

## 2-Methyl-1,3-propanediol (MPO)

### Description:

**2-Methyl-1,3-propanediol** is a colorless, low viscosity, low order of toxicity liquid with a unique molecular structure: a branched aliphatic diol with two primary hydroxyls. This structure inhibits the crystallization of 2-methyl-1,3-propanediol Glycol allowing it to remain liquid even in cold temperature. The main applications are the manufacture of unsaturated polyester resin, saturated polyester, alkyd resin, polyurethane, plasticizer, 2-Methyl-propylene glycol diacrylate, 2-Methyl-propylene glycol alkoxyate diacrylate, 2-Methyl-propylene glycol alkoxyate, polyester polyol, modified PET for fiber and bottle, and personal care.

### Specification:

ITEMS		SPECIFICATION
1. Assay	%	98.0 min.
2. Water	%	0.08 max.
3. Color	APHA	20 max.
4. Carbonyl (as -CHO)	ppm	500 max.
5. Iron	ppm	0.5 max.

### Physical Properties:

Boiling Point (760 torr)	212°C
Freezing Point	-54°C
Specific Gravity (20°C/20°C)	1.015
Flash Point	127°C
Ignition Temperature	380°C

### Application:

**Unsaturated polyester resins (composites).** The unique molecular structure of 2-methyl-1,3-propanediol brings significant process and property advantages to unsaturated polyester resins. The two-primary hydroxyl and high boiling point character of 2-methyl-1,3-propanediol increase both esterification rates and productivity. This

higher reactivity compared with other glycols, such as propylene glycol, leads to lighter color resins. Also, the non-linear backbone of 2-methyl-1,3-propanediol provides polyester with excellent styrene miscibility. 2-methyl-1,3-propanediol provides an excellent balance of tensile strength, elongation and flexibility to the final product. Molding resins can achieve higher elongations and “toughness” without sacrificing modulus. Moreover, unlike other flexibilizing glycols, 2-methyl-1,3-propanediol will not lead to losses in chemical resistance, water resistance or weatherability.

**Unsaturated polyester resins(gel coats).** With their exacting performance requirements, gel coats gain key benefits from the inherent properties of 2-methyl-1,3-propanediol. Gel coats formulated with 2-methyl-1,3-propanediol-based polyesters have high strength and elongation characteristics, excellent blister resistance and excellent weatherability. Comprehensive testing has demonstrated that 2-methyl-1,3-propanediol enhances the toughness of gel coats without sacrificing weatherability performance. 2-methyl-1,3-propanediol-based polyester used in these applications are suitable for use in marine and fiberglass panel resins.

**Saturated polyester for coating.** 2-Methyl-1,3-propanediol unique capability to flexibilize high aromatic content-phthalic, isophthalic, or terephthalic-based polyesters enables flexibility coupled with pencil hardness. This coupling of hardness and flexibility is only possible because the 2-methyl-1,3-propanediol-base polyesters have a very low tendency to form crystalline, insoluble polyesters- even when high aromatic content is utilized. Extensive testing of 2-methyl-1,3-propanediol base polyesters also has demonstrated that 2-methyl-1,3-propanediol can be utilized to make highly weatherable polyester binders that can compete effectively with exterior durable polyesters.

**Polyurethane.** 2-Methyl-1,3-propanediol is a building block that can be broadly utilized in the diverse field of polyurethane coating, adhesives, sealants and elastomers. Application systems include: Industrial Maintenance Coatings, aqueous polyurethane dispersions, liquid prepolymers for urethane elastomers and urethane adhesives.

As a liquid diol, 2-methyl-1,3-propanediol can be used as a chain extender to build molecular weight and performance in urethane elastomers, adhesives and sealants. The branched structure of 2-methyl-1,3-propanediol leads itself especially well to the manufacturing of clear, pliable sealants and adhesives. In addition, 2-methyl-1,3-propanediol has excellent compatibility with conventional polyols.

2-Methyl-1,3-propanediol is an ideal glycol for polyester polyols because it yields all primary hydroxyl-containing polyesters. Its unique structure makes it possible to produce liquid polyesters that are readily dissolved in conventional coatings solvents. 2-Methyl-1,3-propanediol based polyester polyols also demonstrate excellent compatibility in urethane adhesive formulations.

**Plasticizers.** The unique noncrystallizing nature of 2-methyl-1,3-propanediol based diesters and polyesters can be a significant handling advantage for the thermoplastics (PVC) compounder. The very low glass transition temperatures of 2-methyl-1,3-propanediol based ester and polyester derivatives ensure efficient utilization of these premium polyesters.

**2-Methyl-1,3-propanediol alkoxyate.** The main applications are the manufacture of UV curing agent monomer, polyester polyol, painting, ink, adhesive and polyurethane.

**2-Methyl-1,3-propanediol glycol diacrylate and 2-methyl-1,3-propanediol glycol alkoxyate diacrylate.** Both glycol diacrylate can be used in quite broad applications as starting materials and intermediates for thermosetting paints, adhesives, nonwoven fabric binders, photosensitive agents, paper finishing agents, copolymer modifiers and cross-linking agents. But 2-methyl-1,3-propanediol glycol alkoxyate diacrylate has lower skin irritation and odor than 2-methyl-1,3-propanediol glycol diacrylate.

**2-Methyl-1,3-propanediol polycarbonate.** 2-Methyl-1,3-propanediol is a branched aliphatic diol with two primary hydroxyls. This structure inhibits the crystallization of 2-methyl-1,3-propanediol polycarbonate allowing it to remain liquid even in cold temperature. The main applications are the adhesives softsegment intermediates for polyurethanes, coating and ink.

**Modified PET.** 2-Methyl-1,3-propanediol provides an effective crystallization modifier for polyethylene terephthalate. The branched structure of 2-methyl-1,3-propanediol helps control both thermal and crystallization properties of the final polyester products. This control offers differential performance features in polyester bottle and fiber resin applications. Polyethylene terephthalate is essentially a highly crystalline resin and, therefore, appear opaque. It is known to use a small quantity of isophthalic acid together with terephthalic acid as the dicarboxylic acid component of PET or to use 2-methyl-1,3-propanediol together with ethylene glycol as the glycol component of PET can obtain transparent bottle. But isophthalic acid is very expensive, 2-methyl-1,3-propanediol modified PET can reduce PET bottle cost. 2-methyl-1,3-propanediol has a side chain of a methyl group which renders the polyester an asymmetric chemical

structure, if this compound is used as PET Fiber, the result PET fiber will be made in irregular form, and dyestuff molecules will attach to it readily. Therefore, the resulting PET fiber are endowed with excellent dyeability, lesser elongation and greater strength.

**Personal care.** 2-Methyl-1,3-propanediol also can be used in an emulsifier and humectant. The hydrophilic/ lipophilic balance of 2-methyl-1,3-propanediol provides solvency to both polar and non-polar active components. This feature ensures shelf-stable formulations and clear, homogenous solution.

### **Storage and Handling**

**2-Methyl-1,3-propanediol** is a stable material. It should be stored away from strong mineral acids. If low water content is important, it should not suffer excessive exposure to atmospheric moisture and should be stored under a nitrogen blanket. It can be both shipped and stored in phenolic-lined, mild steel containers. Stainless steel will also help extend product consistency.