

Epoxy

A Versatile Material / Solution

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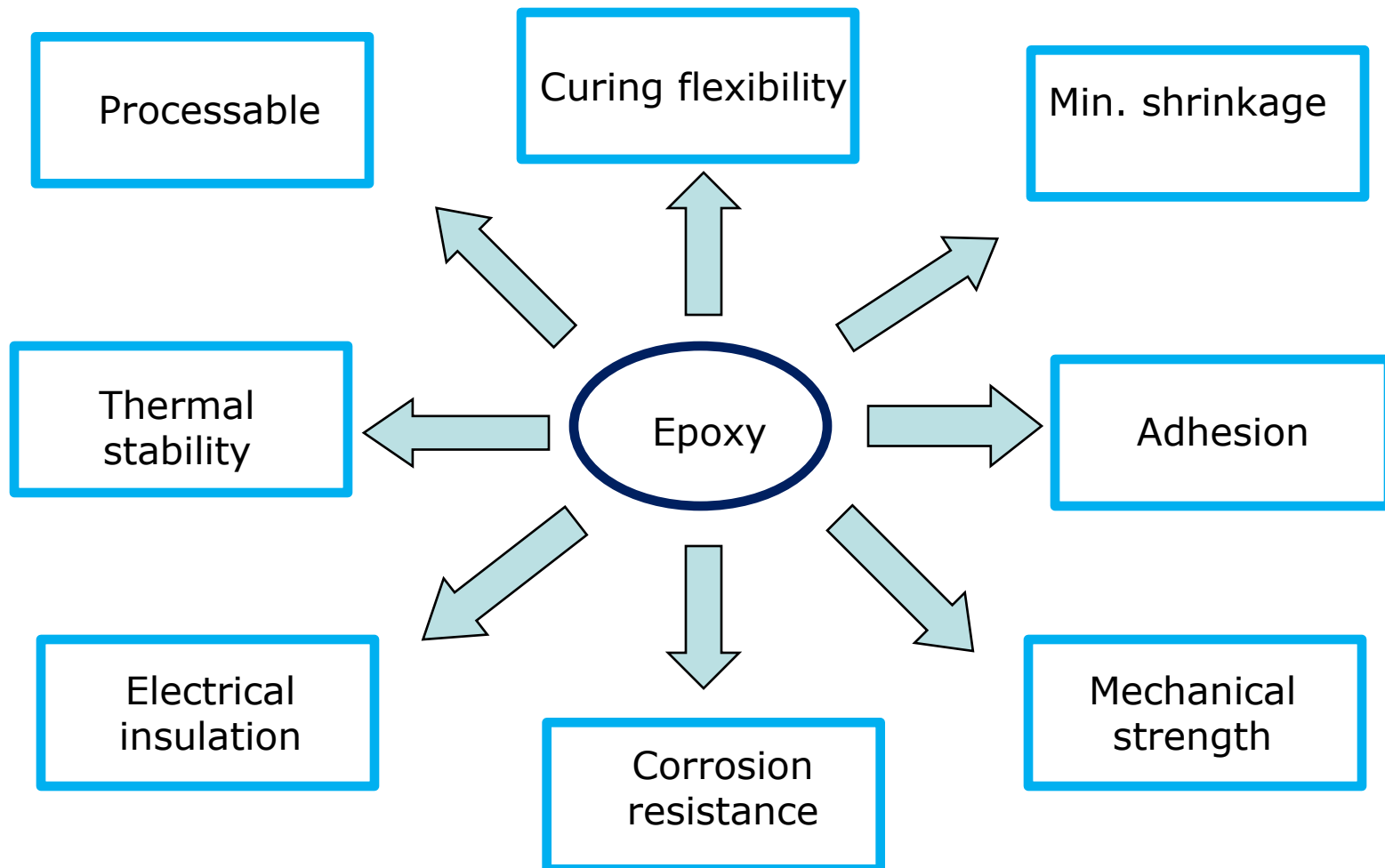
Thermoset Resins for Construction

- **Unsaturated Polyester**
- **Polyurethane**
- **Phenol formaldehyde**
- **Epoxy**

Why epoxy is versatile ?

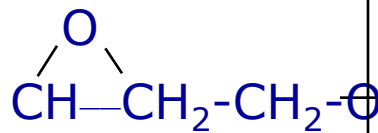
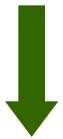
- **Various chemical structure (back bone)**
- **Different physical form (liquid to solid)**
- **Design flexibility (customize structure)**
- **Ability to formulate**
- **Variety of applications**

High performance



How epoxy performs?

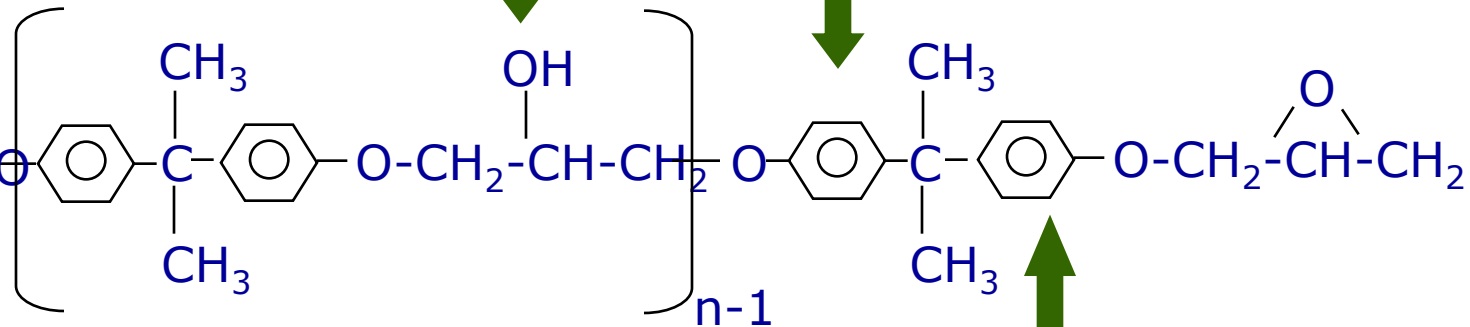
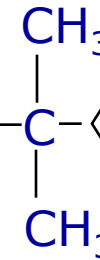
Cross Linking Site



Adhesion



Poor UV Stability



Flexibility

Good corrosion resistance and thermal properties

Resins - Significant Properties

Physiochemical

- Epoxy equivalent weight (EEW)
- Viscosity
- Density
- Color
- Total volatiles

Composition

- Hydrolysable chlorine
- Ionic chlorine
- Bound chlorine
- Total chlorine
- Free ECH
- Molecular weight distribution

Processibility

- Viscosity rise w.r.t. time / temperature
- Gel time
- Exothermic temperature
- Degree of cross linking w.r.t time / temperature
- Glass transition temperature

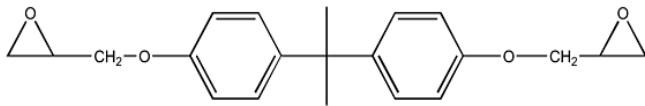
Essential components of epoxy system

- **Epoxy resins**
- **Reactive diluents**
- **Curing agents**

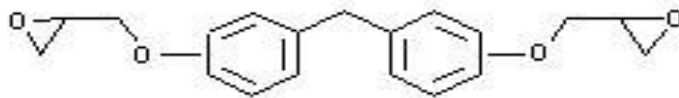
Epoxy Resins

- **Bis-A and Bis-F based**
- **Multifunctional**
- **Specialty**

Bis-A and Bis-F based Resins



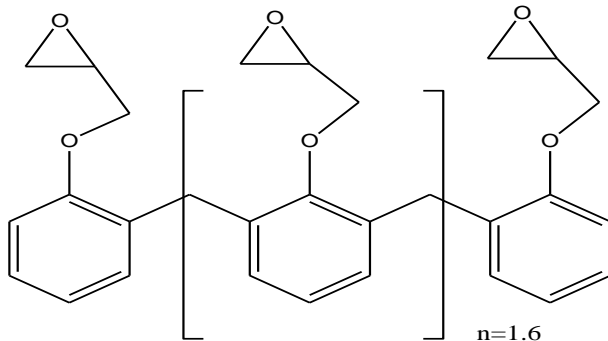
Bis-A based resin



Bis-F based resin

- Basic liquid resins
- Highest selling, >70% of total
- Low crystallization by Bis-F

Multifunctional Resins (Epoxy Phenol Novolac)



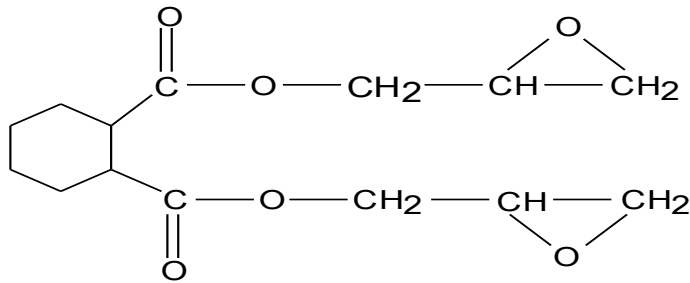
Glycidyl ether of Novolac resin

functionality=3.6

ARNP-36

- High viscosity
- Fast processing
- High chemical resistance
- High thermal stability
- High stiffness

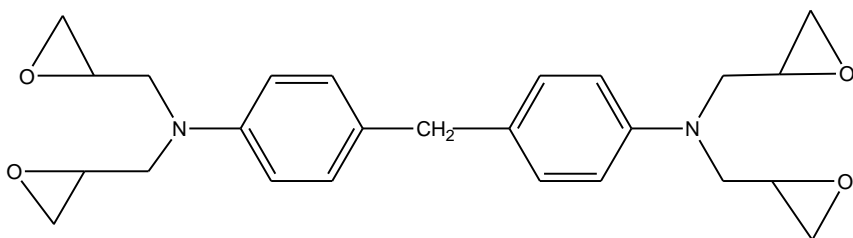
Specialty Resin (Cycloaliphatic resin)



(ARCH-11)

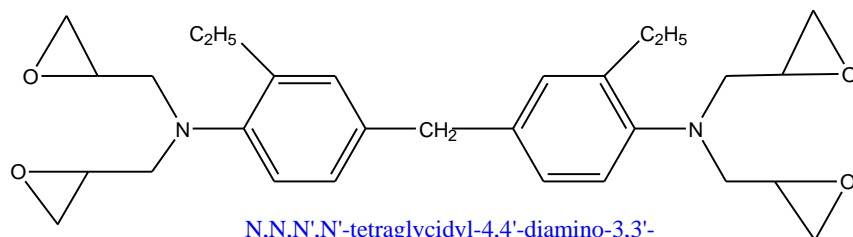
- Low viscosity
- Transparent and clear
- UV resistant

Specialty resin (Tetra functional)



Tetraglycidyl-4,4'-diaminodiphenylmethane

(ARTF-23)

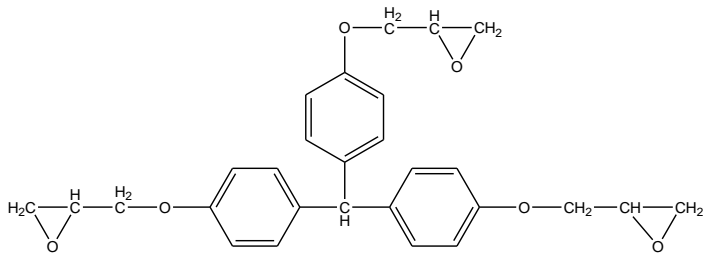


N,N,N',N'-tetraglycidyl-4,4'-diamino-3,3'-
diethyldiphenylmethane

(ARTF-93)

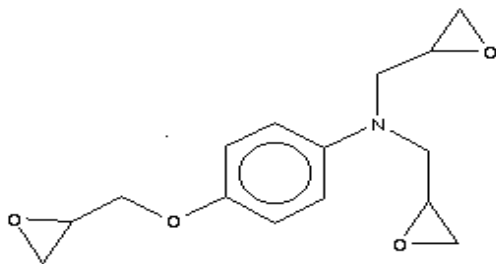
- Excellent thermal resistance
- High chemical resistance
- High hardness

Specialty resin (Trifunctional)



Triglycidyl ether of Tris-(hydroxyphenyl)methane

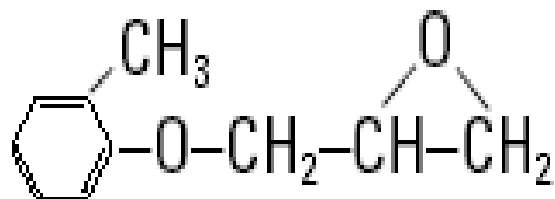
(ARTF-34)



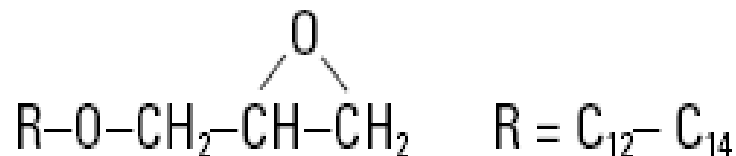
(ARTF-35)

- Low viscosity
- Fast productivity
- High crosslink density
- High thermal and chemical resistance

Common Reactive Diluents



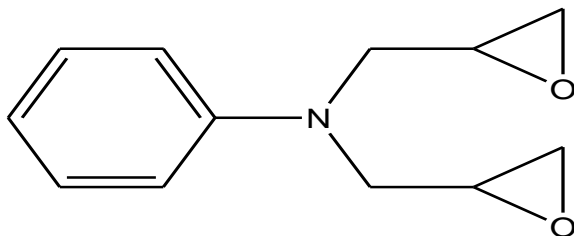
Cresyl Glycidyl Ether
(K-100)



Alkyl C12-C14 Glycidyl Ether
(XR-80)

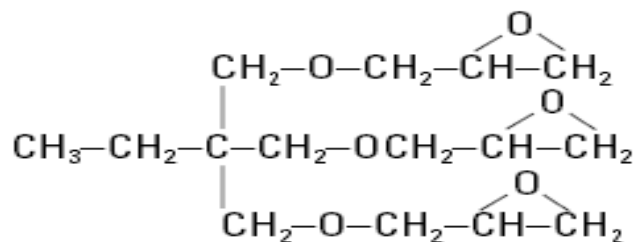
- Viscosity reduction
- Increase in filler loading
- Increase in toughness

Specialty Reactive Diluents



N-N-DIGLYCIDYLANILINE

(XR-104)



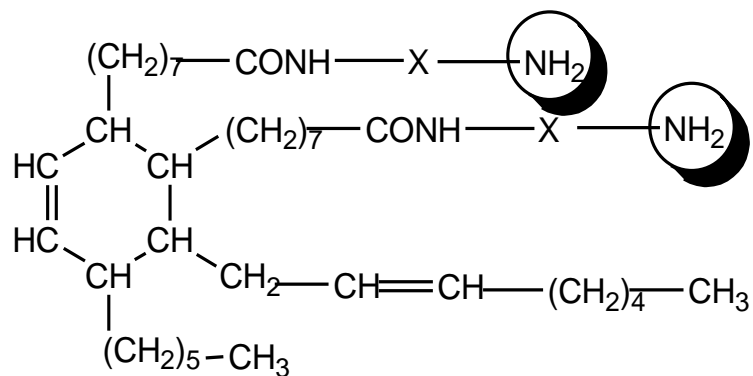
Trimethylol Propane Triglycidyl Ether

(XR-85)

- Very low viscosity
- Good cross linking density
- Faster productivity
- Can be used as modifier also

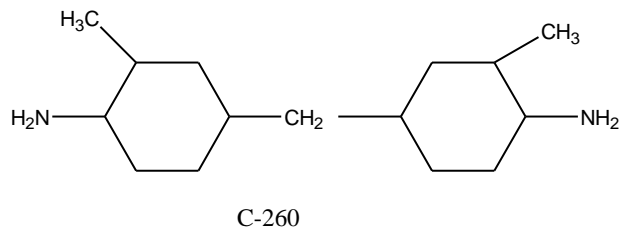
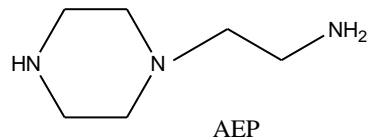
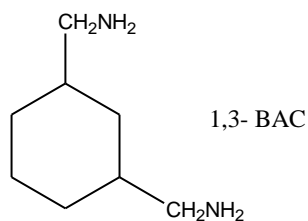
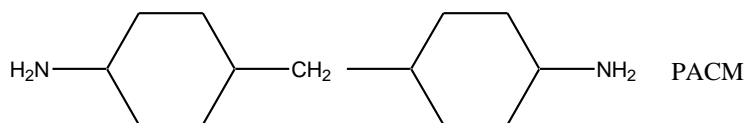
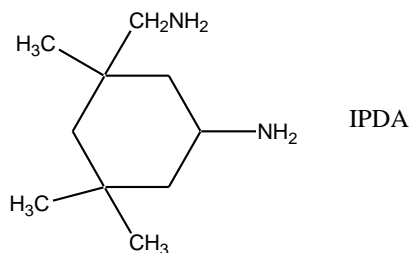
Common Curing Agents

- Aliphatic amines
- Polyamidoamines
- Mannich base
- Cycloaliphatic amines



Polyamide

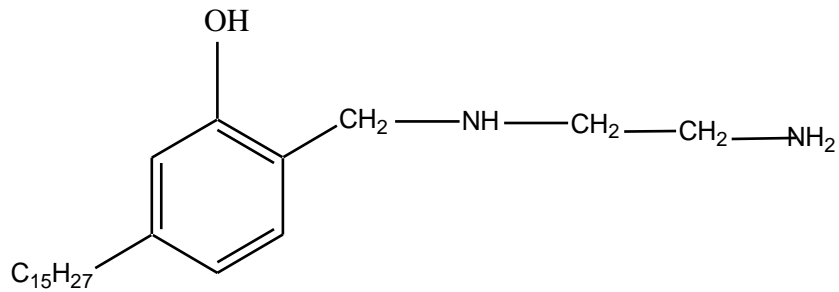
Cycloaliphatic Amines



Adducts offer:

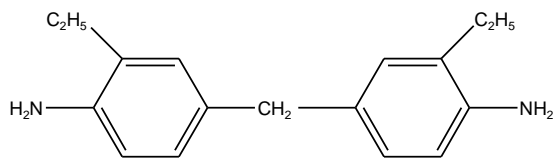
- Better resistance to amine blush
- Modification in process properties
- Modification in performance properties

Phenalkamine (Mannich base)



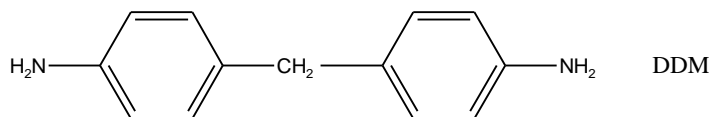
- Curing at low temperature
- Bonding on wet surfaces

Aromatic Amines



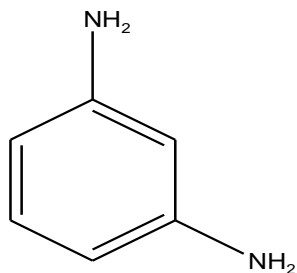
substituted DDM

(K-450)



DDM

(AH-667)



m-phenyline diamine

Adducts offers:

- Curing at ambient conditions
- Good chemical resistance
- Modification in process properties
- Modification in performance properties

Epoxy applications in construction

- Primers
- Mortars
- Self leveling
- Heavy duty flooring
- Chemical resistant industrial floorings
- Concrete repairing
- Concrete structure strengthening
- Grouting
- Water proofing
- Fixing (adhesives)
- Marble / Granite filling, coating and fixings
- Rebar

Thank you

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