Monopropylene Glycol (MPG) Product Stewardship Summary

(CAS number 57-55-6)

Chemical Formula for Monopropylene Glycol (MPG)

$C_3H_8O_2$

What is Monopropylene Glycol (MPG)?

Monopropylene Glycol (MPG) 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 Dipropylene Glycol (DPG) and the second step is the distillation and purification of the mixture into its two separate components (MPG and DPG) with MPG being the main component. Shell Chemical companies supply MPG in two different qualities: the industrial grade and the Unites States Pharmacopoeia (USP) grade, which is produced applying Good Manufacturing Practices (GMP) as described for pharmaceutical excipients.

MPG is a colourless, viscous and 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.

How is Monopropylene Glycol (MPG) Used?

The most important end use of MPG industrial grade 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; airplane de-icers/anti-icers; antifreeze and industrial coolants; detergents; hydraulic fluids.

Monopropylene glycol USP grade is used in food, beverage and animal feed, in pharmaceuticals as an excipient (inactive ingredient or carrier in a pharmaceutical product), in cosmetics and personal care products. The application of MPG USP for direct injections into the blood system is not allowed. Likewise, it is not for use in cat food because of a species-specific effect on blood cells of cats. Use of MPG USP in tobacco applications and electronic cigarettes is not supported.

For both MPG industrial and MPG USP grades, the use in theatrical fogs and artificial smoke generation is also not supported.

Health, Safety and Environmental Considerations

MPG has low acute toxicity by oral, dermal or inhalation routes. It is non-irritating to skin and eyes from animal studies. Some mild irritation effects were observed with human volunteers, but will not trigger classification. There is low concern for skin sensitisation and there are no reports of respiratory sensitisation although there is extensive exposure to this substance given the wide spectrum of

professional and consumer uses. MPG is not considered to be carcinogenic or genotoxic, nor does it have effects on fertility or reproduction.

The US Food and Drug Administration designates MPG as GRAS, 'generally regarded as safe'. As such, MPG made to Food and Drug Administration (FDA) standards may be used in food, food packaging, pharmaceuticals and cosmetics. In the European Union (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. More information about the regulatory status in the EU is available through the Propylene Glycol webpage.

MPG is readily biodegradable, does not bio-accumulate and is of very low toxicity to aquatic organisms.

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

Storing and Transporting Monopropylene Glycol (MPG)

MPG is transported by tank truck and vessel as bulk and packaged (drums, intermediate bulk containers (IBC) products.

The MPG USP grade needs specific attention regarding product quality and purity. Therefore, dedicated equipment and specific cleaning procedures as well as stringent controls throughout the whole supply chain are necessary.

MPG is hygroscopic and requires 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 104°F /40°C and the product should not be stored in direct sunlight. In cold climates, tank heating devices and insulation must 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 where used as an 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.

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