

Polymers

A polymer is a molecule that is made up of repeating subunits called a monomer. Ex plastic, starch, DNA)

1. Addition Polymers

Created using alkene monomers attached by addition reactions.

Ex Polypropene (polypropylene)

Properties of Addition Polymers

Because polymer molecules are really long, they are held together by a large number of intermolecular forces, making them strong and flexible.

Monomers can have more than one double bond, so they can make cross-links between fibers. This provides more rigid structures.

Because all of the bonds become single (saturated) during polymerization, plastics are chemically unreactive.

2. Condensation Polymers

Remember the following two reactions:

Carboxylic acid + alcohol \rightarrow ester

Carboxylic acid + amine \rightarrow amide

If we use a monomer with a carboxyl and hydroxyl group at opposite ends we make polyesters:

If we use a monomer with a carboxyl and amine group at opposite ends, we make polyamides:

Properties of Condensation Polymers

Polyamide chains can hydrogen bond with the N-H and C=O bonds, making them really strong.

Ex. Nylon and Kevlar