Background Info
Content

Polymer Activity from the: [redacted]

What Is A Polymer?

Grades: 6-8 and 9-12

Science Standards: Content Standard B: Physical Science; Content Standard E: Science and Technology

Background:

The most simple definition of a polymer is something made of many units. The units or monomers are small molecules that usually contain ten or less atoms in a row. Carbon and hydrogen are the most common atoms in monomers, but oxygen, nitrogen, chlorine, fluorine, silicon and sulfur may also be present. Think of a polymer as a chain in which the monomers are linked (polymerized) together to make a chain with at least 1000 atoms in a row. It is this feature of large size that gives polymers their special properties. Polymerization can be demonstrated by linking countless strips of construction paper together to make paper garlands or hooking together hundreds of paper clips or gum wrappers together to form extended chains.

Macromolecules or polymers are found in the human body, animals, plants, minerals and manufactured products. Substances like the following contain polymers: diamond, concrete, quartz, glass, nylon, plastics, DNA, tires, cotton, hair, bread, and paint. The macromolecule can have different end units, branches in the chain, variations in the sequence of the monomers, and different monomers repeated in the same chain which leads to the large number of manufactured polymers as well as all of the natural polymers. The table below shows just a few manufactured polymers that are made from the monomer on the right. The double bond in the monomer is broken or water (or some other molecule that can be boiled off) is eliminated in the polymerization process.

Polymer	Repeating Units	Monomer
Polyethylene	—CH_2—CH_2—	CH_2=CH_2
Poly(vinyl chloride)	—CH_2—CH(Cl)—	CH_2=CH(Cl)
Polypropylene	—CH_2—CH(CH_3)—	CH_2=CH(CH_3)
Polystyrene	—CH_2—CH(C$_6$H$_5$)—	CH_2=CH(C$_6$H$_5$)