CHEMISTRY THAT MATTERS™

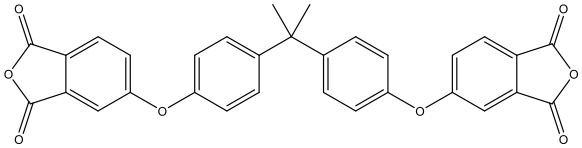
ACHIEVING HIGH HEAT EPOXY FORMULATIONS USING BISDA

Version 1.0

SABIC's Specialties Business
Thermosets & Additives

GENERAL BUSINESS USE

BISDA PRODUCT INFORMATION



BISDA

BISDA (4,4-Bisphenol A Dianhydride) (dianhydrides of BPA) can be used as a comonomer in polyimide synthesis or as an anhydride curing agent in epoxy. When used as an epoxy curative, BISDA can be used to enhance thermal performance in comparison to mono anhydrides and aromatic amine curing agents. Application areas include electronics encapsulation, composites, and adhesives. BISDA derived polyimide varnishes, coatings, adhesives, films and wire enamels meet desired solubility/stability in organic solvents even after complete imidization, heat resistance, flexibility/softness, dimensional stability and adhesion properties for ever-increasing design complexity of electronics devices.

PROPERTIES	TYPICAL VALUES	UNITS	TEST METHODS
PROPERTIES			
Melting Point	185-190	°C	
Boiling Point	>314	°C	
PHYSICAL			
Solubility, Methyl Ethyl Ketone (75°C)	10	wt%	SABIC method
Mw	520.49	-	SABIC method

AVAILABLE PRODUCT FORMS

GRADE	FORM FACTOR
BISDA-1000	Flake
ER009614* (Developmental)	Powder

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Formulation Data:

		BISDA loading (wt %) in overall formulation			
	Unit	0%	6.7%	13.1%	19.2%
Thermal Performance					
Tg by DMA	°C	145	164	173	182
Viscosity of BISDA-MTHPA blends					
Dynamic Viscosity @ 25°C	cP	400	1100	3000	8000
Dynamic Viscosity @ 90°C	cP	38	42	48	80
Formulations:					
Epoxy: D.E.R.(TM) 332*	phr	100	100	100	100
MTHPA**	phr	78.1	70.3	62.5	54.7
BISDA**	phr	0	12.2	24.5	36.7
2E-4-MI***	phr	1.8	1.8	1.9	1.9

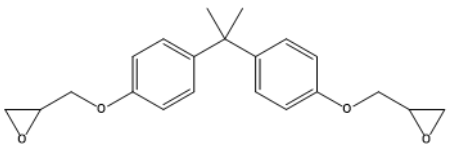
* Anhydride to Epoxy (A/E) ratio: 0.8

** Anhydride $_{BISDA\ 1000}$ /(Anhydride $_{MTHPA}$ + Anhydride $_{BISDA\ 1000}$) : 0, 0.1, 0.2 and 0.3

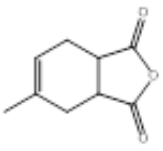
*** Catalyst content: 1 wt% of total formulation

Components:

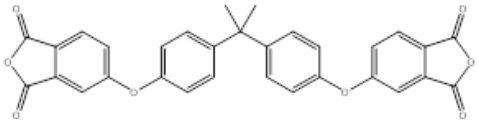
Bisphenol-A Diglycidyl Ether (D.E.R.(TM) 332



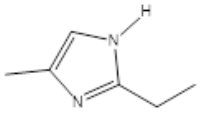
MTHPA: (Methyl-cyclohexene 1,2-dicarboxylic anhydride)



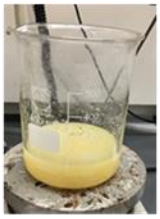
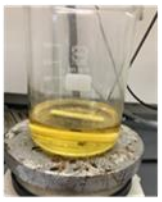
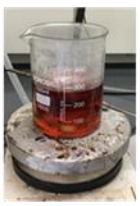
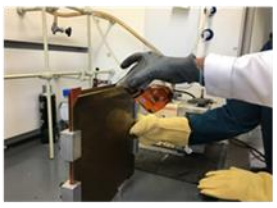
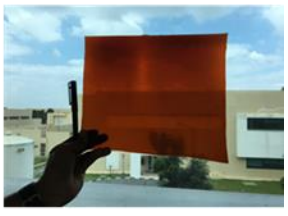
BISDA



2-Ethyl-4-methyimidazole



PROCESSING GUIDELINES

1	Add BISDA into MTHPA	Scale: 120-130 gms • BISDA content: 6-20 wt % • Mixing temperature: 22 °C • Time: 3 minutes Observation: Turbid solution	
2	Heat mixture at 120 °C	BISDA content Vs heating time: • 6.7 wt % >>> 15 minutes • 13.1 wt % >>> 20 minutes • 19.2 wt % >>> 30 minutes Observation: Clear solution	
3	Cool down 80 °C and add D.E.R.® 332	Scale: 275-285 gms • Anhydride to epoxy ratio: 0.8 • Mixing temperature: 80 °C • Time: 3 minutes Observation: Clear solution	
4	Add catalyst 2E-4MI at 80 °C	Scale: 275-285 gms • 2E-4MI content: 1 wt% • Mixing temperature: 80 °C • Time: 2 minutes Observation: Clear solution	
5	Pour into a pre-heated mold	Scale: 275-285 gms • Mold temperature: 130 °C • Pouring time: 2-3 minutes	
6	Thermal curing	Curing profile: • 80 °C >>> 30 minutes • 120 °C >>> 30 minutes 150 °C >>> 30 minutes • 180 °C >>> 60 minutes	

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