BRENNTAG EPOXY CURATIVES AND DILUENTS Data Sheet

BRENNTAG SPECIALTIES

BCA ADH - Adipic Dihydrazide

DESCRIPTION:

BCA ADH adipic dihydrazide, a C-4 backboned dihydrazide, is commonly used as a curing agent for epoxy resins in one-component formulations. BCA ADH provides cure above 120°C, good adhesion to oily substrate and high degree of toughness. BCA ADH can be used with accelerators to increase reactivity at lower temperatures. Some suggested accelerators for BCA ADH include BCA I80 Adduct, substituted ureas like BCA PDU, BCA TDU, and BCA MDU. These accelerators lower the activation temperature of BCA ADH without any adverse impact on performance properties.

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

Jet Milled Grade of BCA ADH is available as BCA ADH-J.

TYPICAL PROPERTIES	
Appearance	*White Powder*
Assay (min)	*97%*
Molecular Weight	*174.20*
Melting Point (°C)	*176 - 185*
Moisture Content (% max.)	*0.4*
Mix Ratio with Std. Epoxy Resin	*23 PHR*

ADVANTAGES:

- Good Toughness
- Highly Soluble in Water
- High Glass Transition Temp
- Excellent adhesion to Oily Substrates

APPLICATIONS:

- One-Component Adhesives
- Hot-Melt Pre-Pegs
- Acrylics Urethane

STORAGE LIFE:

This product has a shelf life of two years from the date of manufacture when stored at ambient temperature in the original unopened container.

HANDLING PRECAUTIONS:

Please refer to the BCA ADH Safety Data Sheet.

Typical Formulations (by wt.):

Liquid Epoxy Resin (EEW=190)	100	100
BCA ADH-J	23	23
BCA I80 Adduct[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
2. Fumed Silica
3.10°C/min. Scan Rate
4. By DMA 5. Time to Double the Viscosity

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BCA I80 Adduct as an Accelerator for ADH:
BCA I80 Adduct can be used as an accelerator for BCA ADH. Three formulations (Table 1) containing BCA ADH-J (Jet milled ADH) and BCA I80 Adduct 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 BCA I80 Adduct. After 60 minutes cure at 140°C, formulation without BCA I80 Adduct did not cure. However, formulations with 1 PHR and 3 PHR of BCA I80 Adduct 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 BCA ADH containing formulations

Liquid Epoxy Resin (EEW=190)	100	100	100
BCA ADH-J	23	23	23
BCA I80 Adduct	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 BCA 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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