

ENVIRONMENTAL POLLUTION AND SAFETY

STORAGE AND TRANSPORTATION:

Alkanolamines should be stored in stainless steel containers with exclusion of air (O₂, CO₂) and moisture, preferably under dry nitrogen. Storage temperature should not exceed 50°C. Steel tanks may be used if absorption of iron (up-to 10ppm) is not important. Ethanolamines turn yellow on prolonged storage, especially in presence of oxygen.

Depending on the quantity requirements and sensitivity of the products, steel, stainless steel, or polyethylene containers can be used for transportation. The container must air tight closures to prevent absorption of water and carbon dioxide. Zinc and other non ferrous metals are attacked by ethanolamines. Rubber gloves and safety goggles must be worn when handling ethanolamines and other alkanolamines also.

HEALTH AND SAFETY FACTORS

TOXICITY:

Monoethanolamine: Prominent among the toxic effects of ethanolamines is irritating effect on skin and mucous membranes. Based on toxicity testing on rats and rabbits it is found that, rats survive 8-h inhalation of saturated vapor at 20°C without any symptoms. Above 100ppm exposure to the ethylene oxide vapor is harmful to human beings.

Ethylene oxide is a reactant used for production of Monoethanolamine. Ethylene oxide is a relatively toxic liquid and gas. Liquid causes eye injuries and the gas may cause eye irritation. Ethylene oxide is a gas used primarily as a chemical intermediate in the production of ethanolamines and other chemicals. A small percentage is also used as a fumigant for sterilizing medical and dental equipment, and foods, such as spices and nuts. It is well established that ethylene oxide can induce cancer, along with genetic, reproductive, developmental, and acute health effects.

ENVIRONMENTAL PROTECTION:

Ammonia or amine containing off gases from ethanolamines production are either burned or purified by acid scrubbing. Wastewater from plant cleaning and acid scrubbing is treated in a sewage plant. When fed to biological treatment plant, appropriate bacteria readily degrade ethanolamines. Spilled material must be removed with an absorptive material such as urea resin foam or peat dust, which is then incinerated.

EXPLOSIBILITY AND FIRE SAFETY:

. Pure ethylene oxide explodes in the presence of common igniters. Hence in order to avoid the possibility of explosive decomposition of ethylene oxide in the reactor, in which the reaction of ethylene oxide occurs with ammonia to produce ethanolamines, it should be diluted with ammonia solution. Explosive decomposition is more dangerous in case of liquids because of the greater concentration of potential energy.