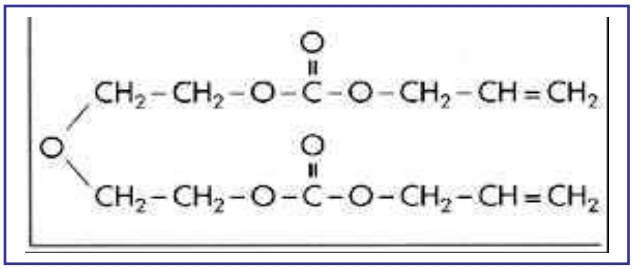
CR-39™ Product Bulletin

Last Revised April 20, 2006

Introduction:

CR-39 allyl diglycol carbonate monomer or diethlyene glycol bis (allyl carbonate) is used chiefly as a monomer to make thermoset plastics. The basic chemical structure of **CR-39** Monomer is shown here.



Health and Safety:

Always read the CR-39 Monomer MSDS (product ID #0120) and product label. Follow all instructions when handling this product.

Storage and Handling:

To safeguard the quality of **CR-39** monomer, keep the product stored in its original, unopened container out of direct sunlight.

Since the material is mildly hygroscopic, containers should be kept closed until time of use. Opening prior to use can cause the drums to rust.

Shelf Life:

CR-39 monomer should be used within 12 months from the date of production at PPG as printed on the barcode label.

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Processing:

CR-39 monomer can be polymerized to produce crosslinked homopolymer or copolymer systems. The compound is also useful as a bifunctional chemical intermediate, because the double bonds undergo reactions characteristic of allylic molecules.

Homopolymers - Homopolymers produced from **CR-39** monomer are essentially colorless and optically clear. Compared to other transparent plastics, they offer better resistance to abrasion, chemicals, heat and radiation.

Principal uses of plastics made from **CR-39** monomer include eyewear lenses and protective covers for welding lenses. Other uses include safety shields and guards, navigation equipment, laboratory equipment, radiation detection devices and photographic filters.

Copolymers - Several copolymer formulations of **CR-39** monomer can be produced to meet needs for specific combinations of properties such as increased heat distortion temperature, impact resistance, and special spectral transmission characteristics.

It is also possible to thermoform some copolymers of **CR-39** monomer containing vinyl acetate or methyl methacrylate.

Initiator Levels:

CR-39 monomer can be cured to a hard polymer with no gas evolution, using a chemical initiator such as IPP (diisopropy, peroxydicarbonate). IPP goes into solution quickly by stirring at room temperature, and is used at a concentration of 2.5-3.0 parts of IPP per hundred parts of **CR-39** (by weight). Dicyclohexyl peroxydicarbonate (CHPC) or benzoyl peroxide (BPO) also may be used, but both may require heating to dissolve them completely.

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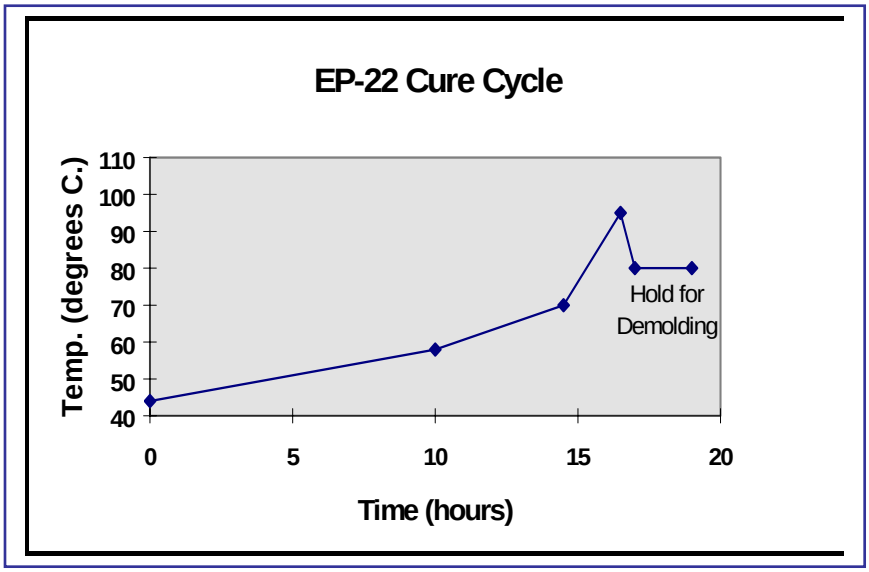
Cure Cycle:

Time (hrs)	Temp (deg. C.)
0.0	44
10.0	58
14.5	70
16.5	95
17.0	80
19.0	80



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Typical Monomer Properties for CR-39:

CAS Registry Number:	142-22-3
Pounds per Gallon at 20^0C (69^0F)	9.6
Specific Gravity, 20 ^{0}C/4^{0}C:	1.15
Viscosity at 25^0C, cPs	19.6 Max
Boiling Water at 2mm Hg	166^0C, 331^0F
Volatile Fraction (boiling point below 1500C at 5mm Hg) %	0.3
Melting Point (supercools readily)	4 to 0^0C, 25 to 32 ^{0}F
Flash Point, Seta Closed Cup	173 ^{0}C, 343 ^{0}C
Water content (slightly hydroscopic) %	<0.1
Refractive Index n_D^{20} at 20^0C	1.452
Appearance	Clear, colorless
Color, Alph	<10
Odor	None to slight

Solubility

- Miscible - in acetic acid, acetone, ethyl acetate, ethyl alcohol, ethyl ether, methyl methacrylate, styrene, vinyl acetate.
- Partly Soluble - in amyl alcohol, carbon disulfide, gasoline, ligroin.
- Insoluble - in ethylene glycol, glycerol, water.

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Typical Polymer properties for CR-39:

PROPERTY	ASTM TEST METHOD	VALUE
Physical and Mechanical Properties		
Density (g/cm^3)	D792	1.31
Barcol 934 (15sec)	---	25 - 28
Bayer Abrasion	F735	5 - 7 Polymethacrylate
Polymerization	---	12 - 13
Heat Distortion ^0C (at 10 mils deflection)	D648	55 - 65
Total Deflection (mils at 130^0C)	D648	35 - 50
Glass Transition Temperature (^0C)	[Estimate]	85
Optical Properties		
Refractive Index n_D^{20} at 20^0C	D542	1.498
Abbe Number	---	59.3
Transmission	---	89 - 91
Yellowness Index, 6.5mm thickness	D1925	0.6 - 1.4
Haze, 6.5mm thickness	D1003	0.3 - 0.9

Samples and Services:

For additional information, please contact a PPG customer service representative at:

- Phone: **1-800-323-2487**
- Fax: **724-325-5042**

or: send E-Mail