

Introducing Polymers

Synthetic Addition Polymers

Chapter 2.1 and 2.2

Many Monomers Make a Polymer

- A **polymer** is a very large, usually chain-like molecule that is built from small molecules



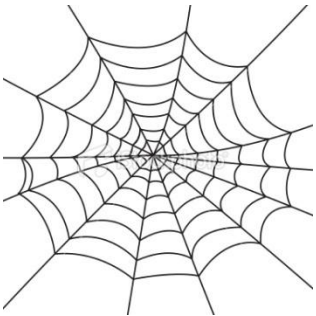
- A **monomer** is one of the small repeating molecular units that make up a polymer



- **Polymerization** is a chemical process by which monomers are joined to form polymers

Natural and Synthetic Polymers

- **Natural polymers** are made by living things
- Ex: silk, spider webs, hair, muscle, cotton, and wood

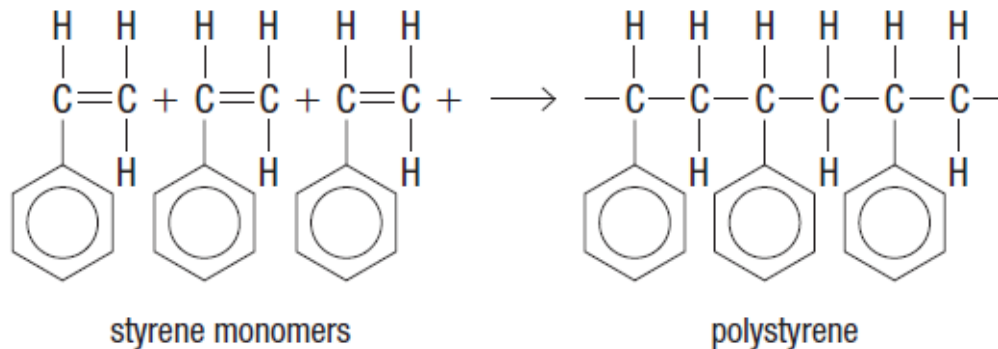
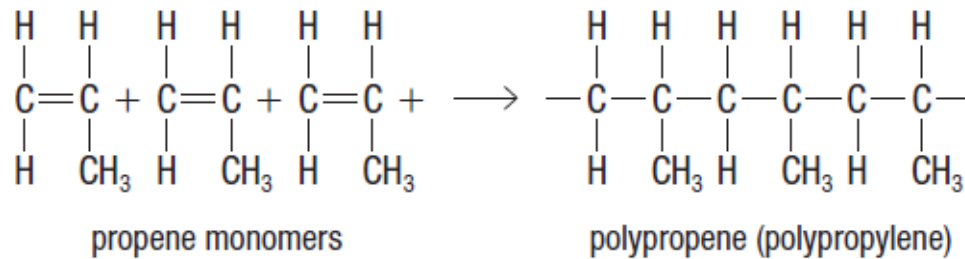


- **Synthetic polymers** are made in a lab
- Ex: plastics, polyester, polyethylene, polypropylene, Kevlar, Teflon, Lycra and Styrofoam



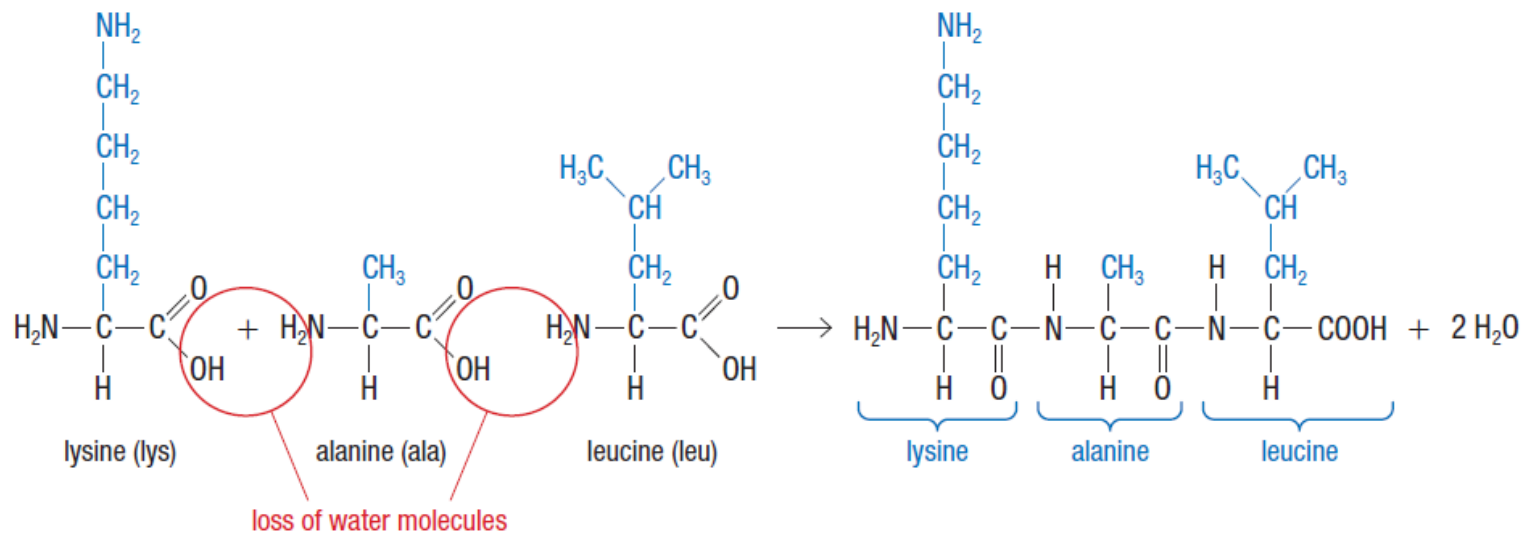
Homopolymers

- A **homopolymer** is a polymer formed by reactions involving a single type of monomer



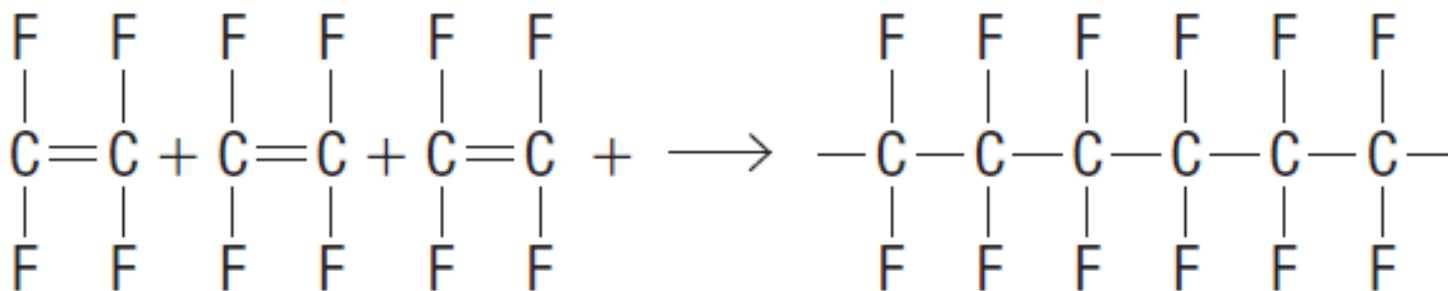
Copolymers

- A **copolymer** is a polymer that is made up of two or more different types of monomers combined



Synthetic Addition Polymers

- An **addition polymer** is a very long organic molecule formed as the result of *addition reactions* between monomers with *unsaturated* carbon-carbon bonds

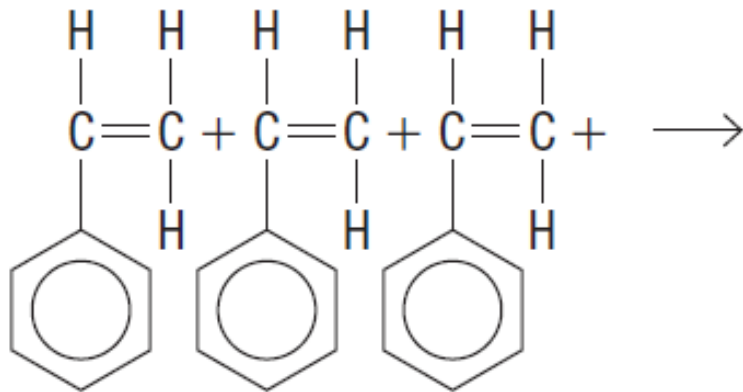


tetrafluoroethene

polytetrafluoroethene

Practice

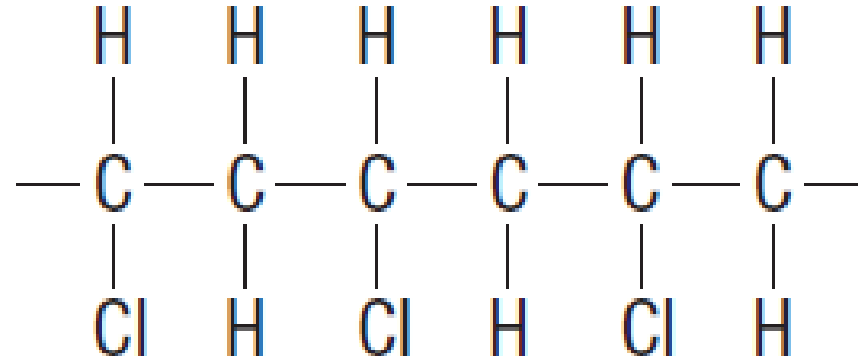
- Draw the polymer that is formed from the addition polymerization of styrene monomers



styrene monomers

Practice

- Draw a structural diagram of the monomer that is used to make polyvinyl chloride (PVC)

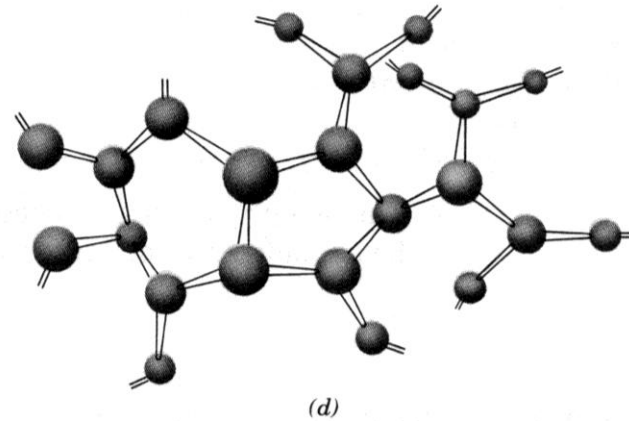
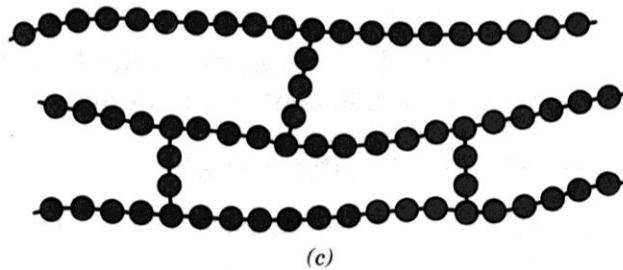
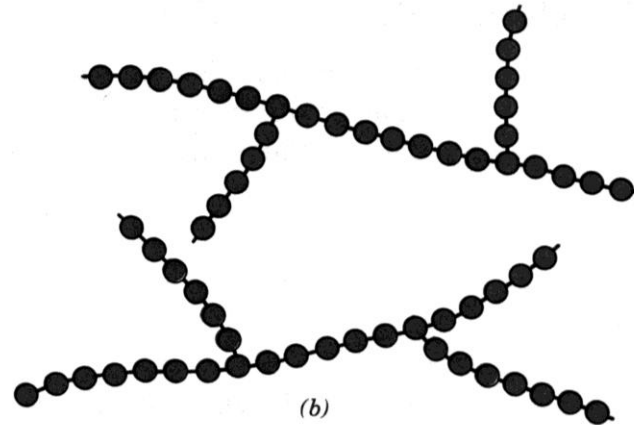
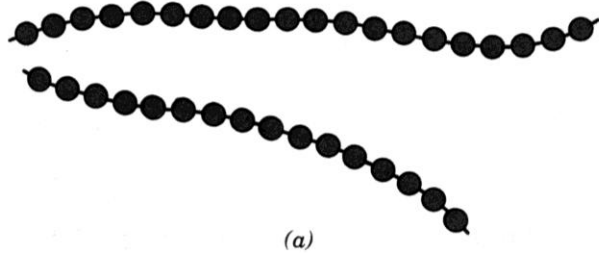


polyvinyl chloride (PVC)

Plastics

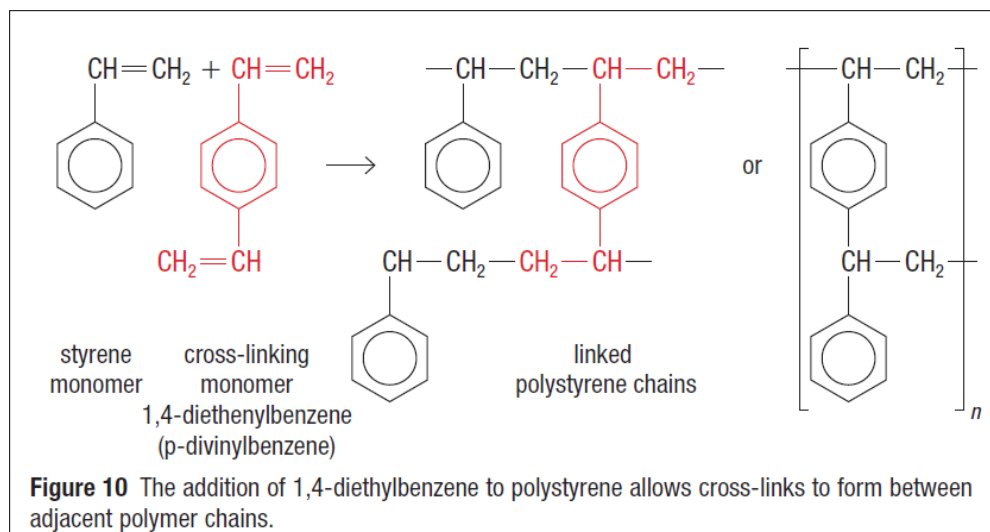
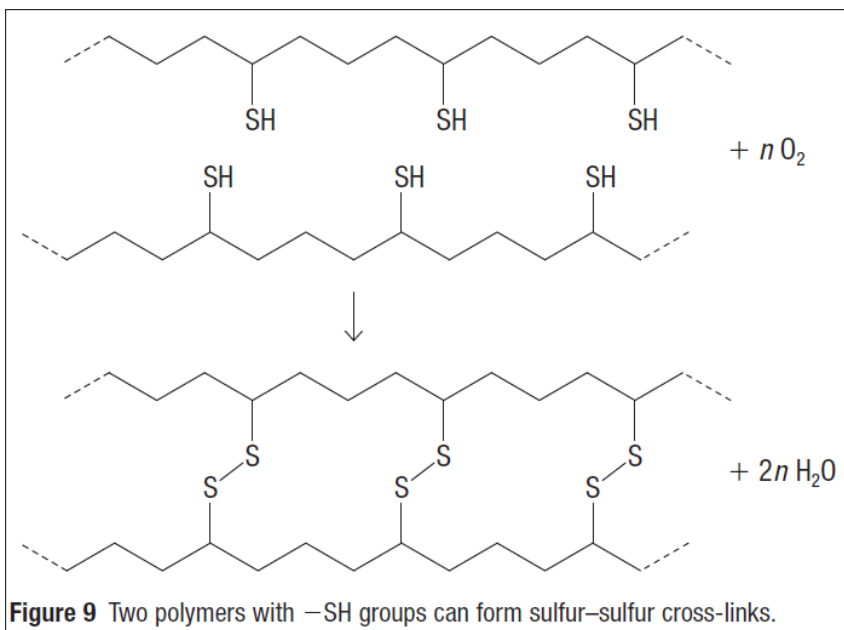
- A **plastic** is a synthetic polymer that can be moulded (often under heat and pressure) and that then retains its given shape
- Think about the properties of different types of plastics that make them useful
- Now think about the intermolecular forces and structural components that are responsible for those properties

Polymer Cross-Linking

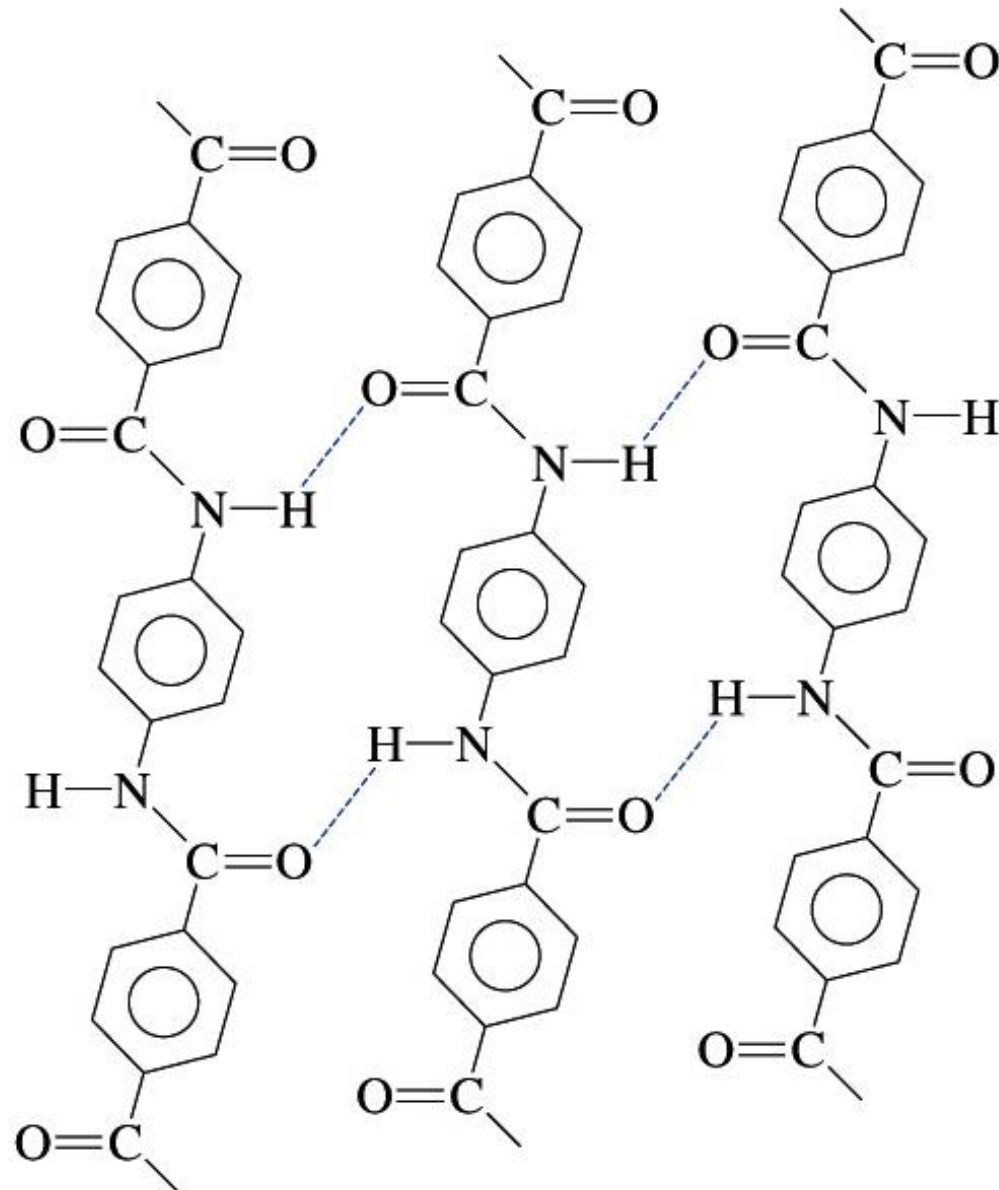


Polymer Cross-Linking

- Cross-Linking is when chemical bonds form between separate polymer strands



Cross-Linking in Kevlar



Cross-Linking Affects Properties

- Flexibility
- Heat Tolerance
- Elasticity

HOMework

Required Reading:

p. 78-93

(remember to supplement your notes!)

Questions:

p. 83 #1-6

p. 87 #1-3

p. 93 #1-5, 8



"OH, YEAH! I'VE FORGOTTEN MORE ABOUT ANIONIC POLYMERIZATION IN MOLECULAR ADSORBATES AT INTERFACES THROUGH ION CHROMATOGRAPHY THERMAL ANALYSIS AND UV SPECTROPHOTOMETRY FOR FORMULATION OF PROCESS DEVELOPMENT THAN YOU'LL EVER KNOW."