

Propylene glycols Product Stewardship Summary

CAS number

MPG: 57-55-6

DPG (CAS 25265-71-8) is a mixture of the isomers 1,1'-oxidi-2-propanol, 2-(2'-hydroxypropoxy)-1-propanol and 2,2'-oxidi-1-propanol

Chemical formula

C₃H₈O₂ (MPG), C₆H₁₄O₃ (DPG)

What is propylene glycol?

Propylene glycol (PG) is the overall name for monopropylene glycol (MPG), dipropylene glycol (DPG) and tripropylene glycol (TPG). Shell chemicals companies are only involved in the manufacture of MPG and DPG. Some heavy glycol (1% of capacity) is produced which could be processed further to DPG and TPG but is instead sold as heavy propylene glycol.

Propylene glycol is a derivative of propylene oxide (PO) and is produced in a two-step process. The first step is the reaction of PO with water into a mixture of MPG and DPG and the second step is the distillation and purification of the mixture into its two separate components.

MPG is the largest volume propylene glycol. It is a colourless, viscous, odourless liquid. It is highly hygroscopic and miscible in all ratios with water, alcohols, esters, ketones and amines. It has limited miscibility with halogenated hydrocarbons and is not miscible with aliphatic hydrocarbons.

DPG is a colourless, hygroscopic liquid. It is miscible with water in any ratio and highly soluble in most organic solvents.

How is propylene glycol used?

MPG's most important end use is in the production of unsaturated polyester resins, which, in turn, are used to make everyday items such as bath tubs, small boats and water/chemical tanks and pipes. Other end use application areas are paints and coatings; aeroplane de-icers/anti-icers; antifreeze and industrial coolants; detergents; hydraulic fluids; and cosmetics.

Shell chemicals companies also supply United States Pharmacopia (USP) grade monopropylene glycol. The end uses of DPG include unsaturated polyester resins, plasticisers, alkyd resins, and urethane polyols. For cosmetics applications Shell chemicals companies also supply DPG LO (low odour), which, together with MPG (USP), is produced under Good Manufacturing Practices.

Health, Safety and Environmental considerations

Propylene glycols are of low mammalian toxicity. They may slightly irritate eyes and skin on repeated/prolonged contact. Propylene glycols are not considered to be carcinogenic.

The US Food and Drug Administration designate MPG as GRAS, 'generally regarded as safe'. As such, MPG made to FDA standards may be used in food, food packaging, pharmaceuticals and cosmetics. In the EU, MPG USP is not cleared as a foodstuff or general purpose food additive. The maximum allowed content in the final foodstuff is 1g/kg.

MPG USP is considered safe to use in animal feed applications EXCEPT cat food. MPG has a species-specific effect on the red blood cells of cats.

Propylene glycols are readily biodegradable and do not bio-accumulate.

MPG/DPG are not classified as flammable, but will burn at temperatures over 90 to 120°C /200 to 244°F.

Storing and transporting propylene glycols

Propylene glycols are transported by marine, rail and road as bulk products and by marine and road in drums.

MPG USP and DPG LO need specific attention regarding product quality and purity. Dedicated equipment and specific cleaning procedures as well as stringent controls throughout the whole supply chain are necessary.

MPG and DPG are hygroscopic products and require storage equipped with drying devices to protect the product from humidity. Nitrogen blanketing compatible to USP requirements is the preferred means of keeping the product dry and ensuring its shelf life. Storage temperature should not exceed 40°C/104°F. In cold climates tank heating devices and insulation have to be installed.

Risk Characterization Summary

Risks associated with exposure to these products have been evaluated for the following "chain-of-commerce" activities: manufacture, storage, product transfer, transportation, and customers/markets. They are manufactured, stored and transported to customers in closed systems. Depending on the customer, end uses may vary from use as an intermediate for the manufacture of other chemicals, commercial products, or certain formulated consumer products. Proper equipment design and handling procedures maintain low risk from exposure to the product where the product is used as a chemical intermediate. Exposures may be higher in commercial and consumer applications. To minimize risk, additional controls, such as, special handling procedures and protective packaging, are implemented.

This product stewardship summary is intended to give general information about the chemical or categories of chemicals addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the chemical's applicable Material Safety Data Sheet, which should be consulted before use of the chemical. This product stewardship summary does not supplant or replace required regulatory and/or legal communication documents.