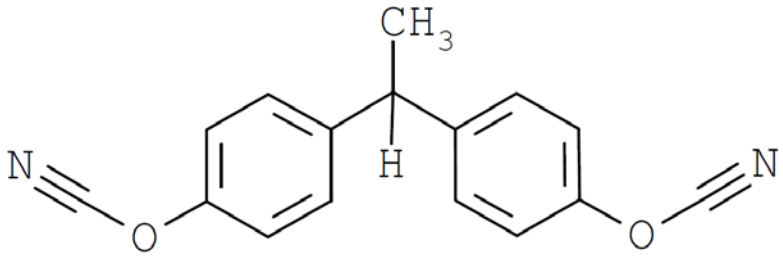
AroCy® L-10 Cyanate Ester

Product Description

AroCy® L-10 is a low viscosity liquid dicyanate monomer which derives its liquid physical state from an asymmetric linkage in the bisphenol unit. Its low viscosity facilitates rapid impregnation of fibrous reinforcements in less labor-intensive processes for manufacturing structural composites such as filament winding, resin transfer molding and pultrusion. AroCy® L-10 dissolves many high T_g amorphous thermoplastic resins, forming filmable blends that are hot melt processible at thermoplastic concentrations up to 25% and undergo phase separation during cure. The compatibility of AroCy® L-10 with other cyanate ester resins, epoxy resins and bismaleimide resins makes it a versatile reactive diluent to improve fiber impregnation, adjust flow and optimize tack/drape properties in prepregs..



Features

- Low viscosity at room temperature
- Low volatility (0.1 mm Hg vapor pressure at 180°C)
- Dissolves PS, PES and PEI thermoplastics
- Homopolymer T_g 240°C - 260°C (ultimate)
- Can be cured at 350°F (177°C)
- 3 - 4% tensile elongation-at-break

Typical Properties*

Property	AroCy® L-10
Appearance	Clear, amber liquid
Density at 25°C, g/cm^3	1.18
Brookfield viscosity at 25°C, cP	100
Reactive index at 25°C at 107°C	 1.565 1.534
Reactivity at 110°C, % trimerization per hour	0.3
Non-volatiles,** % wt.	99.5

*Typical properties are based on Huntsman's test methods. Copies are available upon request.
**Measured on a 0.5 g sample for 30 minutes on a 150°C hot plate.

Processing

Epoxy blends

Blends of AroCy® L-10 and glycidyl type epoxy resins containing 35% or more cyanate ester will cure by a combination of epoxy insertion into the polycyanurate network and by 5-membered, oxazolidinone ring formation. Cured state properties feature T_g values higher than aromatic diamine cured epoxies, lower moisture absorption and lower dielectric loss properties.

Thermoplastic blends.

AroCy® L-10 can dissolve various amorphous thermoplastic resins supplied in a powder form. These include polysulfone (Udel P-1800), polyethersulfone (Victrex 5003P), polyetherimide (Ultem 1000) and thermoplastic polyimide (Matrimid® 5218). Blend viscosities are plotted vs. temperature in Figure 2. Phase separation occurs efficiently at gelation temperatures in the range of 250 - 350°F (121-177°C), providing up to five-fold increases in fracture toughness with little sacrifice in T_g. Figure 3 illustrates the resistance to moisture plasticization of an alloy with 20% Ultem 1000.

Catalysis and Curing

Preferred curing catalysts are solutions of zinc, cobalt or copper carboxylates (most active form) or acetylacetonate chelates (more latent form) in 2 to 6 phr nonylphenol or dinonylphenol. Metal concentrations ranging from 20 to 300 ppm based on resin content are typical, depending on pot life and curing requirements, metal activity, and companion resins. Copper and zinc catalysts are the most

active; cobalt catalysts are more latent in activity. Figure 4 illustrates the 25°C viscosity stability of AroCy® L-10 formulations catalyzed to gel within a fraction of a minute to 6 minutes at 177°C (350°F).

Useful properties at 177°C maximum cure temperature are developed when nonylphenol co-catalyst is increased to 6-8 phr (parts per hundred parts of resin). The incorporation of 50 to 65 % of epoxy resin will also provide essentially complete conversion at 177°C. Ultimate T_g values in homopolymers (240°C - 260°C) require post curing at temperatures in the range of 225°C to 250°C.

Figure 1. Viscosity as a function of AroCy® L-10 - % weight for different systems.

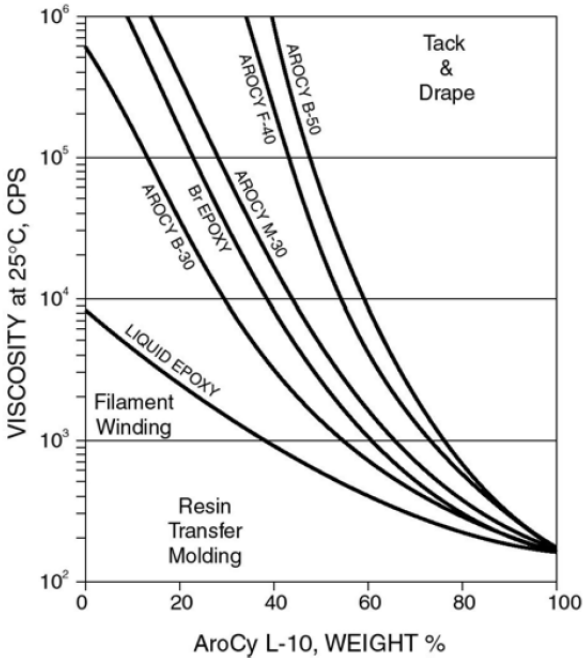


Figure 2. Melt viscosity of AroCy® L-10 thermoplastic resin blends.

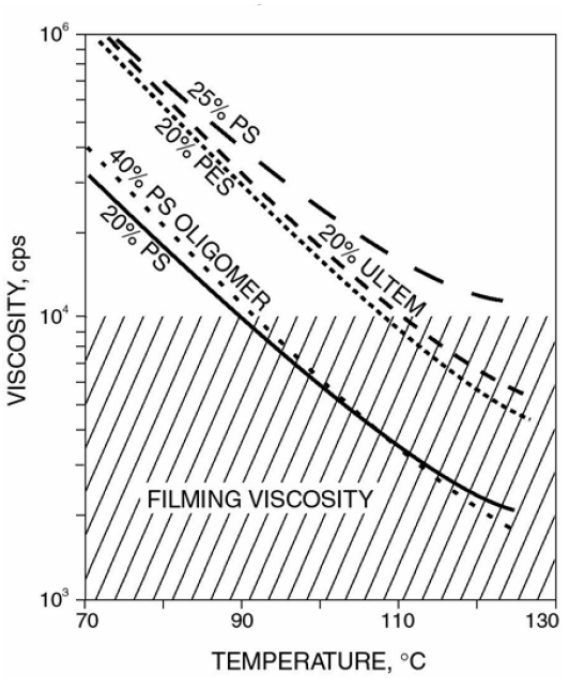


Figure 3. DMA scans of an alloy casting, post cured at 210°C (410°F).

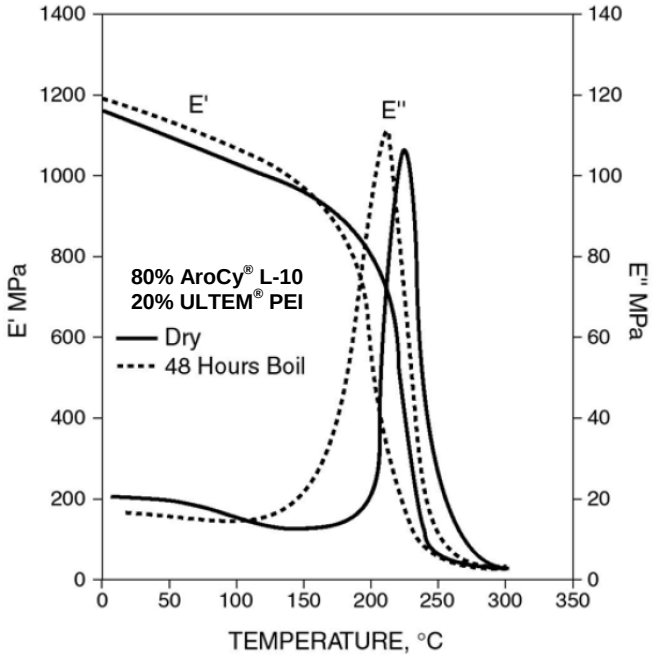
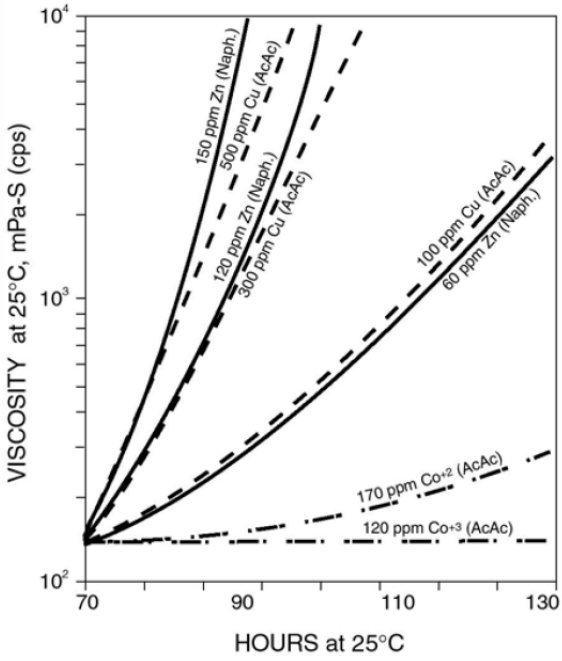


Figure 4. Effect of metal catalyst on pot life of AroCy L-10.



Storage

AroCy® L-10 is supplied in 40 pound pails that should be stored in a dry place, in the sealed original containers, at temperatures between 2°C and 8°C (35°F and 46°F). Under these storage conditions, the shelf life is **2 years** (from date of manufacture). The products should not be exposed to direct sunlight.

While monomer crystals can form, particularly during cold weather transit or storage, the low crystal melt point of 29°C facilitates restoring the product to its normal liquid state via conditioning in a warm room at 35 - 50°C for up to 24 hours.

Precautionary Statement

Huntsman Advanced Materials Americas LLC maintains up-to-date Safety Data Sheets (SDS) on all of its products. These sheets contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products. Users should review the latest MSDS to determine possible health hazards and appropriate precautions to implement prior to using this material.

First Aid!
Refer to SDS as mentioned above.

KEEP OUT OF REACH OF CHILDREN

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