

Experiment 7

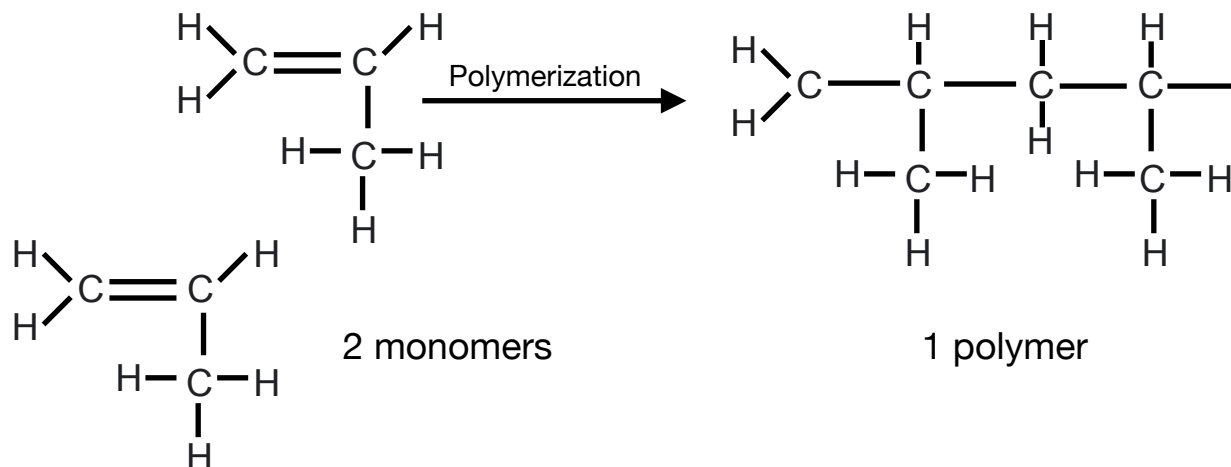
Natural Resources and Synthetic Materials

Things To Know:

Natural resources are materials from the Earth that are used to support life and meet people's needs. Any natural substance that humans use can be considered a natural resource. Petroleum, metals, stone, and sand are natural resources. Propylene, also called propene, is obtained from petroleum and is a natural resource. Propylene is a colorless, flammable, gaseous molecule, C_3H_6 .

Synthetic materials are made by humans by chemical processes. The atom models in the Introduction to Chemistry Model Set are made of a synthetic material called polypropylene. Polypropylene is one of the most commonly used plastics in the world. Polypropylene was first polymerized in 1951 by a pair of Phillips petroleum scientists named Paul Hogan and Robert Banks. During polymerization, small molecules, called monomers, combine chemically to produce a very large chainlike molecule, called a polymer.

Figure 16: Polymerization of Propylene to Produce Polypropylene



The molecular-level structure is important in the functioning of polypropylene. The backbone of carbon atoms make polypropylene and Mega Molecules atom models tough, flexible, and light weight.

Polypropylene can be heated to its melting point of 130 °C, cooled, and reheated again which allows it to be easily injection molded. Polypropylene is an important material because it is abundant and recyclable. Recycling has the potential to reduce the environmental impacts from waste plastics, mitigate climate change, and contribute to the economy.

What To Do:

1. Use Figure 16 to build 2 or more monomers. Use two 51 mm gray bonds to construct the double bond between carbon atoms. Use a black (40 mm) bond as the single bond between carbon atoms. Add hydrogen atoms to the molecule using short (25 mm) gray bonds.
2. Simulate polymerization by replacing the double bonds with black bonds and connecting the two monomers.
3. The polymer may continue to grow in length as monomers are added to the chain.

Discussion Questions for Experiment 7

1. What are natural resources?
2. What are synthetic materials?
3. How are plastics formed?
4. What is polymerization?
5. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.
6. Why is it important for plastics to be recycled?

Challenge

Research solutions for reducing the impacts of human activities on the environment and biodiversity.