

POLYMERS

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Polymers are organic compounds that have molecules made of long chains of smaller molecules. The molecules of some polymers are made of thousands of smaller molecules linked together. Many polymers are made from only one repeating unit, or monomer. Starches, for example, are made of repeating glucose units, which are the monomers. Proteins are polymers made of amino-acid units linked together. Polyesters and rubber may have thousands of monomers. Nylon and most plastics are also examples of polymers. A plastic is a material that can be molded while soft, and then hardened by heat, cooling, or exposing to air. A lot of people think of a plastic as a synthetic material. Some natural plastics, however, do exist. Most synthetic plastics are polymers. The shoes ball players wear have cleats made from a synthetic plastic. It is called polyethylene. The latter is a polymer made up of about forty thousand monomers of ethylene. The prefix “poly”, meaning “many”, is part of the names of synthetic plastics to indicate the many monomers that make them up. Wood and cotton contain a natural polymer called cellulose. It is a polymer made up of many molecules of glucose. Like starch, cellulose is a carbohydrate. But unlike starch, it is woody and tough. If cellulose is treated with acetic acid, a plastic called cellulose acetate is made. Cellophane is made from sheets of cellulose acetate. And if this material is forced through tiny holes, it forms threads. Rayon, a popular fabric, is made by twisting these threads together.

For example, can we imagine a car propelled by “muscles” made of polymers? Some scientists can. They know that the structure of some proteins resemble coiled springs. Slight chemical changes can cause these proteins to coil and uncoil. These scientists believe that a similar coiled spring made of polymers can be used as a muscle. By placing these muscles in an electrolyte solution that keeps changing, they can make the muscles contract and relax like living muscle. This contracting and relaxing would provide a moving force that would propel a car.