

Mixed C4s Product Stewardship Summary

(CAS numbers: 68955-28-2, 92045-23-3)

What are Mixed C4s?

Mixed C4s, also known as Crude C4, Raffinate 1 or Raffinate 2, are colourless gases (liquid under pressure), with a mild, petroleum-like odour. Raffinate 1 is the product remaining when butadiene is extracted from a lower olefin stream (known as crude C4). Raffinate 1 is a mixture of butenes (iso-butenes and n-butenes) with butane and residual butadiene. Raffinate 2 is produced from Raffinate 1 after iso-butenes have been extracted. It consists of a mixture of n-butenes, butane and potentially some residual butadiene.

How are Mixed C4s Used?

Crude C4, the C4 fraction of steam cracking, is used to extract butadiene.

Raffinate 1 is a chemical building block used in the manufacture of methyl tertiary butyl ether (MTBE) and diisobutylene (DIB). MTBE is a liquid added to petroleum to reduce emissions, and DIB is an intermediate in the production of alcohols and solvents.

Raffinate 2 is a chemical building block used in the manufacture of secondary butyl alcohol (SBA) and methyl ethyl ketone (MEK). SBA is an intermediate in the production of industrial cleaning compounds, oil treating chemicals and paint removers, and MEK is an intermediate in the production of surface coatings, adhesives, thinners, printing inks and cleaning agents.

Health, Safety and Environmental Considerations

Direct contact with liquid mixed C4s may cause skin burns (frostbite). Inhalation of high vapour concentrations may cause central nervous system depression resulting in dizziness, headache, nausea and loss of co-ordination. Continued inhalation can be fatal.

Long-term health effects depend on the residual 1,3-butadiene content of the mixed butene gas. 1,3-butadiene classification applies to mixed butenes when residual 1,3-butadiene content exceeds 0.1 %. Most relevant international agencies regard butadiene as a human carcinogen.

In the work environment, the Occupational Exposure Limit (OEL) for butadiene globally ranges from 1 - 2 ppm 8-hour Time Weighted Average (TWA). A Short-term Exposure Level (STEL) of 5 ppm has been set by Occupational Safety and Health Administration (OSHA) and a few other countries.

Mixed C4s are harmful to aquatic organisms and do not biodegrade easily. They have a low potential to bioaccumulate. However, in view of the high tendency to evaporate from water, mixed butenes are not expected to pose a significant hazard to aquatic life.

Mixed C4s gas is extremely flammable and volatile. It presents a significant fire and explosion hazard.

Storing and Transporting Mixed C4s

Mixed C4s gases are transported by pipeline, tank truck, rail car and vessel.

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. It is 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 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.

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 [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.



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