

INTRODUCTION¹

Styrene (phenyl ethylene, vinyl benzene, styrol, cinnamene) $C_6H_5CH=CH_2$, is the common name for the simplest and by far the most important member of a series of unsaturated aromatic monomers. Styrene is used extensively for the manufacture of plastics, including crystalline polystyrene, rubber modified impact polystyrene, acrylonitrile-butadiene-styrene terpolymer (ABS).

Commercial manufacture of the monomer began on a small scale before World War II. Since that time, production of the monomer in the United States has grown enormously, reaching 1.95×10^6 metric tons annually in 1970 and 3.2×10^6 t/yr. in 1980. Several factors have contributed to this increase listed below:

1. boiling point $145^\circ C$, is a liquid that can be handled safely,
2. the activation of the vinyl group by the benzene ring make styrene to polymerize and copolymerize under a variety conditions,
3. Polystyrene is one of the easiest thermoplastic materials to mould and extract and it can be used for a large variety of application.

Styrene was 1st isolated in the the 19th century from distillation of storax (a natural balsam). Although styrene was known to polymerize, no commercial application were attempted for many yrs because the polymers was brittle and cracked easily. The simultaneous development of a process for the manufacture of styrene the dehydrogenation of ethyl benzene by Dow Chemical and company and BASF represented the 1st real breakthrough in styrene technology. In 1937, both these companies were manufacturing a high purity monomer, which could be polymerized to a stable, clear, colorless plastic. During World War II, styrene become important in the manufacturing of synthetic rubber and large scale plants were built. Later, peacetime uses styrene based plastics, especially crystalline and high impact polystyrene, have accounted for its continuing rapid growth.