Technical Data

Technicure® ADH

Description:

Technicure® ADH, adipic dihydrazide, a C-4 backboned dihydrazide, is commonly used as a curing agent for epoxy resins in one-component formulations. Technicure® ADH provides cure above 120°C, good adhesion to oily substrate and high degree of toughness. ADH can be used with accelerators to increase reactivity at lower temperatures. Some suggested accelerators for ADH include Technicure® LC-80, substituted ureas like Technicure® PDU-250, TDU-20, and MDU-11. These accelerators lower the activation temperature of ADH without any adverse impact on performance properties.

Technicure® ADH can also be used as a curative for acrylics and urethanes by Michael Addition reaction. Due to its very high water solubility (>50%), ADH can be used as a cross-linker in water dispersed acrylics and urethanes.

Jet milled grade of Technicure® ADH is available as Technicure® ADH –J.

Advantages:

- Excellent adhesion to oily substrates
- Good toughness
- High glass transition temperature
- Highly soluble in water

Typical Applications:

- One-component adhesives
- Hot-melt pre-pregs
- Acrylics Urethane

Handling Precautions:

Refer to the product Safety Data Sheet

Typical Properties:

Appearance:	White powder
Molecular Weight:	174.2
Melting point:	176-185°C
Moisture content:	<0.4%
Assay:	97% min.
Recommended use level with liquid epoxy resin (EEW=190)	23 PHR

Typical Formulations (by wt.):

Liquid epoxy resin (EEW=190)	100	100
Technicure® ADH-J	23	23
Technicure® LC-80[1]	0	3
Fumed silica (H 200U)[2]	1	1
Reactivity by DSC[3]		
Onset Temp., °C	172	114
Peak Temp., °C	176	140
Heat of Reaction, J/gm	306	311
Glass Transition Temp[4]., °C		
After 30 minutes cure at 140°C	-	149
After 60 minutes cure at 140°C	-	158
Shelf stability[5] at 40°C		
Weeks	> 4	>4

1. Accelerator – Product of ACCI Specialty Materials
2. Fumed silica – Product of OCI Company Ltd.
3. 10°C/min. scan rate
4. By DMA
5. Time to double the viscosity

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Supplemental Technical Information:

Technicure® LC-80 as an accelerator for ADH:

Technicure® LC-80 can be used as an accelerator for Technicure® ADH. Three formulations (Table 1) containing Technicure® ADH-J (Jet milled ADH) and Technicure® LC-80 were prepared to study reactivity, glass transition temperature and shelf stability.

Differential scanning calorimeter data (Table 1) suggests that onset temperature (indication of reactivity) lowers as a function of increasing loading of Technicure® LC-80. After 60 minutes cure at 140°C, formulation without LC-80 did not cure. However, formulations with 1 PHR and 3 PHR of LC-80 as an accelerator for ADH cured and developed high glass transition temperature and offered very good latency.

Table 1. Formulations (by wt.), reactivity, glass transition temperature and shelf stability of Technicure® ADH containing formulations

Liquid epoxy resin (EEW=190)	100	100	100
Technicure® ADH-J	23	23	23
Technicure® LC-80	0	1	3
Fumed silica (H 200U)	1	1	1
Reactivity by DSC			
(10°C/min scan rate)			
Onset Temp., °C	172	150	114
Peak Temp., °C	176	161	140
Heat of Reaction, J/gm	306	205	311
Glass Transition Temp., °C			
After 30 mins. cure at 140°C	No cure	No cure	150
After 60 mins. cure at 140°C	No cure	135	160
Shelf stability at 40°C			
Weeks	> 4	>4	>3

Solubility of Technicure® ADH:

Solubility of ADH was studied in various solvents at various temperatures. The following table shows solubility as the grams of ADH dissolved in 100 gm of solvent to make a saturated solution at a given temperature.

Temp.(°C)	10	20	30	40	50
H_2O	7.376	11.953	17.630	-	36.219
Ethanol	0.069	0.069	0.069	-	0.235
DMF[1]	0.090	0.139	0.215	-	0.61
DMSO[2]	-	-	2.149	-	6.767
Toluene	<0.01	<0.01	<0.01	<0.01	-
Ethyl Acetate	<0.01	<0.01	<0.01	<0.01	-
Butoxyethanol	<0.01	<0.01	0.017	0.034	-
PGMEA[3]	<0.01	<0.01	<0.01	<0.01	-

[1]Dimethylformamide, [2]Dimethylsulfoxide, [3]Propyleneglycol monomethyl ether

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