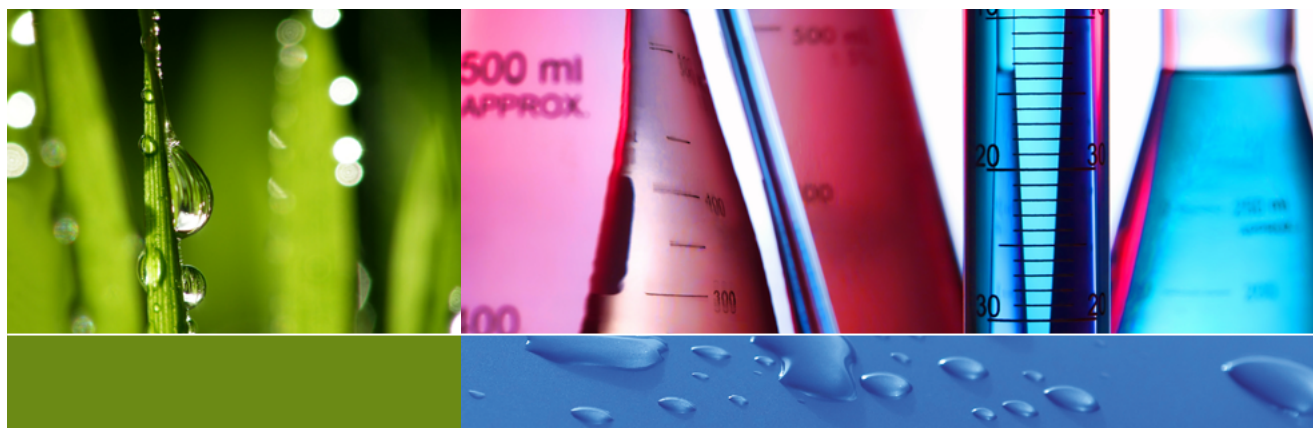


## Cardura™ E10P Glycidyl Ester

An Easy Process for High Solids Acrylic Resins



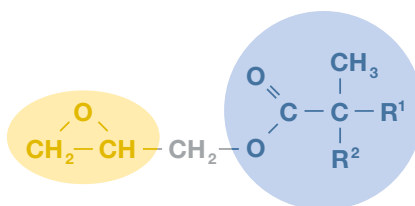
### Cardura E10P Monomer

Cardura E10P monomer is the glycidyl ester of Versatic™ Acid 10, a highly branched carboxylic acid containing 10 carbon atoms.

Cardura E10P monomer is a bulky and hydrophobic intermediate which is easily incorporated into resins via its reactive epoxy group.

#### Characteristics:

- Epoxy group content approximately: 4170 mmol/kg
- Boiling range: 251–278 °C (5–95 %)
- Low viscosity (23 °C): 7 mPa·s
- High flame / flash point
- Low colour
- Low vapour pressure
- EINECS and TSCA listed



#### Glycidyl Ester

##### Structural Features:

- Epoxy group

##### Performance Characteristics:

- Highly reactive towards amines, acids, alcohols
- Enhanced metal adhesion

#### Versatic Acid 10

R<sup>1</sup> + R<sup>2</sup> = 7 carbon atoms

##### Structure and Properties:

- Sterically protected ester group
- Bulky structure

##### Performance Characteristics:

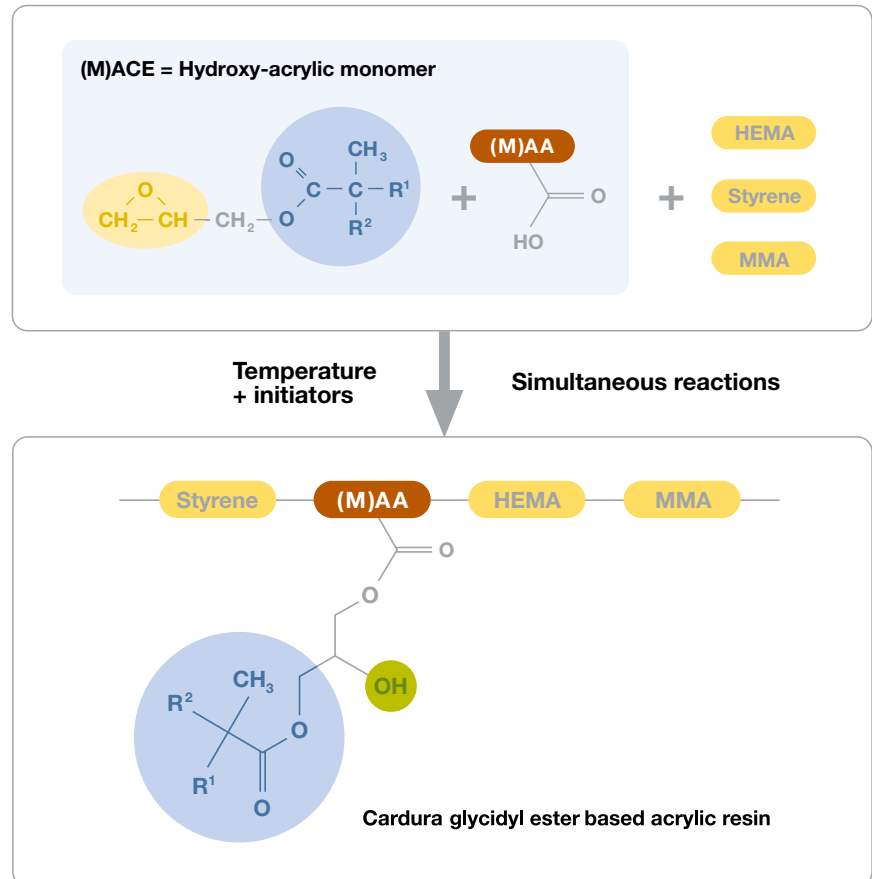
- Excellent compatibility with polar solvents
- Excellent acid and alkali resistance
- Superior outdoor durability
- Improved gloss
- Improved pigment utilization
- Low solution viscosity
- High solids resins
- Improved polar solvent resistance
- Excellent solubility in aliphatic solvents

## Chemistry

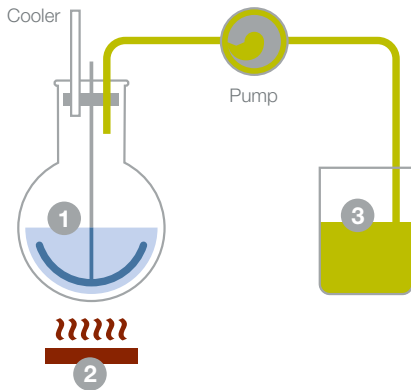
Cardura E10P monomer can easily be incorporated into acrylic polymers by the reaction of its epoxy group with the carboxylic group of (meth)acrylic acid to form a hydroxyl (meth)acrylate

monomer called (M)ACE. (M)ACE reacts with the other monomers via a radical polymerisation reaction. The epoxy-acid reaction and the radical polymerisation proceed simultaneously.

### Incorporation of Cardura E10P Monomer in Acrylic Resins:



## Preparation Procedure



- 1 Use Cardura monomer as reactive solvent
- 2 Heat to 140–170 °C
- 3 Add gradually Monomers  
+ (meth)acrylic acid  
+ initiator

## Process:

Cardura E10P monomer is used as a reactive solvent for the preparation of acrylic resins: it is charged into the reactor as part of the initial reactor constituents. This allows for the reduction or elimination of solvent during the polymerisation step and therefore increases the reactor efficiency. Mass polymerisation (without solvent) is possible. The initial reactor charge is heated to the desired polymerisation temperature. (Meth) acrylic acid is then gradually added to the reactor together with the acrylic monomers, styrene and the peroxide initiator over a period of time.

## Higher Reaction Temperature:

Thanks to the high boiling point of Cardura E10P monomer, a high polymerisation reaction temperature can be maintained at a level where the required low molecular weight is easily achieved.

Very high solids, low viscosity resins are easily produced.

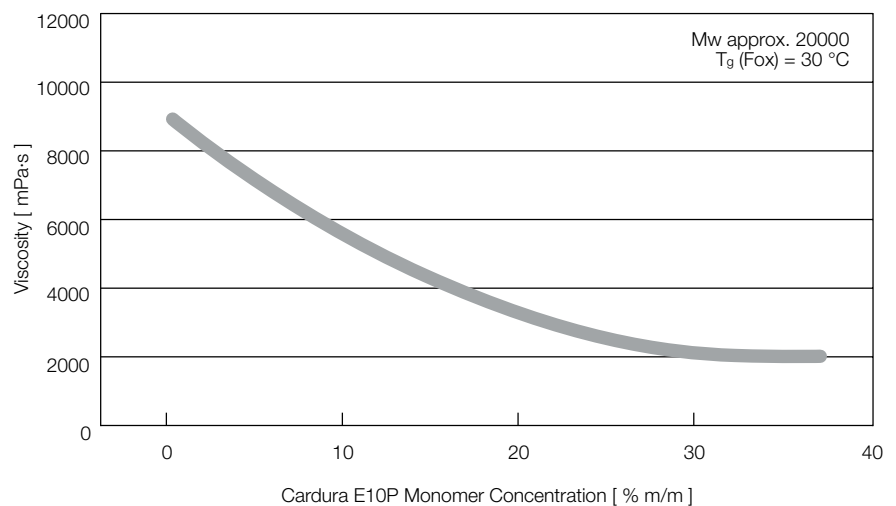
## Added Values:

- Easy process
- Cardura E10P glycidyl ester used as reactive solvent
  - Higher resin solids content
  - Higher reactor throughput
- Higher reactive temperature
  - Low Mw resin
  - Low VOC acrylic resin

## Effect of Cardura E10P Monomer on Polymer Solution Viscosity

Cardura E10P monomer produces lower viscosity acrylic resins which can be used for low VOC applications.

The higher the concentration of Cardura E10P monomer, the lower the polymer viscosity.



## Viscosity / Co-solvent Content:

Cardura E10P monomer reduces the resin viscosity as the polymer has a shorter chain length at a similar molecular weight. Its bulky structure also limits the chain interactions. Therefore the solvent content of solvent-borne paints or the co-solvent content of water-based paints can be reduced.

## Introduction of hydroxyl groups:

Cardura E10P monomer introduces hydroxyl groups into the resin via reaction with a carboxylic acid or an amine. These hydroxyl groups can be used, in combination with other hydroxy-functional intermediates, for reaction with the cross-linker, e.g. melamine formaldehyde and polyisocyanate resins.

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HXN-526 12/22

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