



Propylene Glycol

Propylene glycol [HO-(CH₂-CHCH₂O)-H] is a viscous, stable, hygroscopic liquid. It is essentially colorless and has a slight odor and a very slight acid taste. Propylene glycol is completely miscible with water and many organic solvents and will dissolve a number of resins, dyes and essential oils. It is available in Industrial, Feed and USP grades.

Table 1
Specifications
(Industrial Grade)

Water, max (% by weight)	0.2
Acidity, as acetic acid, max (% by weight)	0.005
Specific Gravity @ 25/25°C	1.0350-1.0365
Color, max (APHA)	10
Chlorides, as Cl, max (% by weight)	0.001
Boiling Range (°C)	
Initial Boiling Point, min.	185
Dry Point, max	190

Table 2
Typical Physical Properties

Boiling Point @ 760 mm Hg (°C)	187.4
Coefficient of Expansion @ 20°C, per °C	0.00073
Density @ 25°C (kg/m ³)	1032
(lbs/gal)	8.62
Dielectric Constant @ 20°C (esu)	32.0
Fire Point (°C)	107
Flash Point, COC (°C)	107
Freezing Point (°C)	Supercools
Heat of Vaporization @ 760 mm Hg (joules/g)	711
Molecular Weight	76.09
Pour Point (°C)	-57
Refractive Index @ 20°C (n _D)	1.4329
Specific Gravity @ 20/20 °C	1.0381
Specific Heat @ 20°C (joules/g °C)	2.481
Spontaneous Ignition Temperature (°C)	446
Vapor Density (air = 1)	2.52
Viscosity @ 20°C (cp)	56.0

Applications

Antifreeze and Coolants. An important property of propylene glycol is its ability to lower the freezing point of water. This results in its use in the formulation of antifreeze mixtures. Propylene glycol is about 90% as efficient as ethylene glycol in antifreeze applications, but it is much less toxic. It is frequently used in applications where toxicity is a consideration.

Solutions of inhibited propylene glycol (propylene glycol containing a corrosion inhibitor) can replace salt and calcium chloride brines in air cooling systems where the corrosive effects of the coolant are important considerations. The nontoxic properties of propylene glycol are particularly advantageous. They permit its use as a coolant in the refrigeration systems of dairies, breweries and food processing plants where a leak in the system could cause the refrigerant to come into contact with the products.

Deicing Fluids. Propylene glycol can be formulated with other glycols into fluids that are brushed or sprayed onto aircraft wings and surfaces to remove or prevent the formation of ice. These deicing fluids can also be used to remove ice from automobile windshields.

Hydraulic Fluids. Propylene glycol is formulated into all types of hydraulic and brake fluids, primarily to inhibit the swelling of rubber. In addition, it is a good solvent for corrosion inhibitors as well as other brake fluid components, and it functions over a wide range of temperatures.

Food and Tobacco Products. Propylene glycol (USP grade) is employed as a humectant, preservative, solvent and lubricant by the food processing and tobacco industries.

Propylene glycol is employed as a hygroscopic agent for tobacco. It is used as a humectant in baked goods and shredded coconut to maintain freshness, and is added to cereals to improve friability and firmness.

Because of its mutual solvent properties, both aromatic chemicals and essential oils can be dissolved in propylene glycol and then diluted with water. Propylene glycol is used to extract flavor from natural flavoring



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materials. In soft drinks, it is employed as a syrup flavor solvent and imparts smoothness, body and sparkle to the final product.

Propylene glycol can be used to lubricate food packaging machinery; ordinary lubricants are prohibited because of their toxic effects. Some types of food products, such as dates, can be prevented from sticking to process machinery by washing them with solutions of propylene glycol.

Cosmetics and Pharmaceuticals. In cosmetic and pharmaceutical formulations, propylene glycol (USP grade) acts as a softening agent, ointment base, preservative, humectant and emollient.

Propylene glycol is a component of many cosmetic ingredients. Many grease-like materials can be presented in attractive form through the proper use of this product. Propylene glycol assists in the formation of oil-in-water emulsions. It couples lanolin, oil and soap into water in cold creams and cleansing creams, helps to overcome flaking and rolling in vanishing creams, and generally prolongs the shelf life of most cosmetic formulations. It is also an excellent solvent for dyes and most perfumes, allowing the dispersion of these materials throughout the preparation.

Addition of propylene glycol to hand lotions ensures complete and rapid absorption of the protective ingredients by the skin. Propylene glycol is also used in toothpastes and shaving creams to maintain the proper degree of moisture content. Many cosmetic formulations using lemon or other natural fruit juices contain propylene glycol as an inhibitor of mold growth.

Propylene glycol is often employed in the formulation of biological elixirs, antiseptics, salves and ointments. It is a solvent for many organic chemicals used for medicinal purposes and for some water-soluble vitamins. As a drug vehicle, propylene glycol acts as an antioxidant and stabilizer.

Polyester Resins. Propylene glycol reacts with maleic, fumaric or similar dibasic acids to form polyester. These polyesters, when cross-linked with a vinyl-type monomer such as styrene, form resins which are useful for low pressure laminating.

Polyesters of propylene glycol and dibasic acids such as phthalic, adipic and sebacic are used as plasticizers, primarily in vinyl compounding. These plasticizers are resistant to migration and extraction by gasoline, oil and water.

Urethanes. Polyesters containing propylene glycol and adipic acid are intermediates, together with isocyanates, in the manufacture of both flexible and rigid urethane foams. Propylene glycol is also an intermediate in the syntheses of urethane elastomers.

Plasticizers. Propylene glycol is a nontoxic plasticizer and humectant, widely used in cellophane film. It is also used as a plasticizer in phenolic resins. As a component of dry adhesive formulations, propylene glycol acts as a plasticizer and humectant to maintain a constant moisture content and to help the adhesive to wet out quickly at the time of use. Propylene glycol is also used as a conditioning agent for the cork linings in bottle caps.

Inks. Propylene glycol's high boiling point, dye solvency and strong penetrating properties make it an ideal ingredient for the formulation of high speed steam-set inks. The nontoxic properties of propylene glycol are important when formulating ink for printing cloth, paper and plastic film food wrappers.

Storage and Handling

Propylene glycol is noncorrosive and nontoxic; it has a low vapor pressure and high flash point. It is easily handled under ordinary commercial conditions. Storage in mild steel is satisfactory, except where color requirements are critical. Protection from discoloration can be obtained by storage in resin-lined steel, glass, aluminum or stainless steel containers. Store in a cool, dry, well-ventilated place.

For More Information

Technical Service

Technical service is available to facilitate further use of propylene glycol. If you have a specific question or need further information, please write or call Organics Technical Service, Arch Chemicals Inc., P.O. Box 547, 2450 Highway 933, Brandenburg, KY 40108-0547; (502) 422-6924 or fax: (502) 422-6909.



**Technical
Product
Information**

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Shipping Information

Containers: Tank cars, compartmental tank cars, tank trucks and 55-gallon (480 lbs/net) resin-lined drums.

How To Order

To place orders for delivery in the U.S. or Canada and to get fast answers on order status or product availabilities,

call our toll-free number: (800) 636-3786. (From Kentucky, call (502) 422-6457, collect.) For written inquiries about orders, and to place confirmations, we have set up a special box number for you. Just address your envelope to Arch Chemicals Inc., P.O. Box 547, Brandenburg, KY 40108-0547.

Please refer to the Material Safety Data Sheet (MSDS) for complete information on Storage and Handling, Toxicological Properties, Personal Protection, First Aid, Spill and Leak Procedures, and Waste Disposal. To order an MSDS, call the Arch sales office listed below or the MSDS Control Group at (800) 511-MSDS. Before using or handling this product, the MSDS should be thoroughly reviewed.

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Sales Office

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