The Chemistry of Clothes

Biopolymers, Inc.
Teacher's Guide

Part 1 (60-90 minutes)

Prep: For Part 1, you will need an assortment of starches, a bottle of glycerine per group, and an assortment of additional optional ingredients that students can add to their biopolymers, such as sugar, glue, corn syrup, and vinegar. Each group of students will also need various teaspoons and tablespoons, one hot plate, safety goggles, beakers, stirring rods, petri dishes or aluminum foil for molds, and a set of Student Worksheets.

Starches, like potato starch and tapioca starch, can be found in the baking aisle at various grocery stores, and glycerine can often be found at drug stores located next to other skin moisturizing products.

Procedure:

1. Introduce students to **biopolymers**: *Plastic is durable and long-lasting, making it useful for packaging things like food, but not so good for the environment. Plastic in landfills can take hundreds of years to degrade, and plastic debris in the ocean is a threat to marine life. Traditional plastic is made from petroleum, but there is a movement now to make plastics from more renewable—and in some cases biodegradable—organic sources, like vegetable fats. These 'bioplastics,' or biopolymers, can come in various forms with various physical properties. Knowing what kind of biopolymer would work best for a particular use is a creative design challenge!*

2. Introduce students to their **Design Challenge**: *You have just started your own biopolymer company. The purpose of your company is to design and engineer plastic-like materials that are more environmentally-friendly than traditional petroleum-based plastics.*

3. Hand out the **Student Worksheet for Part 1** and go through the instructions and procedure. In Part 1, students will be testing out different biopolymer recipes to see what how different combinations of glycerine, starch, and other ingredients change the physical properties of the biopolymers. The ingredients they will be working with are not toxic or dangerous, but students should still follow proper lab safety procedures as they will be working with hot plates.

4. Biopolymers should cool completely before students analyze their final physical properties—this step will be done at the beginning of Part 2. Glycerine is highly water soluble, which makes clean-up after this activity fairly easy.

[The Chemistry of Clothes homepage]