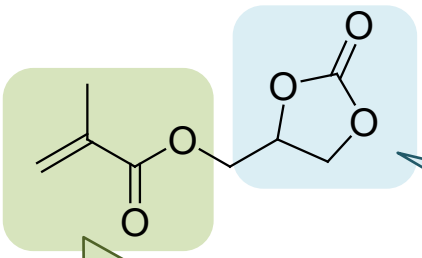
Cyclic carbonate monomer
BLEMMER® DO-MA (Developed product)

Characteristics

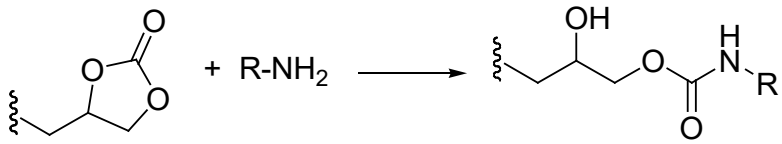


Methacryloyl group:
Polymerization

(2-Oxo-1,3-dioxolan-4-yl)-methyl methacrylate
CAS Registry Number: 13818-44-5
Molecular Weight: 186.16

Carbonate group:
reacts with amine to generate urethane

Forms urethane by reacting with amine



(Typical characteristics)

- Generates urethane bond without using tin catalyst and isocyanate.
- Uses carbon dioxide as raw material.

General properties

Item	Typical values
Appearance	Yellowish, transparent liquid
Purity (%)	95 or more
Viscosity (mPa・s, 25℃)	60
Hue(APHA)	200
Refractive index (n_d, 25℃)	1.4661
Homopolymer Tg(℃)	134 †

† F. Camara *et al.*, *Eur. Polym. J.* 61(2014) 133.

Chemical inventory status

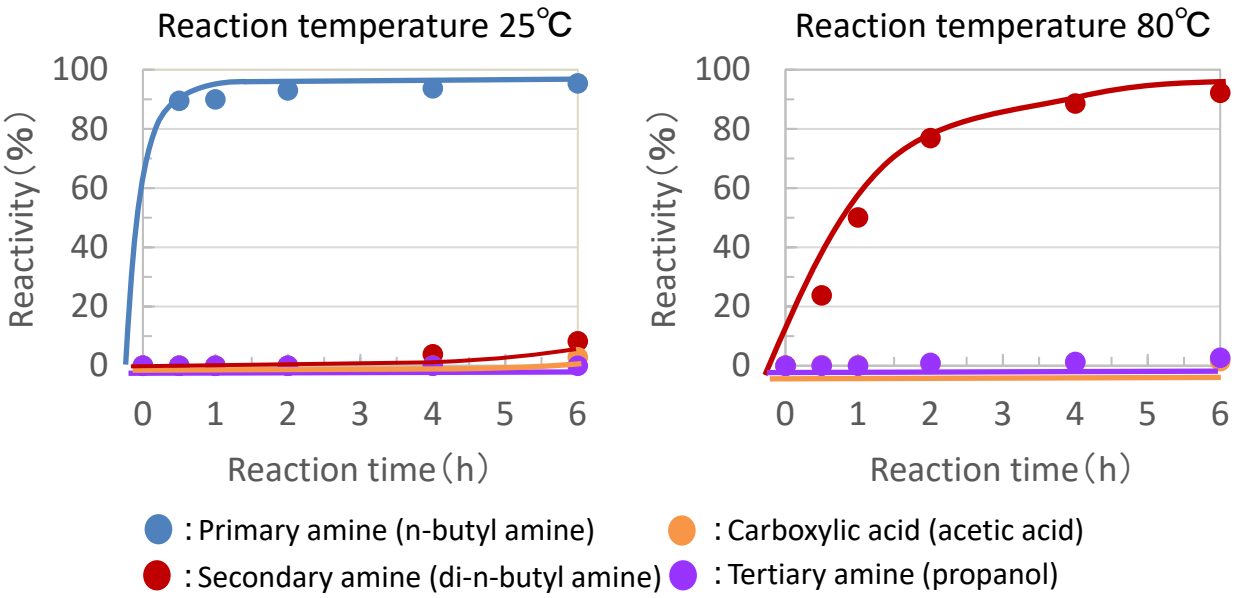
Japan (Chemical Substances Control Law)	China (IECSC)	Taiwan (TCSI)	Korea (ECL)	US (TSCA)
listed	listed	listed	Not listed	listed

Reactivity of carbonate group

(1) Reaction under neat condition

Add same amount of amine, carboxylic acid and alcohol to BLEMMER® DO-MA, and stir at 25℃ and 80℃.

Reactivity was evaluated with gas chromatography and was calculated from the peak area of Blemmer® DO-MA and generated compound.

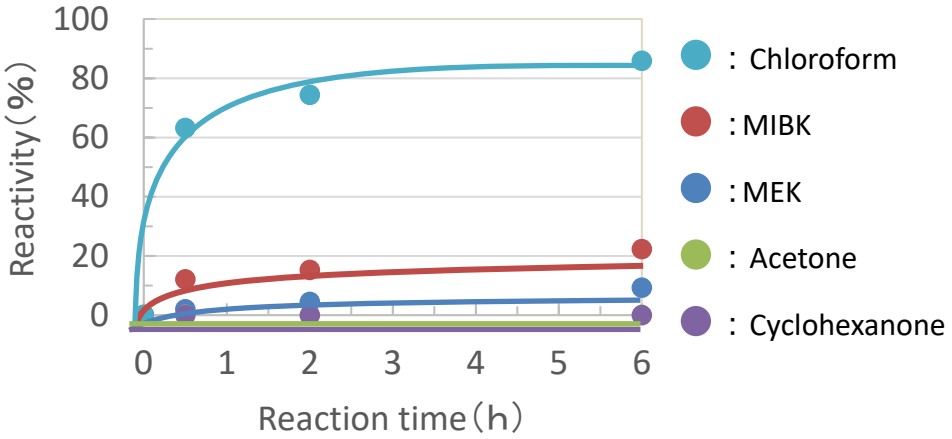


Selective reaction with amine compounds.
Fast reaction with primary amines without catalyst at room temperature.
Reaction with secondary amines under high temperature.

(2) Reactivity by difference of solvents.

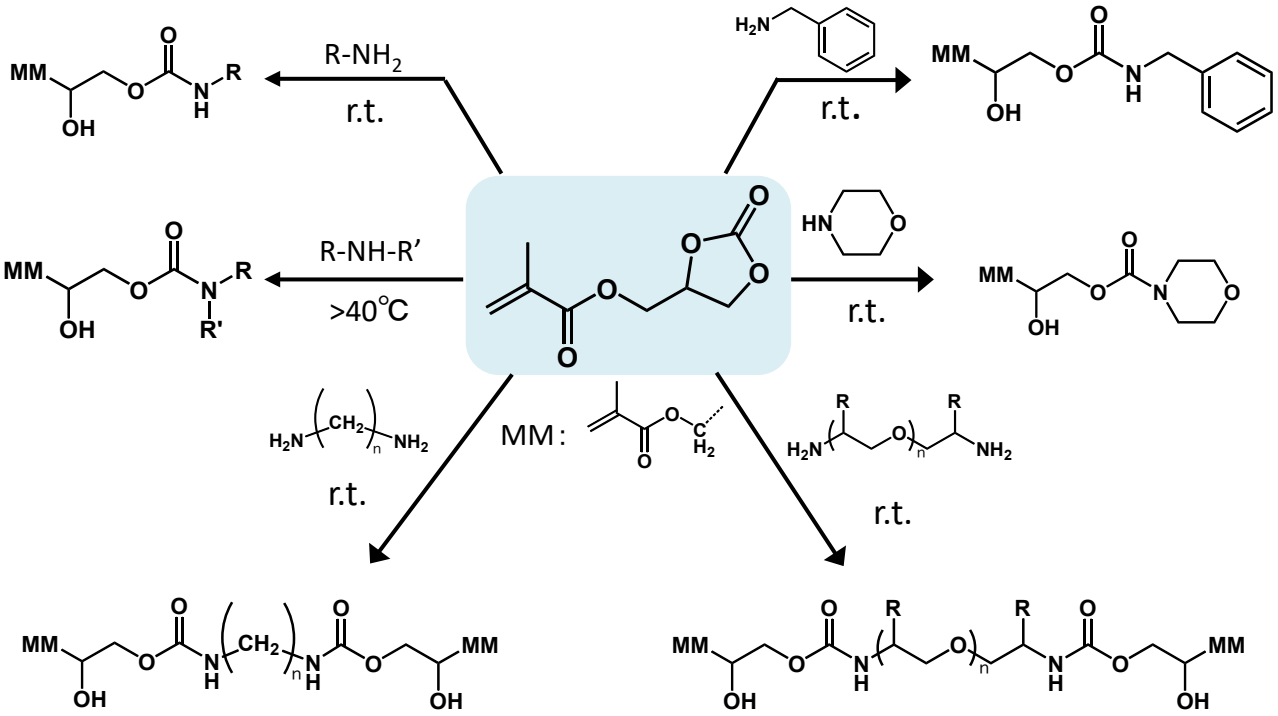
Add same amount of the primary amine to 20wt% of BLEMMER® DO-MA solution, and stir at 25℃.

Reactivity was maesured with gas chromatography and was calculated from the peak area of BLEMMER® DO-MA and generated compound.



Lower reactivity under ketones.

Example of reaction with carbonate group



Solubility of BLEMMER® DO-MA

Solvent	Solubility
Hexane	×
Toluene	×
THF	○
Acetone	○
MEK	○
PGMEA	○

Solvent	Solubility
NMP	○
DMF	○
DMSO	○
Methanol	○
2-propanol	○
Water	×

DO-MA concentration: 10wt%, Dissolving condition: room temperature
Result standards: ○ Soluble, △ Partially soluble, × Insoluble

Example of polymerization reaction of BLEMMER® DO-MA

PERBUTYL® ND (0.6 g) was added to a mixed solution of BLEMMER® DO-MA (4.5 g) and DMF (10 g), and was heated at 70℃ for 5 hours under nitrogen atmosphere. The Mw of the obtained compound was 26,200.

Solubility of BLEMMER® DO-MA/MMA co-polymer

Solvent	DO-MA/MMA ratio (wt wt)			
	100/0	75/25	50/50	30/70
Hexane	×	×	×	×
Toluene	×	×	△	△
THF	×	×	△	○
Acetone	×	×	○	○
MEK	×	△	○	○
PGMEA	×	×	△	○
NMP	△	○	○	○
DMF	○	○	○	○
DMSO	○	○	○	○
Methanol	×	×	×	×
2-propanol	×	×	×	×
Water	×	×	×	×

Mw of polmers: 10,000 - 30,000
Polymer concentration: 10wt%, Dissolving condition: room temperature
Result standards: ○ Soluble, △ Partially soluble, × Insoluble

Polymerization of BLEMMER® DO-MA is also available upon request.
Please contact us for more details.

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