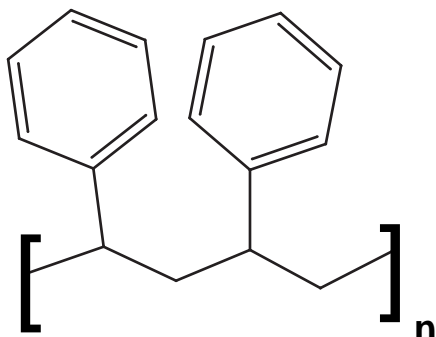
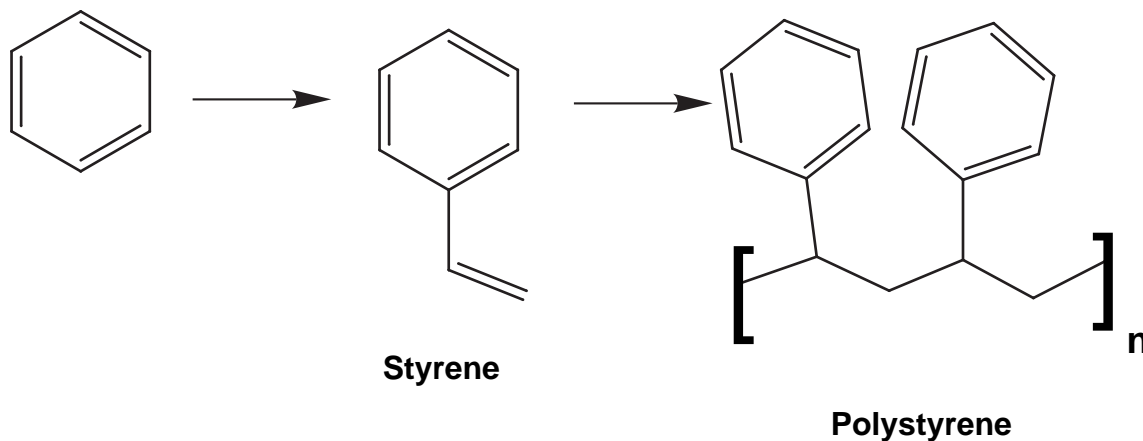


Molecule of the week: Polystyrene**Concepts: Friedel Crafts Acylation, Polymers**

Polystyrene is formed by the polymerization of styrene. The German Company BASF first manufactured polystyrene in the 1930s. Pure polystyrene, is a fairly rigid material that is the basic component of many plastic products such as model kits, plastic cutlery, disposable cups and other items. The rigidity comes from the intramolecular non-covalent interactions between the benzene groups that are attached to the polystyrene backbone. Polystyrene's most common form comes as an “expanded” polymer, a mixture of ca. 5% polystyrene and 95% air. This “Styrofoam”, a tradename of the Dow Corporation, is the lightweight material that we use as takeaway and throwaway coffee cups and food containers. The large voids filled with air make this Styrofoam material an excellent insulator, both for heat and sound. Your coffee stays hot and your juice stays cold! For this reason, polystyrene is also used as an insulation material in buildings.

Question: Propose a synthesis of polystyrene from benzene. Be sure to indicate all the reagents needed to make styrene from benzene and the conditions needed to make polystyrene from styrene. What are the mechanisms of the reactions that you propose?



How many kilos of polystyrene are made in the U.S. each year?