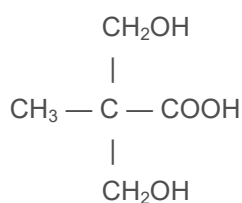


DMPA[®]

DMPA[®] Dimethylolpropionic Acid Hydrolytic Stability vs. Trimellitic Anhydride (TMA)



CAS Number: 4767-03-7

DMPA[®] Dimethylolpropionic Acid is both a glycol and a carboxylic acid.

This bulletin summarizes the processing and evaluation of **DMPA[®]** Dimethylolpropionic Acid vs. Trimellitic Anhydride (TMA) in isophthalic acid polyesters for waterborne baking enamels.

Specifications	
Property	Regular Grade
Hydroxyl Content, wt %	24.0 min
Neutralization Equivalent	141.0 max
Ash as Na ₂ O, wt %	0.03 max
Moisture, wt %	0.3 max
Water Insolubles, ppm	50.0 max
Colour, APHA	250 max

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Polyester Starting Point Formulation

Table 1—Polyester Starting Point Formulation

	EX1013-60	EX1013-62	Supplier
Dipropylene glycol	459	497	Aldrich
TRIMET [®] TME	58.5	56.6	GEO
Isophthalic acid	546	528.7	Flint Hills
DMPA [®]	55	0	GEO
TMA	0	32.5	Flint Hills
Total parts	1118.5	1114.8	
Water Loss	-118.5	-114.8	
Yield	1000	1000	

Procedure:

Equipment: round bottom four neck flask, J-Kem temperature controller, nitrogen sparge tube, overhead mechanical stirrer, Vigoreaux column, reflux condenser, water trap.

1. Charge dipropylene glycol and TME to a reactor set up for fusion processing.
2. Heat glycol solution to 160-170°C with low nitrogen sparge and moderate agitation.
3. At 160-170°C, charge isophthalic acid and set the temperature to 200-205°C.
4. At 205°C, hold for 2 hours, then continue heating to 230°C at a rate of 5-10°C per hour with low nitrogen sparge.
5. Hold at 230°C until one half of the theoretical water is collected, then cool to 190°C and charge DMPA.
6. Reheat to 205-210°C and hold for acid value of 34-38.
7. Cool batch and discharge to container

All information and data, including the formulations and procedures discussed herein, are believed to be correct. However, this should not be accepted as a guarantee of their accuracy, and confirming tests should be run in your laboratory or plant. No statement should be construed as a recommendation for any use which would violate any patent rights. Sales of all products are pursuant to terms and conditions included in GEO Specialty Chemicals sales documents. Nothing contained therein shall constitute a guarantee or warranty with respect to the products described or their use. Safety information regarding these products is contained in their Safety Data Sheets. Users of these products are urged to review and use this information.

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Typical Resin Properties

Resin Properties	
	Results
Non Volatile content, % (Method 24)	98 min
Acid Value on solids, mg KOH /g	34 - 38
Hydroxyl Number, mg KOH /g (corrected for acid value)	155 - 170
Viscosity, Gardner - Holt @ 70% in butyl cellosolve	X - Z
Colour, Gardner @ 70% in butyl cellosolve	2 - 4

Solvent Free Waterborne Baking Enamel Formulation & Typical Properties

Table 3—Typical Properties	
	Parts
Polyester polyol	238
Cymel [®] 303 ¹	102
Dimethylethanol amine (DMEA)	14.3
De-ionized water	645.7
Total parts	1000
Results	
Non-Volatile content, %	33 - 35
Viscosity, cP	100 - 150
pH	7.7 - 8.0

¹ Cytac Industries

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Procedure:

1. Warm polyester and Cymel[®] 303 to 50-60°C then charge to vessel and begin mixing at moderate shear.
2. When resin blend is homogeneous, charge the DMEA and continue to mix at moderate shear.
3. Warm de-ionized water to 40-45°C.
4. Increase the shear and begin charging the de-ionized water at an even rate.
5. When the viscosity has decreased to the minimum, reduce the shear and adjust pH and viscosity as needed.

Stability Study at 120°F

1 pH adjusted to 7.5 with DMEA and solution cleared

Table 4—Stability Study at 120°F

	0 weeks	1 week	2 weeks	3 weeks
DMPA [®] Polyester				
pH	7.95	7.55	7.33	7.31
Visual	clear	clear	clear	slight haze ¹
TMA Control ²				
pH	8.2	7.54	-	-
Visual	opaque	separated	-	-

² TMA control was prepared using standard TMA polyester processing

Conclusion

It can be concluded that DMPA[®] gives greater hydrolytic stability than Trimellitic Anhydride (TMA).

Registration & Regulatory Information: Please refer to the safety datasheet.

Handling & Storage: DMPA[®] is classified as “DOT not regulated” by the US Department of Transportation and requires no special labelling for shipment. The Harmonized Tariff Code is 2918.19.40

DMPA[®] should be stored in a clean, dry area, following good warehousing practices.

Shelf-life: DMPA[®] has a minimum shelf of not less than 3 years if stored in its original unopened container and under normal storage conditions.

Miscellaneous: DMPA[®] is packaged in 250lb fibre drums, 50lb and 25kg multi-wall paper bags with HDPE liners and 500kg super sacks with LDPE liners.

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