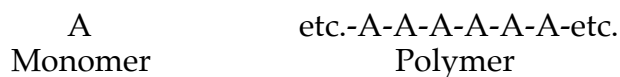


Reading Assignment: MTOL, Chapt 6, pp. 146-164, on FTIR. Also, consult the index of your organic textbook for information on polymerizations.

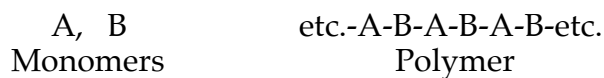
Introduction:

In this week's experiment you will prepare two types of polymers, addition and condensation and use IR to analyze the liquid monomers. IR could also be run on the polymers, if sufficient time were available for purification and film preparation.

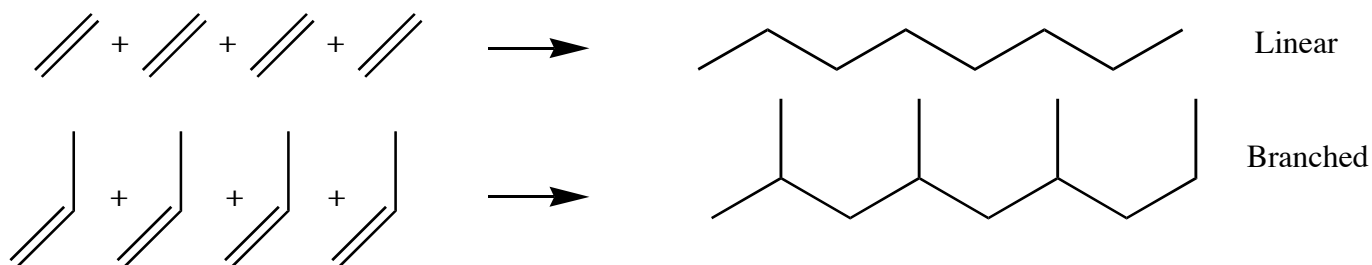
A polymer is a high molecular weight, chainlike molecule made up of many (1000 to 1 million) repeating low molecular weight molecular units. The polymer is formed by sequential addition of monomer molecules to one another. A polymer formed from identical repeating units is called a homopolymer.



Monomers that are different can also be linked to form a polymer with an alternating structure. This type of polymer is called a copolymer.



Mechanistically, there are two or more main types of polymers, distinguished by the type of reaction involved in chain formation. The first type, **Addition polymers**, are formed by a reaction in which monomer units simply add to one another to form a long chain (generally linear, sometimes branched) polymer. The monomers usually contain C=C double bonds (substituted alkenes). Examples of common synthetic addition polymers include polystyrene (Styrofoam), polytetrafluoroethylene (Teflon), polyethylene, polypropylene, polyacrylonitrile (Orlon, Acrilan, Creslan fibers), polyvinylchloride (PVC pipe), and polymethylmethacrylate (Lucite, Plexiglas). The polymerization process can be represented as follows:



A second type is **Condensation polymers** which are formed by the reaction of bifunctional or polyfunctional molecules, with the elimination of some small molecule (such as water, ammonia or hydrogen chloride) as a by-product. Familiar examples of synthetic condensation polymers include polyesters (Dacron, Mylar), polyamides (Nylon), polyurethanes and epoxy resins. Natural condensation polymers include polyamino acids (proteins), cellulose and starch. The polymerization process can be represented as follows:

