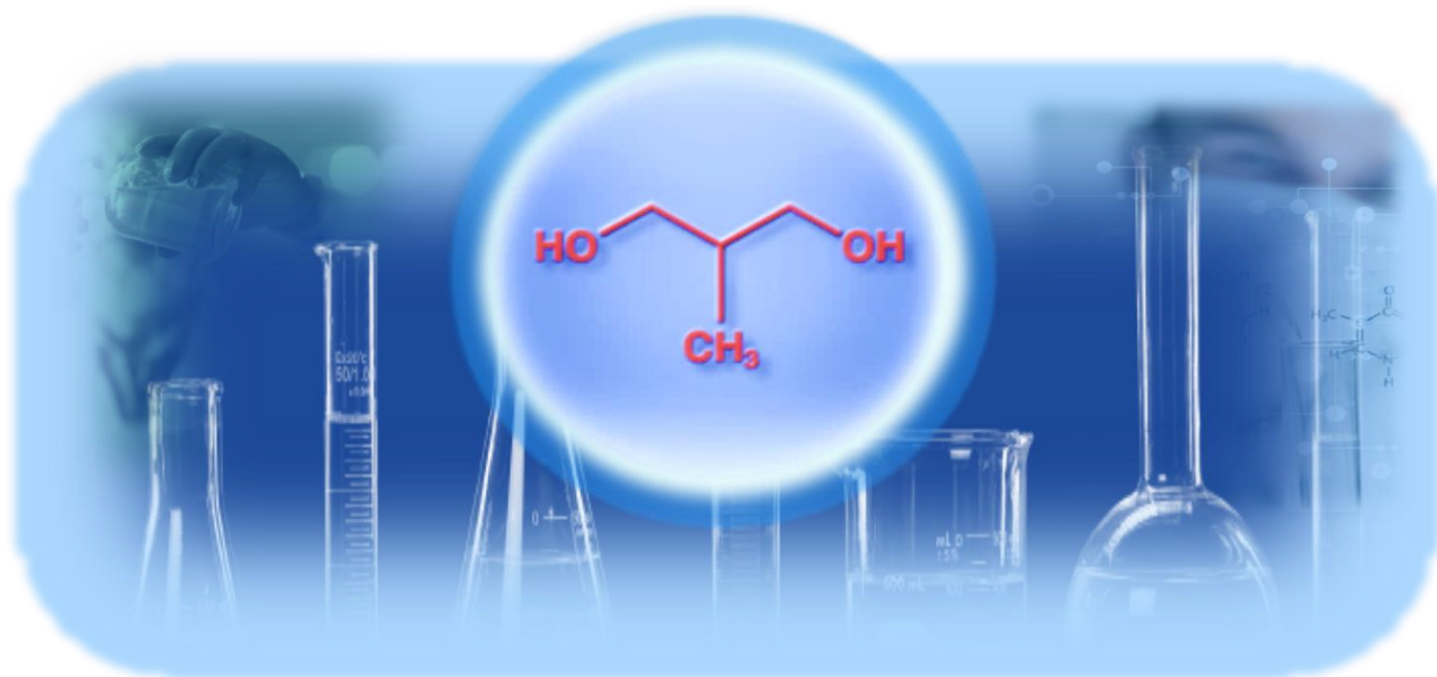


MPO

The Versatile Diol Monomer

2-Methyl-1,3-Propane Diol

Global Chemical Solutions



COLLABORATION

SUSTAINABILITY

GLOBAL

INNOVATION

MPO Attributes

2-Methyl-1,3-Propanediol (MPO) is a versatile liquid, non-crystallizing, short-chain diol possessing two primary hydroxyl groups. MPO exhibits a high boiling point of 212°C and a very low melting point of -54°C.

- Ease of handling, easily pourable, low moisture pick-up and low toxicity
- High solvency characteristics and compatibility in formulations
- Imparts flexibility and toughness in resins
- Inhibits crystallization in polyesters and improves compatibility with additives
- Improves moisture resistance, hydrolytic stability and weatherability
- Rapid poly-esterification reactions and high reactor productivity
- Not a regulated product (vs. 1,4-butanediol)

Regulatory and Toxicology Overview

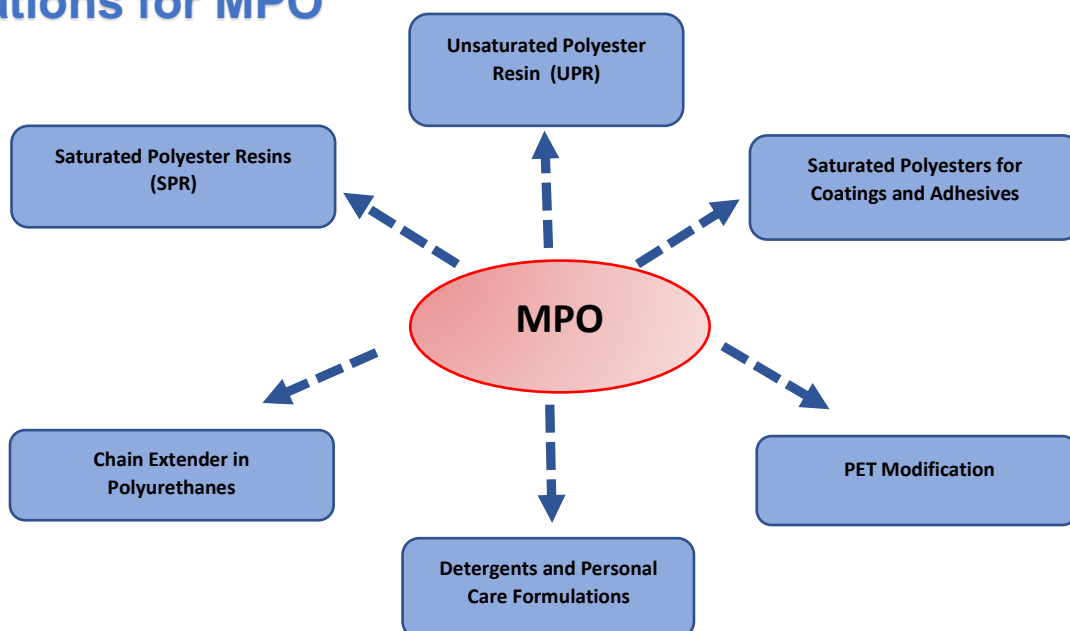
MPO is not considered to be hazardous based on available toxicology data. A compilation and assessment of toxicological data on MPO was published by the Commonwealth of Australia, Department of Health and Family Services. This assessment concluded that MPO exhibits low oral toxicity, low dermal toxicity, low skin irritation or sensitization, low inhalation toxicity and no eye irritation. Environmental hazards of MPO were also reviewed. No effects were found in acute aquatic tests and no long-term effects or accumulation were anticipated.

FDA 21 CFR Regulations

MPO is considered an isomer of butylene glycol and is listed under the following food contact applications. It is the responsibility of our customer and the converter or food packager to validate compliance with the relevant regulations.

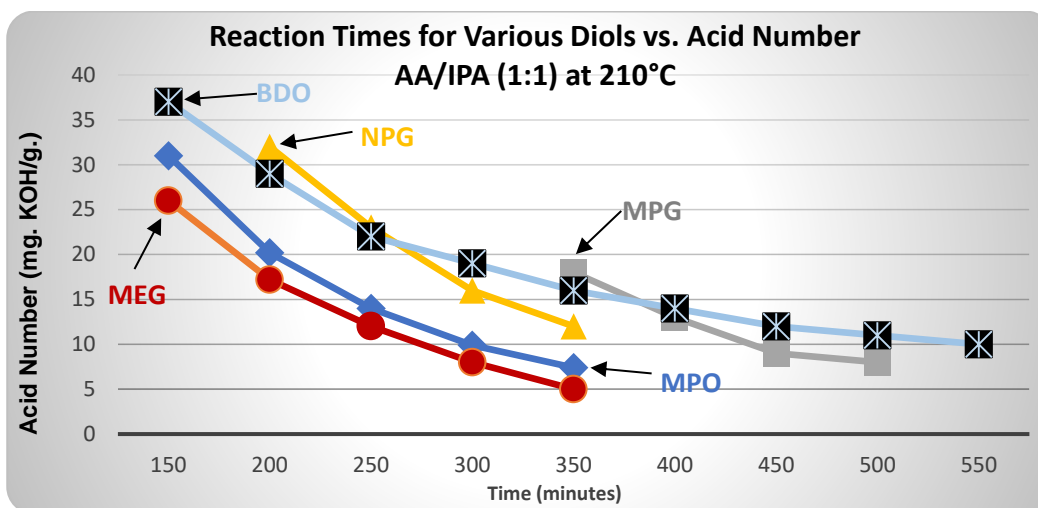
- 21CFR 175.105 Adhesives
- 21CFR 175.300 (b)(3)(ii) and (vii)(c). Resinous and polymeric coatings
- 21CFR 177.2420 (a)(2) Components of polyester resins, cross-linked

Applications for MPO



Reactivity of MPO in Polyesterification

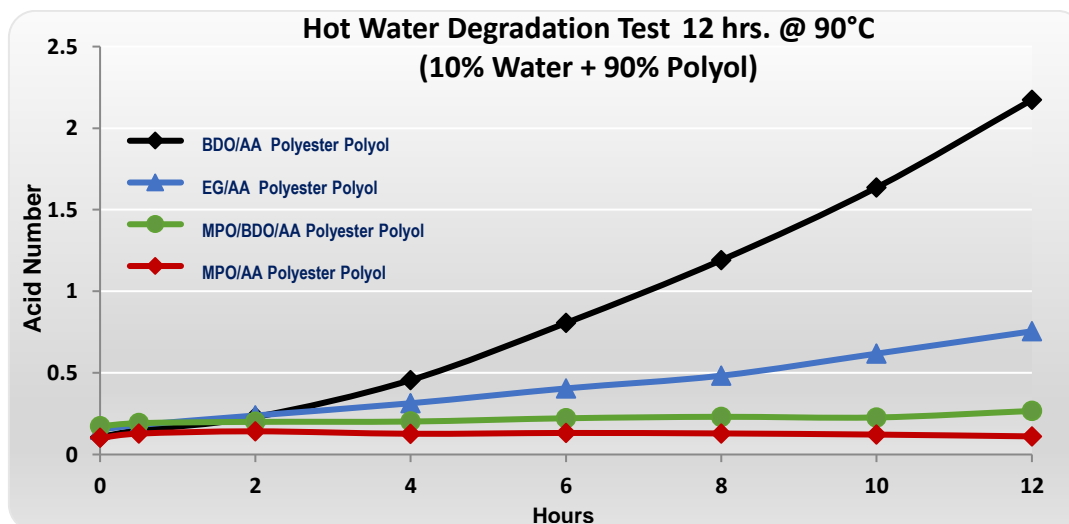
The reactivities of MPO versus related diols such as mono ethylene glycol (MEG), mono propylene glycol (MPG), neopentyl glycol (NPG) and 1,4-butanediol (BDO) are compared in the chart below. Based on the reduction in the acid number, the esterification rates of MPO and MEG are similar and fastest, when reacted with a 1:1 mixture of adipic acid and isophthalic acid at 210°C.



The benefits of a faster reaction rate would be shorter reactor times or lower reactor temperatures which afford lower product color and greater reactor productivity.

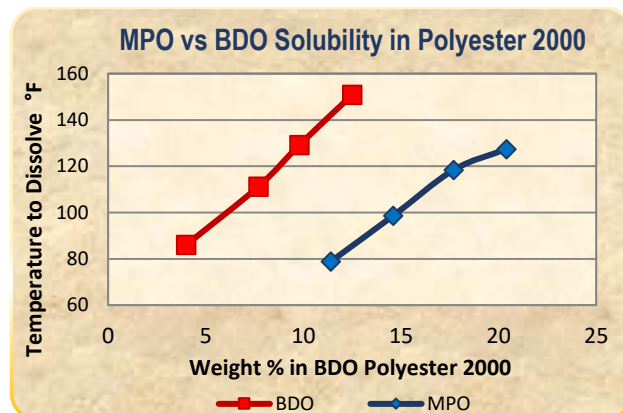
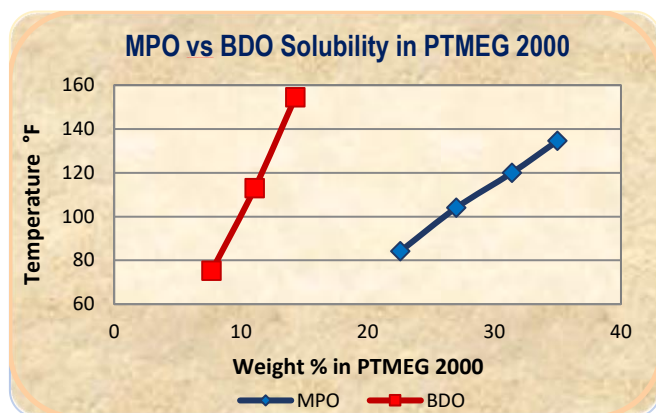
Hydrolytic Stability of Associated Polyester Polyols

MPO polyesters exhibit excellent hydrolytic stability. The chart below compares the hydrolytic stability of various adipate polyester polyols admixed with 10 wt. % water and subjected to heating at 90°C over 12 hours. Hydrolysis rates are determined by the generation of acidic moieties. Generation of acid, as measured by the acid number, demonstrates the significantly greater resistance to hydrolysis of MPO based diols.



High Compatibility of MPO

The solubility of MPO in high molecular weight polyols like PTMEG 2000 and a 2000 MW Polyester Polyol is three times greater than that of 1,4-BDO, avoiding the phase separation sometimes experienced by 1,4-BDO in these polyols. The following charts show the differences.



Using MPO as a Chain Extender - Polyurethanes

MPO as a chain extender gave clearer, transparent elastomers with a lower Shore A hardness vs. 1,4-BDO. MPO based elastomers exhibit improved abrasion and rebound characteristics.

Comparison of MPO Cured Polyurethane Properties										
Prepolymer	NCO	Curative	Initial Hardness	100% Modulus (psi)	200% Modulus (psi)	300% Modulus (psi)	Tensile strength (psi)	Elongation (%)	Tear strength (psi)	Abrasion loss (mg)
MDI-polyester	6.5%	BDO	84A	940	1360	1940	6130	740	660	0.0102
		MPO	62A	290	380	490	3340	800	220	0.0057
MDI-PTMEG	9%	BDO	79A	780	1110	1540	3420	570	460	0.0039
		MPO	63A	270	310	400	1560	730	200	0.0006
		BDO/MPO (50%:50%)	66A	430	610	860	2770	620	279	0.0012

MARINE & SOLID SURFACES



SHOE SOLE



TRANSPARENT MPO MODIFIED PET



Sales Specification

Gantrade's Sales Specifications for Industrial Grade and a High Purity Grade of 2-Methyl-1,3-Propanediol are shown below.

	MPO (Industrial Grade)	MPOH (High Purity Grade)
Purity (wt.%)	≥ 98.00	≥ 99.85
Water (wt.%)	≤ 0.080	≤ 0.080
Carbonyl (as-CHO) (wt. ppm)	≤ 500	≤ 50
Color (APHA)	≤ 20	≤ 20
Iron (ppm)	≤ 0.5	≤ 0.5

MPO is available from Gantrade Corporation in 20 metric tonne ISO Tanks, road tank trucks or 200 kilogram steel drums. MPO is stable under recommended storage conditions. It should be stored in a dry, cool and well-ventilated place. Keep/store away from extremely high temperatures, ignition sources, direct sunlight and UV sources, or incompatible materials. For additional information, request a Safety Data Sheet from Gantrade Corporation.

To explore how MPO can meet your unique needs, partner with **Gantrade**. Our team, armed with a wealth of technical knowledge and expertise, can guide you to the best solutions for your applications. Contact **Gantrade** today to get started. We offer a wide portfolio of products to achieve your high-performance requirements.



COSMETICS

MPOH has applications as an emulsifier, emollient and humectant in cosmetics and make-up products.

MPO's hydrophilic and hydrophobic balance provides solvency to both polar and non-polar components.



PERSONAL CARE & DETERGENTS

MPOH can be used to replace Monopropylene Glycol and Dipropylene Glycol in liquid laundry detergents, shampoos, skin creams and sun care products.



Our website blog on replacement of DPG has key toxicology references. The referenced authors concluded there was a lack of toxicity or environmental hazards across all media and test systems they reviewed.

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Gantrade markets quality chemicals and intermediates around the world