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Advanced Materials

Accelerator DY 9577

A LATENT CURING AGENT / ACCELERATOR

GENERAL

Accelerator DY 9577 is a boron trichloride-amine complex, which may be used either as a latent catalytic curing agent for liquid epoxy resins or as a latent accelerator for anhydride cured epoxy resins.

CHEMICAL DESCRIPTION

Accelerator DY 9577 is a boron trichloride-amine complex.

APPLICATIONS

Casting
Encapsulation
Filament winding
Pultrusion
Molding
Electrical tapes

ADVANTAGES

Exceptional latency at temperatures up to 80°C
Highly reactive at temperatures above 120°C
Does not degrade electrical properties of cured system
Soluble in liquid epoxy resins and hardeners
Stabilizes pre-accelerated resins and hardeners

TYPICAL PROPERTIES*

Visual Appearance	Amber/brown semi-solid
Melting Point, °C (°F)	26 - 35 (78.8 - 95.0)
Water Content, %, max	0.1
Density @ 25°C (77°F), g/cm^3 (lb/gal.)	1.1 (9.2)

* Typical properties are based on Huntsman's test methods. Copies are available upon request.

FORMULATIONS

The amount of Accelerator DY 9577 used in any formulation will depend on the resin and hardener used and the reactivity required.

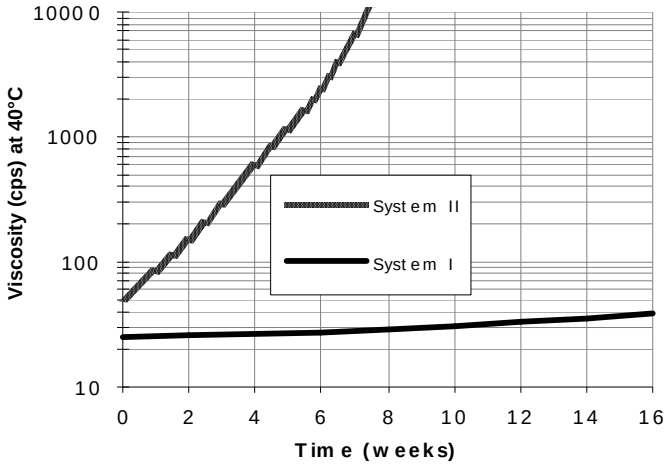
In general, when Accelerator DY 9577 is used as a catalytic curing agent, 1 to 5 phr* will suffice. When used as an accelerator for anhydride cured systems, concentration of 0.1 to 1 phr of Accelerator DY 9577 is usually sufficient.

The excellent latency at temperatures below 80°C is demonstrated in Figures 1-3.

* Parts per 100 parts of resin

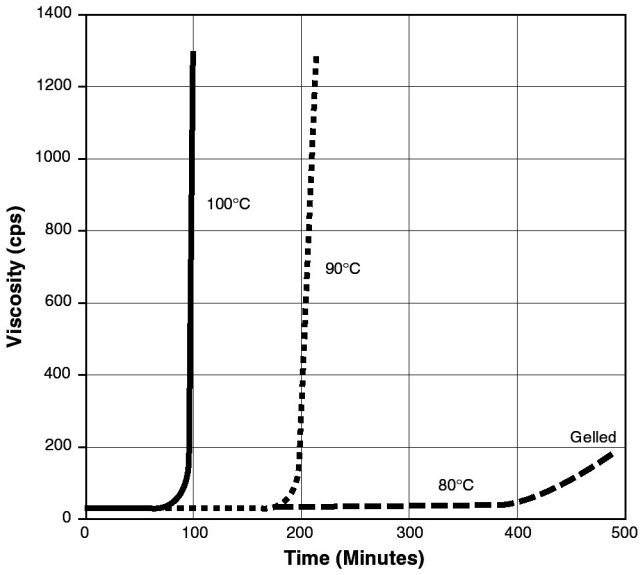
FORMULATIONS (CONTINUED)

Figure 1 Latency Test
Viscosity vs. Time



System I		**System II**	
Araldite® GY 6010	100 pbw	Araldite® GY 6010	100 pbw
Accelerator DY 9577	3 pbw	BF_3• MEA	3 pbw

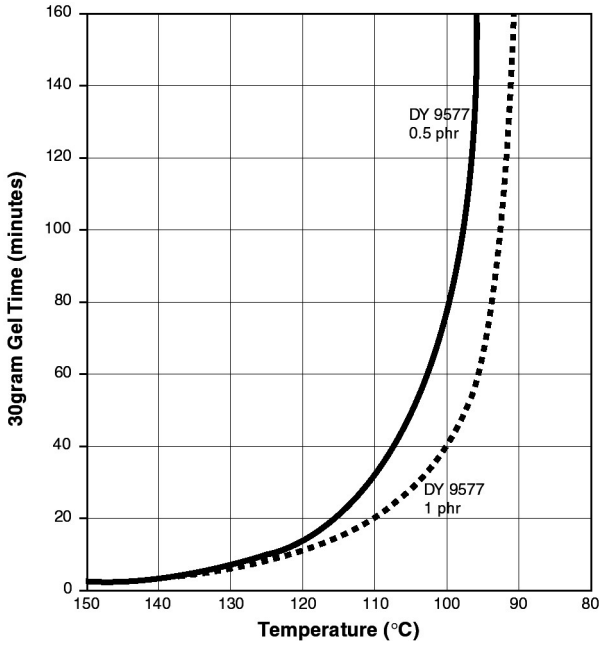
Figure 2 Latency Test at Various Temperatures
Viscosity vs. Time (one pound mass)



Araldite® GY 6010	100 pbw
Aradur® 907	85 pbw
Accelerator DY 9577	0.5 pbw

FORMULATIONS (CONTINUED)

Figure 3
30 Gram Gel Time vs. Temperature



Araldite® CY 184	100 pbw
Aradur® 907	100 pbw
Accelerator DY 9577	as indicated

FORMULATION NO.	**1**	**2**	**3**	**4**
	Parts by weight			
Araldite® CY 184	100	100	-	-
Araldite® GY 6010	-	-	100	100
Aradur® 907	100	-	85	-
Tetrahydropthalic anhydride	-	100	-	85
Accelerator DY 9577	0.5	0.5	0.5	0.5

Cure Cycle: Gel @ 120°C + 2 hr cure @ 150°C

Mechanical properties @ 25°C

Tensile strength, psi	12,400	12,300	12,100	12,900
Tensile modulus, psi x 10^5	4.9	4.8	4.3	4.8
Elongation, %	5.4	6.3	5.4	4.9
Flexural strength, psi	19,100	19,900	18,500	21,000
Flexural modulus, psi x 10^5	4.5	4.7	4.3	4.8
Izod impact strength, ft-lb/in	0.2	0.4	0.3	0.3
Heat deflection, °C	103	101	127	110
Water absorption, 2 hr boil, weight gain %	0.5	0.5	0.2	0.4

FORMULATIONS (CONTINUED)

Table 1: Comparison of BF_3 and BCl_3• Amine Complexes

Accelerator DY 9577 is a BCl_3• amine complex, which can be used in place of BF_3• MEA to give improved latency, higher reactivity at 120°C and better electrical properties.

The following formulations display the superior properties of Accelerator DY 9577.

	1	2	3
	Parts by weight		
Araldite® GY 6010	100	100	100
BF_3• MEA*	3	-	-
Accelerator DY 9577	-	3	5
Physical Properties			
% boron in system	0.28	0.11	0.18
Initial viscosity @ 40°C, cPs	76,000	21,500	18,500
Time to 2x initial visc. @ 40°C, wks	1.0	>15	>8
Gel time (7.5g in oil bath), min			
@ 90°C	719	608	404
@ 105°C	196	169	83
@ 120°C	63	34	13

Cure cycle, hours: @ 120°C + 150°C + 190°C			**Heat Distortion Temperature,°C**		
½	0	0	-	-	58
3	0	0	-	-	87
8	0	0	-	94	-
16	0	0	88	-	-
2	1	0	98	88	108
2	6	2	156	130	128

Electrical Properties

Cure schedule: 2 hrs @ 120°C + 6 hrs @ 150°C + 2 hrs @ 190°C

Tan 10^3 @ 50 Hz and 20°C	4	3	4
Temp. for tan = 0.05 @ 50 Hz	123°C	153°C	142°C
Tan 10^3 @ 1 kHz and 20°C	<5	<5	5
Temp. for tan = 0.05 @ 1 kHz	155°C	177°C	163°C

* Please refer to DT 3357 data sheet for recommended use levels to achieve desired gloss range.

FORMULATIONS (CONTINUED)

Laminating Properties

Formulation No.	**1**	**2**
	Parts by weight	
Araldite® GY 6005	100	50
Araldite® EPN 1138	-	50
Aradur® 906	80	80
Accelerator DY 9577	1	1
Post cure:	16 hr. @176°C	2 hr. @ 150°C+ 2 hr. @ 176°C

Reinforcement: Fiberite 700P Fabric

Mechanical Properties

Flexural strength, psi		
@ 25°C	148,500	189,000
@ 250°F	113,800	132,100
Flexural modulus, psi x 10^6		
@ 25°C	14.0	12.97
@ 250°F	12.6	12.64
Short beam shear, psi		
@ 25°C	10,500	10,800
@ 250°F	6600	7400

Powder Coating

Formulation No.	**1**	**2**
	Parts by weight	
Araldite® GT 6063	37.70	14.24
Araldite® GT 6450	22.60	34.81
Uralac P 5070 (DSM)	-------	14.31
TiO_2	29.35	30.00
Matting Agent DT 3357	9.70	6.27
Accelerator DY 9577	0.45	0.17
Benzoin (BASF)	0.20	0.20
Total	100.00	100.00

Coating Properties:

Cure Cycle, min/°C	15/200	15/200
Film thickness, mils	2. 0	2.0

Film Properties:

Substrate	0.032” CRS panels	
20° gloss, %	1.3	0.7
60° gloss, %	2.4	4.5
Reverse impact, in-lbs	160	160
Direct impact, in-lbs	160	160
MEK resistance, double rubs	>200	>200

PACKAGING & STORAGE

Accelerator DY 9577 is supplied in 40 pound steel drums. It should be stored in sealed containers at temperatures not exceeding 40°C. Containers should be kept closed to prevent moisture absorption and contamination.

HANDLING/SAFETY PRECAUTIONS

Caution! May cause irritation. May be harmful if swallowed or inhaled.

Avoid contact with eyes, skin or clothing.
Avoid inhaling vapor.
Use with adequate ventilation.
Wash after handling.
Store in cool area in tightly closed containers to prevent contamination and water absorption.

Read Material Safety Data Sheet Before Using.
For Industrial Use Only.

FIRST AID

In case of contact:

Eyes: Promptly flush eyes with water for at least 15 minutes.
Skin: Promptly wash with mild soap and water.
Inhalation: Remove to fresh air. Give oxygen if breathing is difficult.
Ingestion: If conscious, give large quantities of water. Call a physician.

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