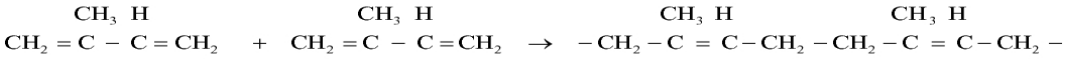
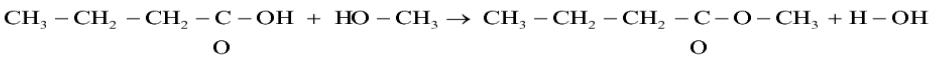
CHAPTER 5: THE STRUCTURE AND FUNCTION OF MACROMOLECULES

I. POLYMERS: large molecule made of many small subunits called monomers; a macromolecule is a large organic polymer
   A. Polymers and Molecular Diversity
      1. Unity: only 40 - 50 common monomers used to construct macromolecules
      2. Diversity: new properties emerge when monomers arranged differently
   B. Polymerization: formation of polymers (large numbers of carbon atoms held together by covalent bonds and linked in huge molecules of a few thousand to several million carbons)
      1. Addition polymerization: monomers with double or triple bonds add to similar units forming chains or cross-linked chains; the double bond breaks freeing the carbons to bond together



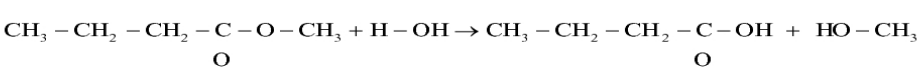
      2. Condensation polymerization: monomers condense together by eliminating or splitting out a small molecule such as water from between them
         a. Most polymerization reactions found in living organism are condensation reactions
         b. Removal of ONE water for EACH covalent linkage
         c. One monomer loses a hydroxyl and the other loses a hydrogen
         d. Requires energy and a catalyst
         e. Also called a dehydration reaction

acid + alcohol → ester + water



   C. Hydrolysis: add water to a molecule to split it and form smaller units
      1. Reverse of condensation
      2. Add hydroxyl to one monomer and hydrogen to the other

ester + water → acid + alcohol



II. CARBOHYDRATES: sugars and their polymers; condensation reaction; classified by number of simple sugars in molecule; -ose ending
   A. Monosaccharides: simple sugars with C, H, and O occur in ratio of CH_2O
      1. Major nutrients for cells
      2. Store energy in chemical bonds
      3. Carbon skeletons used as raw materials for other organic molecules
      4. Glucose is the most common
      5. Characteristics
         a. Hydroxyl group on each carbon EXCEPT ONE which has a carbonyl group
            1. Aldose: sugar with carbonyl group on end carbon - an aldehyde
            2. Ketose: sugar with carbonyl group on a middle carbon - a ketone
         b. Most common have 3 - 7 carbons