

## **HEALTH AND SAFETY<sup>1</sup>**

Styrene is mildly toxic and inflammable, and it can polymerize violently under specific conditions. However, none of the hazard associate with styrene is severe, and it is considered a relatively safe organic chemical when handled according to appropriate safe guards.

Styrene has an odor threshold of .05-.15 ppmv. Both liquid and vapor irritate the eye and respiratory system, and high vapor concentration results in depression of central nervous system.

Irritation of eye and respiratory tract occurs at 400-500 ppmv, but does not result in permanent injury. Test animals for one hr serious systematic effects can tolerate concentration up to 2500 ppmv. Exposure for 30-40 min to a conc. of 10000 ppmv may be fatal.

Styrene is low in oral toxicity. Contact with eyes is painful, but results in transient damage. Short term contact with skin, do not cause irritation; however prolonged contact may cause swelling, blistering. However, styrene as it is commonly store and transported contains TBC, which is skin sensitizer. Styrene monomer is flammable and can form explosive mixture with air at atmospheric ambient condition. It is generally suggested to store & handle styrene below or at atmospheric temp.

Polymerization of styrene is an exothermic reaction and proceeds slowly at room temperature. Thus, there is potential for a runaway polymerization reaction, which may results in an accelerating evolution of styrene vapor that may cause fire or rupture in the confining vessel. The polymerization reaction is generally been prevented by adding TBC inhibitor.

Effective inhibition of polymerization by TBC occurs in presence of dissolved oxygen, and so storage in an atmosphere-permeable tank is preferred, where inert gas blanketing of the stored material is to be done. Periodic air addition is recommended to maintain the presence of dissolved oxygen.

For the areas, where, average temperature is over 27° C, additional refrigeration is required.

#### MEASURES:

- The efficiency of the, condenser should must be properly justified, so that there be minimum loss of styrene in the atmosphere.
- The reactor is generally made adiabatic, and the reaction is endothermic. The heat of reaction is generally supplied by adding steam at 800° C. This steam is then condensed and separated as an aqueous solution, saturated with different organic chemical. To maintain the proper industrial economy, this condensate must be treated and recycled back at maximum possible limit.
- The heavy end from the final column, contain styrene polymers and some styrene derivatives, which have good economical values. However, disposal of this heavy end causes problem. So by adopting proper separation method it is desired to separate those components of high economical values.
- In order to prevent the chance polymerization, final treatments are generally carried out under reduced temperature and low pressure.