

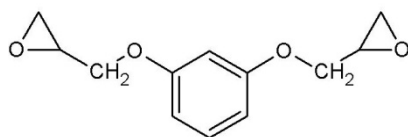
New Product Introduction



HAR 2120/2140

RESORCINOL DIGLYCIDYL ETHER

DIFUNCTIONAL Aromatic



Hydrite Advanced Resins (HAR) is now offering two grades of Resorcinol Diglycidyl Ether (RDGE)

HAR 2120 - has properties similar to other commercial RDGE resins including a relatively low viscosity (500-1,000 cps) making it an excellent choice as a reactive additive to reduce viscosity while enhancing physical properties

HAR 2140 – is a higher molecular weight RDGE with viscosity of 3,500-4,500 cps enabling the formulator to use HAR 2140 in higher concentrations or even as the sole resin system. In addition, unlike HAR 2120 and other commercial RDGE resins, HAR 2140 will not crystallize in storage eliminating the need for heated storage and/or melting ovens.

Both grades provide many advantages, including:

- High Cross Link Density upon Curing
- Exceptional Chemical Resistance
- Superior Adhesion to Wide Variety of Substrates
- Enhances physical properties of DGEBA

HYDRITE ADVANCED RESINS, LLC

114 North Main Street, Cottage Grove, WI 53527 U.S.A.

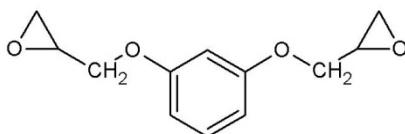
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New Product Introduction



HAR 2120/2140 RESORCINOL DIGLYCIDYL ETHER



While several mono-functional aromatic resins are available (e.g. cresyl glycidyl ether), RDGE is one of very few DI-FUNCTIONAL aromatic epoxy resins. As a result of this di-functional aromatic structure, cured resin formulations exhibit relatively high cross-link density which enhances many key physical properties such as dimensional stability, toughness and surface hardness. RDGE and formulations with RDGE can be cured with virtually all common curing systems often with reduced curing times and temperatures.

Most notably, properly cured RDGE exhibits exceptional chemical resistance. This includes resistance to a wide variety of alkali, acids and solvents - including concentrated sulfuric acid and methylene chloride - both which are considered a challenge to most epoxy based systems. The following summarizes tests conducted by HAR laboratories which demonstrates these chemical resistance properties.

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**Hydrite
Advanced
Resins**

HAR 2140 Chemical Resistance Study

Test Articles: Castings of neat HAR 2140

Hardener: Air Products IMICURE®EMI-24® (ethyl methylimidazole)

Curing cycle: 6 hours at 121°C

Methodology: Castings were suspended in the test solutions and held at 20°C or 40°C for 90 days. Castings were weighed and examined once per week

Reagent	Temperature (°C)	% WT Change, Days		
		7	28	90
Sulfuric Acid 98%	40	-0.03	-0.37	-0.85
Hydrochloric Acid 36%	20	0.75	2.24	4.80
Acetic Acid - Glacial	20	0.06	0.29	0.83
Phosphoric Acid 88%	20	0.03	0.17	0.33
Methylene Chloride	20	0.99	2.66	6.40
Phenol 90%	40	2.18	3.45	4.59
Methanol	40	1.77	3.59	7.40
Acrylonitrile	40	1.68	3.03	4.79
Sodium Hydroxide 50%	20	0.22	0.19	0.33
Sodium Hypochlorite 12% (bleach)	20	0.68	1.36	2.63

HAR 2140 vs. DGEBA Chemical Resistance Study (ongoing)

Test Articles: Castings of neat HAR 2140 and DGEBA (Dow DER®331)

Hardener: Air Products AMICURE® PACM (cycloaliphatic amine)

Curing cycle: 6 hours at 90°C

Methodology: Castings are suspended in the test solutions and held at 20°C. Castings are weighed and examined once per week and will continue for 90 days

Reagent	DGEBA		HAR 2140	
	% WT Change, Days		% WT Change, Days	
	7	28	7	28
Sulfuric Acid 98%	D*		0.23	0.45
Methylene Chloride	SF**		1.21	5.11
Methanol	2.03	3.32	1.87	3.54
Methyl Ethyl Ketone	0.24	0.71	0.02	0.06
Toluene	0.11	0.23	0.04	0.10
Sodium Hypochlorite 12% (bleach)	0.17	0.31	0.09	0.16

D* = Sample dissolved/destroyed; SF** = Sample swollen & fractured

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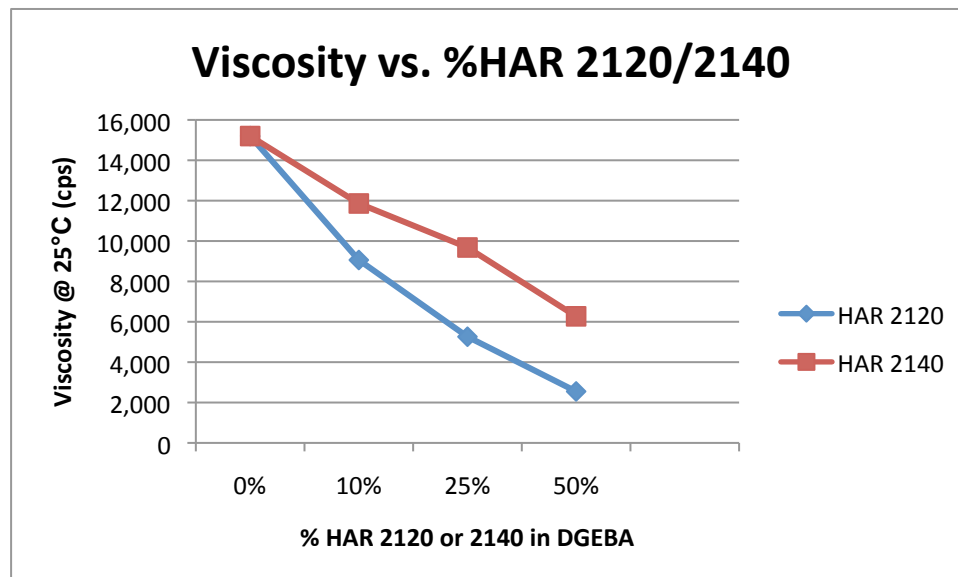
HAR 2140 Tensile Strength

Hardener: Air Products AMICURE® PACM cycloaliphatic amine
Curing cycle: 6 hours at 90°C
DGEBA Resin: Dow DER®331

RESULTS

100% HAR2140 vs. 100% DGEBA: +30%
30/70 HAR2140/DGEBA vs. 100% DGEBA: +20%

VISCOSITY OF HAR2120/2140 BLENDS WITH DGEBA DGEBA Resin: Dow DER®331



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