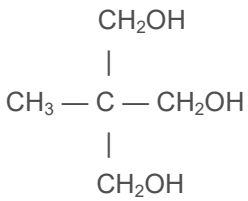
TECHNICAL BULLETIN

TRIMET® TME

TRIMET® TME in Medium Oil Alkyd Resins Containing Isophthalic Acid



CAS Number: 77-85-0

TRIMET® TME Trimethylolethane, manufactured by GEO Specialty Chemicals Inc., is a polyol useful in the preparation of alkyd resins. This bulletin contains a comparison of two polyols in a suggested starting formulation for a medium oil soya alkyd. **TRIMET® TME** was compared against glycerol. Air-dry enamel formulations were prepared from each resin.

Specifications

Property	Technical Grade	Pure Grade
Hydroxyl content, wt %	**41.0 min**	**41.75 min**
Ash as NA_2O, wt %	**0.01 max**	**0.01 max**
Moisture, (Karl Fisher), wt %	**0.3 max**	**0.3 max**
Water insoluble, ppm	**50 max**	**50 max**
Colour, APHA	**250 max**	**100 max**

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The values of low cost, ease of processing and good performance qualities are well illustrated in medium oil alkyds, which find commercial use in a wide range of industrial applications. These compositions account for a major part of industrial coatings where extreme performance is not demanded. Their use in air-drying and some baking finishes requires the inclusion of fatty acids and oils, which provide adequate cure speed as well as good gloss and adhesion to a variety of surfaces.

Industrial finishes based on medium oil alkyd resins made with TME possess outstanding performance characteristics. Quality coatings are proving attractive to many customers because better industrial finishes are necessary to meet the increasingly severe demand of many applications. Formulators who want to provide high quality coatings find that alkyds containing TME give the desired product improvements.

The results of these evaluations show that TME-containing resins provide faster cure along with improved resistance to stain, detergent, water immersion, salt spray and humidity

Table 1—Resin Preparation

	MO201	MO202
TRIMET® TME	167	-
Glycerol	-	139
Soya Oil	513	508
Benzoic Acid	45	44
Isophthalic Acid	274	308

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Processing:

Charge soya oil, polyol and catalyst to the reaction kettle. Heat to 232°C and hold for complete alcoholysis. Note: alcoholysis is one part resin and one part methanol. If solution is clear when hot, alcoholysis is complete.

Cool to 215°C and add isophthalic acid.

Heat to 246°C and hold for an acid number 7 to 10.

Resin Properties

	MO201	MO202
Viscosity, Gardner	X-Y	Y-Z
Colour, Gardner	4+	5-6
Acid Value (AV), mgKOH / g	8.7	11.9
Non-volatile matter (NVM), %	50	50
Cure @ 200°C	20 sec.	20 sec.
Excess Hydroxyl Content, %	9.6	8.7
Oil, %	56.0	54.8
Phthalic Anhydride, %	29.4	33.2

Table 2 - General Purpose Medium Oil Isophthalic Acid Air-Dry Enamel

Resin Properties

	Quantity, g
Alkyd Resin (50% NVM in Mineral Spirits)	572.0
Wetting Agent [1]	20.0
Titanium Dioxide [2]	264.0
12% Cobalt Naphthenate	1.2
4% Calcium Naphthenate	3.6
18% Zirconium Naphthenate	3.2
Anti-skin Agent [3]	0.5
VM&P Naphtha	25.0
Xylene	128.5

1 Yelkin® TS, Ross & Rowe Co

2 Ti-Pure® R-960, El Du Pont de Nemours & Co

3 Exkin® No 2, Nuodex

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Table 3 - Viscosity and Dry Film Tests

	MO201	MO202
Polyol	TRIMET® TME	Glycerol
Paint Designation	PMO201	PMO202
Viscosity #4 Ford Cup @ 25°C	71 sec.	73 sec.
Pencil Hardness 24 hrs.	< 2B	2B
Pencil Hardness 72 hrs.	B	B
Pencil Hardness 1 week	HB	HB
60° Gloss	90	90
Cross Hatch Adhesion Pass %	100	100
Conical Mandrel Pass %	100	100

Stain Resistance

Paint was sprayed to dry film thickness of 0.02 - 0.03 mm on Bondrite 1000 panels. The panels were allowed to dry for three weeks at ambient temperature. All materials, except xylene and gasoline were applied

Table 4—Stain Resistance

	MO201	MO202
Polyol	TRIMET® TME	Glycerol
Paint Designation	PMO201	PMO202
2% Iodine	very slight stain	stained
Mustard	stained and blistered	stained and blistered
Ketchup	very slight Stain	very slight stain
Oil	no effect	no effect
Xylene	swelled	swelled
Gasoline	softened	softened

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Detergent Resistance

Procedure:

Panels were prepared in the same way as for the stain resistance test. They were allowed to dry for 21 days at ambient temperature, and then were immersed in a 2% laundry detergent solution for one hour at 83°C.

Table 5—Detergent Resistance

	MO201	MO202
Polyol	TRIMET® TME	Glycerol
Paint Designation	PMO201	PMO202
Original Gloss	90	94
Final Gloss	80	73
Loss in Gloss	10	21
Condition	no effect	no effect

Water Immersion

Procedure:

Panels were prepared in the same way as in the previous tests. They were then backed with a primer. One panel of each paint (*) was scribed with a sharp razor to expose the bare metal. All edges were coated with paraffin. The panels were allowed to dry for 7 days at ambient temperature and then were immersed in distilled water for 200 hours.

Table 6—Water Immersion

	MO201		MO202	
Polyol	TRIMET® TME		Glycerol	
Paint Designation	PMO201	PMO201*	PMO202	PMO202*
Film Thickness, mm	0.025	0.025	0.025	0.025
Original Gloss	89	90	92	94
Final Gloss	81	77	79	77
Loss in Gloss	8	13	13	17

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Humidity Resistance

Procedure:

Paint was applied to Bondrite 1000 panels to a film thickness of 0.02 - 0.03 mm. The panels were air dried at ambient temperature for 7 days and then were placed in a Cleveland condensing cabinet at 38°C, 100% relative humidity for 250 hours. One panel with each paint (*) was scribed with a sharp razor down to bare metal.

Table 7—Humidity Resistance

	MO201		MO202	
Polyol	TRIMET® TME		Glycerol	
Paint Designation	PMO201	PMO201*	PMO202	PMO202*
Film Thickness, mm	0.02	0.02	0.02	0.02
Original Gloss	89	87	90	89
Final Gloss	86	87	86	86
Loss in Gloss	3	0	4	3

Salt Spray Resistance

Procedure:

Paint was applied to Bondrite 1000 panels to a film thickness of 0.02 - 0.03 mm. The panels were baked 15 minutes at 150°C and aged for 72 hours before testing. All panels were backed with a primer. One panel of each paint (*) was scribed with a sharp razor down to the bare metal. All panels were edged with paraffin and placed in a salt fog chamber using a 5% salt solution and a cabinet temperature of 32°C for 400 hours.

Table 8—Salt Spray Resistance

	MO201		MO202	
Polyol	TRIMET® TME		Glycerol	
Paint Designation	PMO201	PMO201*	PMO202	PMO202*
Film Thickness, mm	0.02	0.02	0.02	0.02
Original Gloss	89	89	89	90
Final Gloss	77	68	75	51
Loss in Gloss	12	21	14	39

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Condition of Panels	
PMO201	few slight blisters
PMO201*	few slight blisters, some 0.8 - 9.5 mm creepage at scribe
PMO202	few slight blisters
PMO202*	few slight blisters, some 1.6 - 12.5 mm creepage at scribe

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

Handling & Storage: TRIMET® TME is packaged in 50lb and 25kg multi-wall paper bags with HDPE liners. Super sacks containing 500kg / 1102lb and lined with antistatic LDPE are also available.

TME is a combustible solid with a flashpoint (Cleveland open cup) of 160°C. Store in a cool, dry area. Do not store near oxidizers.

The moisture content of **TRIMET® TME** may increase slowly with extended storage.

Shelf life: TRIMET® TME has a minimum shelf life of not less than 3 years if stored in its original unopened container and under normal storage conditions. Granular **TRIMET® TME** Tech storage should be limited to 6 months or less due to a tendency of the product to cake. To minimize caking, pallets should not be stacked on top of each other and storage temperatures should be minimized. High humidity conditions may accelerate caking especially if packaging has been opened.

Miscellaneous: Various pack types available; please contact your local GEO Specialty Chemicals representative for further information.

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