Technical Data

Technicure® LC-80

Description:

Technicure® LC-80 is an encapsulated modified imidazole designed for one-component epoxy formulations. The product can be used as a sole curing agent or as an accelerator for dicyandiamide, anhydride, dihydrazides and diaminodiphenylsulfone. As a sole curing agent or an accelerator, the product offers excellent low temperature reactivity, long shelf life and high glass transition temperature.

Advantages:

- Excellent low temp reactivity
- Long formulation shelf stability
- High glass transition temperature

Typical Applications:

- One-component paste and film adhesives for auto, aerospace and electronics applications
- Hot-melt pre-pregs
- Composites

Handling Precautions:

Refer to the product Safety Data Sheet

Typical Properties:

Appearance:	Off white to yellow powder
Average Particle Size	10 micron
Melting point:	90 - 110°C

Recommended Use Level
(PHR with EEW=190):

As a DICY cure accelerator:	2-8
As a sole curing agent:	12-20

Typical Formulations (by wt.):

Liquid epoxy resin (EEW=190)	100	100
Technicure® D-10[1]	8	0
Technicure® LC-80	3	15
Fumed silica (H 200U)[2]	1	1
Reactivity by DSC[3]		
Onset Temp., °C	121	106
Peak Temp., °C	141	116
Heat of Reaction, J/gm	355	262
Glass Transition Temp[4]., °C		
After 30 minutes cure at 120°C	-	120
After 30 minutes cure at 140°C	158	155
Shelf stability[5] at 40°C		
weeks	>6	>3

1. Dicyandiamide – 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

A&C Catalysts, Inc.
1600 W. Blancke St. Linden, NJ 07036 Tel: (908) 474-9393 Fax: (908) 474-9388 www.ac-catalysts.com

Supplemental Technical Information:

Five one-package formulations containing Technicure® LC-80 and Technicure® D-10 (DICY) as shown in Table 1 were studied for reactivity, glass transition temperature, and shelf stability.

Reactivity:

Differential Scanning calorimeter data (Table 1) suggests that onset temperature (indication of reactivity) lowers as a function of increasing loading of LC-80 with or without DICY. As a sole curing agent it reaches plateau at 15 PHR.

Glass Transition Temperature:

Samples of cured formulations were analyzed for glass transition temperature (Tg) by DMA. The scan rate was 10°C/minute starting at 25°C. The results are shown in Table 1. As can be seen, formulations containing LC-80 as DICY accelerator did not provide any noticeable glass transition temperature after 30 minutes cure at 120°C. However the same formulations provided very high glass transition temperature after 30 minutes cure at 140°C regardless of the loading level. As a sole curing agent the glass transition temperatures increase as a function of loading level of LC-80 when cured at 120°C.

Formulation Shelf Stability:

Twenty-four hours after mixing and degassing, the viscosity of the formulations was measured at 25°C. Thereafter, the formulations were stored at 40°C and their viscosities were measured (after equilibrating to 25°C) every week. Time to double the viscosity was recorded as the end of shelf life. All formulations demonstrated acceptable latency.

Table 1. Formulations (by wt.), reactivity, glass transition temperature and shelf stability

Liquid epoxy resin (EEW=190)	100	100	100	100	100
Technicure® D-10	8	8	0	0	0
Technicure® LC-80	3	5	10	15	20
Fumed silica (H 200U)	1	1	1	1	1
Reactivity by DSC					
(10°C/min scan rate)					
Onset Temp., °C	121	114	110	106	105
Peak Temp., °C	141	132	120	116	115
Heat of Rection, J/gm	355	298	154	262	280
Glass Transition Temp., °C (by DMA)					
After 30 mins. cure at 120°C	-	-	75	122	132
After 30 mins. cure at 140°C	158	155	110	155	156
Shelf stability at 40°C					
weeks	>6	>6	>5	>3	>3

A&C Catalysts, Inc.
1600 W. Blancke St. Linden, NJ 07036 Tel: (908) 474-9393 Fax: (908) 474-9388 www.ac-catalysts.com

Technicure® LC-80 as Dihydrazide accelerator:

Technicure® LC-80 can be used as an accelerator for adipic dihydrazide (Technicure® ADH) and isophthalic dihydrazide (Technicure® IDH). Three formulations containing Technicure® ADH-J (Jet milled ADH) and Technicure® LC-80 (Table 1) as well as three formulations containing Technicure® IDH-J (jet milled IDH) and Technicure® LC-80 (Table 2) were prepared to study reactivity, glass transition temperature and shelf stability.

Differential scanning calorimeter data (Table 1 and 2) 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 reveal any measurable cure. However, formulations with 1 PHR and 3 PHR of LC-80 as an accelerator for ADH-J and IDH-J cured well and developed high glass transition temperature.

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	158
Shelf stability at 40°C			
weeks	>4	>4	>3

Table 2. Formulations (by wt.), reactivity, glass transition temperature and shelf stability of Technicure® IDH containing formulations

Liquid epoxy resin (EEW=190)	100	100	100
Technicure® IDH-J	26	26	26
Technicure® LC-80	0	1	3
Fumed silica (H 200U)	1	1	1
Reactivity by DSC			
(10°C/min scan rate)			
Onset Temp., °C	187	152	119
Peak Temp., °C	192	169	148
Heat of Reaction, J/gm	346	245	312
Glass Transition Temp., °C			
After 30 mins. cure at 140°C	No cure	No cure	148
After 60 mins. cure at 140°C	No cure	145	168
Shelf stability at 40°C			
weeks	>4	>4	>3

A&C Catalysts, Inc.
1600 W. Blancke St. Linden, NJ 07036 Tel: (908) 474-9393 Fax: (908) 474-9388 www.ac-catalysts.com