Shell Chemicals

PROPYLENE Product Stewardship Summary

CAS number

115-07-1

Chemical formula

C3H6

What is propylene?

Propylene - also known as propene - is one of the major building blocks of the petrochemical industry. Propylene is typically obtained via two main routes: either as a co-product of the refinery catalytic cracking process used to make gasoline (resultant product known as refinery grade propylene) or as a co-product of the steam cracking process used to make ethylene (known as chemical grade propylene). There are also a number of technologies for making propylene directly from other feedstocks. The most common of these on-purpose process routes are propane dehydrogenation and metathesis.

How is propylene used?

The materials that are derived from propylene include: polypropylene; acrylonitrile (which is converted to acrylic fibres and coatings); propylene oxide (which then goes into polyurethane resins and other chemicals); oxo alcohols (which are used in PVC plasticisers and coatings); cumene (which is ultimately used to make epoxy resins and polycarbonate); and isopropyl alcohol (which is used as a solvent).

As a result, propylene is a key component of countless end use products. Examples include automobile headlights, taillights, disk brake pads and bumpers; carpets; CDs and optical disks; clear film food wrap; eyeglasses; flexible foams used in bedding and furniture; rigid foam insulation; impact-resistant and bullet-proof windows; moulded plastic goods such as buckets, food containers, kitchen utensils and wastebaskets; nitrile rubber hoses, seals and gaskets; paints and protective coatings; grocery bags; synthetic fibres for blankets, sweaters, socks and fleeces; watercooler bottles; and wood products such as plywood, oriented strandboard and laminates.

Health, Safety and Environmental considerations

At room temperature, propylene is a volatile, colourless, extremely flammable gas that has a faint, sweet odour. It is a liquid under pressure. Odour threshold values of 10-50 mg/m3 (detection) and about 100 mg/m3 (recognition) have been reported.

Propylene is currently classified as a simple asphyxiant by the American Conference of Governmental Industrial Hygienists (ACGIH): this indicates that a primary hazard is the displacement of oxygen resulting in an oxygen-deficient atmosphere.

Propylene has low toxicity after prolonged exposure by inhalation. In rats, the no effect level is 345 mg/m3 over two years. There is no evidence from the production and handling of propylene over many years that it is hazardous to human health. Eye or skin contact with liquefied propylene that is rapidly expanding may cause irritation and burns (frostbite) due to the cooling effect resulting from the evaporation of the material. Propylene is classified as a Group 3 product by the International Agency for Research on Cancer (IARC) and as A4 by the ACGIH, which means it is not classifiable as a carcinogen. The primary hazard concern, if there is a spill or leak near the general public, is a fire and/or explosion based on the extremely flammable characteristics of propylene.

In the aquatic environment, propylene will evaporate rapidly, followed by rapid atmospheric oxidation.

Storage and Transport

Shell chemicals companies ship propylene via barge/ship and pipeline, with limited rail and truck options. Most products are delivered directly to the customer. Propylene may be stored in storage tanks or underground salt wells (domes).

Risk Characterization Summary

Risks associated with exposure to this product have been evaluated for the following "chain-of-commerce" activities: manufacture, storage, product transfer, transportation, and customers/markets. Due to health, safety and environmental considerations, it is only manufactured, stored and transported to customers in closed systems. Likewise, customers are limited to those who only use the product in closed systems as an intermediate for the manufacture of other chemicals. Proper equipment design and handling procedures maintain low risk from exposure to the product where the product is used as a chemical intermediate..

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.