CHMA		BZMA		MAA	
	Chemical Formula		$CH_2=C(CH_3)COO-CH<^{CH_2-CH_2}_{CH_2-CH_2}>CH_2$		$CH_2=C(CH_3)COO-CH_2-C<^{CH-CH=CH}_{CH=CH}>CH$		$CH_2=C(CH_3)COOH$	
Specifications & Typical Properties			Specifications	Typical properties	Specifications	Typical properties	Specificaltions	Typical properties
	Color when shipped (APHA)		50 max.	10 max.	30 max.	15 max.	30 max.	5 max.
	Specific Gravity (20°C/4°C)		0.963~0.968	0.966	1.036~1.042	1.040	1.012~1.018	1.015
	Acidity (as methacrylic acid)	%	0.01 max.	0.001	0.05 max.	0.03	—	—
	Purity %	PSDB						
		Bromination						
		Gaschromatography	98.5 min.	99.6	98.0 min.	99.0		
		Others					98.5 min.	99.9
	Water when shipped (by karl Fisher)	%	0.3 max.	0.02	0.1 max.	0.03	0.3 max.	0.01
	Inhibitors	HQ ppm					300	
		MEHQ ppm	50		200		250	
		IA ppm						
	Package & Net Weight*		180 Kg Iron Drum		200 Kg Chemi Drum		200 Kg Plastic Drum	
General Properties	Formula Weight		168.24		176.22		86.09	
	Refractive Index (n_D^{20})		1.4598		1.5144		1.432	
	Viscosity (mPa·s, 20°C)		2.50		2.68		1.35	
	Freezing Point	°C	below –60		below –60		15	
	Specific Heat	J/(g·°C)	1.84				2.10	
	Heat of Polymerization	kJ/mol	53.2		53.1		66.2	
	Boiling Point	°C/hPa	210/1013, 60/2.7		160/213, 115/21.3		161/1013, 124/267, 106.6/133, 60/13.3	
	Solubility % 20°C	Water in	0.27		0.30		∞	
		In Water	below 0.01		0.14		∞	
	Flash Point	°C	78		115		73	
	Toxity (Acute oral LD_{50}, rats, mg/kg)		11,000		3,633		1,250	
	Tg of Polymer		83		54		228	
	Uses		• Opical material • Molding material • Adhesives • Covering material • etc.		• Polymer modifier • Deodrant • Coating modifier • Textile treatment agent • etc.		• Coating • Adhesives • Textile treatment agent • Rubber modifier • Leather treatment agent • Paper processing • Ion exchange resin • etc.	
	CAS	No.	101–43–9		2495–37–6		79–41–4	
	TSCA	No.	101–43–9		2495–37–6		79–41–4	
	EINECS	No.	2029435		2196744		2012044	

2-Hydroxyethyl Methacrylate		Hydroxypropyl Methacrylate		Dimethylaminoethyl Methacrylate		Diethylaminoethyl Methacrylate	
HEMA		HPMA		DMMA		DEMA	
$CH_2=C(CH_3)COO-CH_2CH_2OH$		$CH_2=C(CH_3)COO-CH_2CH(OH)CH_3$		$CH_2=C(CH_3)COO-CH_2CH_2N(CH_3)_2$		$CH_2=C(CH_3)COO-CH_2CH_2N(CH_2CH_3)_2$	
Specifications	Typical properties	Specifications	Typical properties	Specificaltions	Typical properties	Specificaltions	Typical properties
30 max.	10 max.	50 max.	10 max.	20 max.	10 max.	30 max.	10 max.
1.069~1.075	1.072	1.024~1.030	1.027	0.930~0.936	0.934	0.918~0.924	0.921
0.3 max.	0.01	1.0 max.	0.003				
		97.0 min.	98.9				
97.0 min.	98.3						
				98.5 min.	99.7	98.5 min.	99.6
0.3 max.	0.03	0.3 max.	0.04	0.2 max.	0.02	0.1 max.	0.05
200, 250		200, 250		2000		2000	
200 Kg Chemi Drum		200 Kg Chemi Drum		180 Kg Iron Drum		180 Kg Iron Drum	
130.15		144.17		157.22		185.27	
1.4537		1.4489		1.4414		1.4454	
6.79		9.28		1.34		1.80	
below –60		below –57		below –60		below –60	
1.97		1.93		1.84		1.84	
50.0		50.7					
95/13.3, 87/6.7, 68/1.3		96/13.3, 87/6.7, 66/1.3		186/1013, 97.5/53, 87.5/33, 68.5/13.3		114/40	
∞		21.7		∞		1.50	
∞		13.4		∞		1.33	
109		106		65		94	
5,050		over 2,000		1,751		4,696	
55		26		18		16~24	
• Thermo setting coating • Textile treatment agent • Adhesives • Paper processing material • Polymer modifier • etc.		• Thermo setting coating • Textile treatment agent • Adhesives • Paper processing material • Polymer modifier • etc.		• Coating • Textile treatment agent • Adhesives • Paper processing material • Polymer modifier • Lube oil additives • Rubber modifier and stabilizer • Ion exchange resin • Water treatment agents • etc.		• Coating • Textile treatment agent • Adhesives • Paper processing material • Polymer modifier • Lube oil additives • Rubber modifier and stabilizer • Ion exchange resin • Water treatment agents • etc.	
868–77–9		27813–02–1		2867–47–2		105–16–8	
868–77–9		27813–02–1		2867–47–2		105–16–8	
2127822		2486663		2206888		2032757	

	Chemical name of monomer		Dimethylaminoethyl Methacrylate Methylchloride Salt		Glycidyl Methacrylate		Allyl Methacrylate	
	Abbreviations		DMCMA		GMA		AMA	
	Chemical Formula		$[CH_2=C(CH_3)COO-CH_2CH_2N(CH_3)_3]^+C\ell^-$		$CH_2=C(CH_3)COO-CH_2-CH-CH_2$ (O)		$CH_2=C(CH_3)COO-CH_2CH=CH_2$	
Specifications & Typical Properties			Specifications	Typical properties	Specifications	Typical properties	Specificaltions	Typical properties
	Color when shipped (APHA)		100 max.	30 max.	30 max.	10 max.	50 max.	5 max.
	Specific Gravity (20°C/4°C)		1.108~1.114	1.111	1.071~1.080	1.074	0.930~0.936	0.933
	Acidity (as methacrylic acid)	%	0.2 max.	0.10			0.05 max.	0.01
	Purity %	PSDB	79 min.	80.6				
		Bromination						
		Gaschromatography			97.0 min.	98.5	99.0 min.	99.9
		Others			Chlorine 1.0 max.	Chlorine 0.2		
	Water when shipped (by karl Fisher)	%	21 max.	19.3	0.1 max.	0.03	0.1 max.	0.01
	Inhibitors	HQ ppm						
		MEHQ ppm	2000		50, 100		250	
		IA ppm						
	Package & Net Weight*		200 Kg Chemi Drum		200 Kg Chemi Drum		180 Kg Chemi Drum	
General Properties	Formula Weight		207.73		142.16		126.16	
	Refractive Index (n_D^{20})		1.4802		1.4495		1.4373	
	Viscosity (mPa·s, 20°C)		108		2.53		1.09	
	Freezing Point	°C	15		below –60		below –60	
	Specific Heat	J/(g·°C)			1.76		1.89	
	Heat of Polymerization	kJ/mol						
	Boiling Point	°C/hPa			189/1013, 75/13.3		144/1013	
	Solubility % 20°C	Water in	∞		2.04		0.50	
		In Water	∞		2.50		0.12	
	Flash Point	°C			86		37.5	
	Toxity (Acute oral LD_{50}, rats, mg/kg)		over 2,000		597		430	
	Tg of Polymer				46		52	
	Uses		• Water treatment agents • Paper precessing material • etc.		• Coating • Textile treatment agent • Rubber modifier • Resin modifier • Photo-sensitive resin • etc.		• Cross linking agent • Resin modifier for improving surface hardness • Resin modifier for improving thermoplastic • Rubber modifier • etc.	
	CAS	No.	5039-78-1		106-91-2		96-05-9	
	TSCA	No.	5039-78-1		106-91-2		96-05-9	
	EINECS	No.	2257335		2034419		2024730	

Ethyleneglycol Dimethacrylate		Triethyleneglycol Dimethacrylate		1,3-Butyleneglycol Dimethacrylate	
EDMA		3EDMA		BDMA	
$CH_2=C(CH_3)COO-CH_2$ $CH_2=C(CH_3)COO-CH_2$		$CH_2=C(CH_3)CO(OC_2H_4)3$ $CH_2=C(CH_3)COO$		$CH_2=C(CH_3)COOCH_2CH_2$ $CH_2=C(CH_3)COOCH(CH_3)$	
Specifications	Typical properties	Specifications	Typical properties	Specificaltions	Typical properties
20 max.	10 max.	100 max.	30 max.	50 max.	10 max.
1.048~1.054	1.052	1.075~1.081	1.078	1.012~1.018	1.014
0.05 max.	0.01	0.5 max.	0.01	0.01 max.	0.001
98.0 min.	99.0	95.0 min.	99.8	96.0 min.	99.0
0.3 max.	0.01	0.3 max.	0.02	0.2 max.	0.02
100					
		200		200	
200 Kg Iron Drum		200 Kg Iron Drum		200 Kg Iron Drum	
198.22		286.33		226.28	
1.4554		1.4600		1.4535	
3.20		10.2		4.40	
–40		–55		below –60	
1.84		1.89		1.84	
97/5.3		162/2.7		110/4.0	
0.70		2.22		0.69	
0.18		1.91		0.08	
118		164		130	
3,300		10,837			
• Cross linking agent • Plastisol • Rubber modifier • Leather treatment agent • Paper processing material • Ion exchange resin • Dental material • Optical material • Modifier • Coating and covering material • Adhesives • etc.		• Cross linking agent • Plastisol • Acrylic sheet and lod modifier • Rubber modifier • Ion exchange resin • Dental material • Resin modifier • etc.		• Cross linking agent • Resin modifier • Rubber modifer • Sheet modifier • Adhesives • Textile treatment agent • FRP modifier • etc.	
97–90–5		109–16–0		1189–08–8	
97–90–5		109–16–0		1189–08–8	
2026172		2036526		2147110	

	Chemical name of monomer		1,6-Hexanediol Dimethacrylate		Trimethylolpropane Trimethacrylate		2-Ethoxyethyl Methacrylate	
	Abbreviations		HXMA		TMPMA		ETMA	
	Chemical Formula		$CH_2=C(CH_3)COO-CH_2-(CH_2)_4-CH_2-OOC(CH_3)C=CH_2$		$[CH_2=C(CH_3)COOCH_2]_3-C-CH_3-CH_2$		$CH_2=C(CH_3)COO-CH_2CH_2OCH_2CH_3$	
Specifications & Typical Properties			Specifications	Typical properties	Specifications	Typical properties	Specificaltions	Typical properties
	Color when shipped (APHA)		100 max.	10 max.	50 max.	20 max.	20 max.	10 max.
	Specific Gravity (20°C/4°C)		0.996~1.003	1.002	1.062~1.068	1.065	0.964~0.970	0.967
	Acidity (as methacrylic acid) %		0.03 max.	0.001	0.01 max.	0.001	0.05 max.	0.002
	Purity %	PSDB	97.0 min.	99.3	95.0 min.	98.4		
		Bromination						
		Gaschromatography					98.0 min.	99.9
		Others						
	Water when shipped (by karl Fisher) %		0.1 max.	0.01	0.2 max.	0.02	0.5 max.	0.02
	Inhibitors	HQ ppm						
		MEHQ ppm	60		60		100	
		IA ppm						
	Package & Net Weight*		200 kg Iron Drum		200 Kg Chemi Drum		180 Kg Iron Drum	
General Properties	Formula Weight		254.33		338.41		158.20	
	Refractive Index (n_D^{20})		1.457		1.4750		1.4128	
	Viscosity (mPa·s, 20°C)		4		57.0		3.5	
	Freezing Point °C		below –10				below –60	
	Specific Heat J/(g·°C)				1.76			
	Heat of Polymerization kJ/mol						62	
	Boiling Point °C/hPa		128/2.7		185/6.7		122/133	
	Solubility % 20°C	Water in	0.61		0.49		1.7	
		In Water	below 0.02		0.02		1.3	
	Flash Point °C		145		174		73.5	
	Toxity (Acute oral LD_{50}, rats, mg/kg)				over 21,200		8,200 (mouse)	
	Tg of Polymer						–31	
	Uses		• Cross linking agent • Coating modifier • Adhesives • Rubber modifier • Ion exchange resin • etc.		• Cross linking agent • Rubber modifier • Adhesives • Plastisol • Resin modifier • etc.		• Coating • Paper precessing material • Adhesives • etc.	
	CAS	No.	6606–59–3		3290–92–4		2370–63–0	
	TSCA	No.	6606–59–3		3290–92–4		2370–63–0	
	EINECS	No.	2295517		2219504		2191353	