

POLLUTION CONTROL & SAFETY:

Environmental protection:

Ecologically glycerol presents no special problems. Discussion of environmental protection is limited to those industrial processes based on fats and oils and on epichlorohydrin because only these processes are concerned with environmental pollution problems.

A) Production from fats and oils:

Production plants:

No special protective measures are necessary for the work of natural crude glycerol with the technology followed.

Gaseous emissions:

Certain measures are necessary to prevent atmospheric pollution by odours during storage and purification of native crude glycerol. Exhaust vapor from the respective tanks and process units should be drawn off and treated.

Residues:

The residues of higher glycerol oligomers and inorganic salts remaining from evaporation and distillation are water-soluble and must be treated further or disposed off properly.

B) Production from epichlorohydrin:

Extensive protective measures must be taken to allow proper manipulation of epichlorohydrin because of the hazardous properties of this material

Production plants:

Production plants must be explosion proof to prevent ignition of epichlorohydrin. Manipulation of epichlorohydrin exclusively in a closed system guarantees protection of personnel.

Gaseous emission:

Epichlorohydrin and accompanying organic materials in exhaust gases from the hydrolysis of epichlorohydrin can be removed, e.g. by adsorption on activated carbon.

Waste water:

Contaminated with epichlorohydrin can be treated with, thereby converting the epichlorohydrin to glycerol. Regulations exist in several countries concerning exhaust gas and waste water purification's well as measures for the protection of plant personnel.

Residues:

Residues from evaporation and distillations column should be treated.

The process chosen requires no special protection measures as no harmful by products are produced in the process, on the other hand, acetone, a by product of both hydrogen peroxide and allyl alcohol production is formed in fairly large quantities.

Environmentally important properties of glycerol:

Gaseous emission:

No problems are encountered with gaseous emission because of the low vapor pressure of glycerol and lack of odour of the pure material.

Waste water:

Glycerol poses no problem for waste water because it is completely biodegradable in sewage treatment plants, glycerol is not regarded as a danger to water supply in some countries, however its presence in wastewater is liable to payment of duty because of its high oxygen demand: COD=127 mg of O₂ per gram: BOD = 780 mg of O₂ per gram.

Storage and transportation:

Storage:

Glycerol is stable when stored below 100°C: it is non corrosive and presents little risk of ignition because of its high flash point. Anhydrous glycerol does not corrode steel, but storage tank of carbon steel must be protected by surface coating to prevent rusting by residual moisture. Glycerol is therefore stored in tanks of stainless steel or aluminum.

Transportation:

Glycerol is shipped in tank trucks, containers and drums. The tank trucks and containers are usually made of stainless steel, galvanized or resin coated steel is used for drums: for small drums, plastic is also employed.

Toxicology and occupational health:

Glycerol is not harmful to health. Ingestion even of large amounts causes no harm to humans.

The use of glycerol as a food additive is permitted in most countries in particular those of the EEC and in the United States. Slight irritation of the skin or mucous is possible on contact with undiluted glycerol because the strongly hygroscopic glycerol draws water from the skin.

