

Propylene Glycol is Safer

In contrast to ethylene glycol, a potent cause of acute toxicity in humans, propylene glycol is a “generally recognized as safe” (GRAS) additive for foods and medications.

It is widely used in food and tobacco products, pharmaceuticals, and cosmetics (the main ingredient in deodorant sticks).

In certain medicines, cosmetics, and food products, propylene glycol acts as

- a humectant food additive, labeled as E number E1520
- an emulsifying agent in Angostura and orange bitters
- industrial drying agent,
- surfactant, and
- solvent.

Propylene glycol is sometimes used as a de-icing agent; however, ethylene glycol is used more often because it costs less, even though it is a poison. Propylene Glycol has been the safe alternative for vehicle antifreeze coolant in the USA and France for many years. In the UK only ethylene glycol antifreeze coolant was available for retail in January 2010. Switzerland banned the sale of products containing ethylene glycol in 1972.

The industrial norm is to replace ethylene glycol with propylene glycol when safer properties are desired.

Biological Fate

Propylene glycol is metabolized in the liver by alcohol dehydrogenase to

- lactic acid, and then
- pyruvic acid

Both of these metabolites are normal constituents of the citric acid cycle and are further metabolized to carbon dioxide and water

About 45% of an absorbed propylene glycol dose is excreted by the kidneys unchanged or as the glucuronide conjugate.

Key Points

- Propylene glycol is used in various foods, cosmetics, and pharmaceutical products.
- Propylene glycol is metabolized to compounds that are normal constituents of the citric acid cycle.
- Unlike ethylene glycol, propylene glycol does not produce nephrotoxicity in humans caused by calcium oxalate in humans.
- Unlike ethylene glycol, propylene glycol is not metabolized to oxalic acid, so calcium oxalate is not deposited in the kidneys
- Propylene glycol (PG) is traditionally produced from petroleum-derived propylene oxide. However, Archer Daniels Midland Company has a proprietary glycols technology that uses a catalytic process known as hydrogenolysis to convert glycerin and sorbitol into propylene glycol. The process includes reacting glycerin and hydrogen in the presence of a catalyst under conditions of high temperature and pressure. The products resulting from this process include propylene glycol and water. So we now have a sustainable propylene glycol.