

# Investigating Polymers

**Purpose:** The purpose of this lab is to determine the various properties of materials made of polymers. The properties of a polymer determines its use.

**Materials:** An assortment of polymers  
Bunsen burner and tongs  
Test tubes and test tube clamp  
Aluminum foil  
A variety of solvents

**Procedure:** Part I = Plastics

1. Each group should obtain a sample of one of the plastics labeled #1-6. Test how the polymer reacts with each of the following solvents by placing a piece of the polymer in a test tube and stirring. Note the condition of the polymer after 30 minutes.

Sample Number = \_\_\_\_\_

Water =

Ethanol =

Acetone =

Sulfuric acid, 3 M =

Sodium hydroxide =

Mineral oil =

Sodium chloride, 3 M =

2. Obtain a sample of each of the plastics # 1-7. Write a general description of each. Consider softness, color, transparency, texture, shine, color, flexibility, odor, etc.

#1 –

#2 –

#3 –

#4 –

#5 –

#6 –

#7 –

3. Determine the strength of each sample #1-7. Try tearing, breaking, stretching, bending, twisting, folding, etc. Record your observations:

#1 –  
#2 –  
#3 –  
#4 –  
#5 –  
#6 –  
#7 –

4. Place a piece of aluminum foil near a Bunsen burner. Hold a small piece of each sample, using a pair of tongs, in a Bunsen burner flame. Once the polymer begins to melt or burn, take it out of the flame and hold it over the aluminum foil. Record your observations:

#1 –  
#2 –  
#3 –  
#4 –  
#5 –  
#6 –  
#7 –

## Part II – Other Polymers

5. Obtain a sample of polymer A. Place the sample in a beaker with a small amount of warm water. Stir for a few minutes. Record your observations:
6. Obtain a 1 in. x 1 in. piece of polymer B. Weigh the sample and record its mass. Add water to the sample one drop at a time (quickly) until the polymer is saturated and will hold no more water. Weigh the sample again and record the mass.

7. Obtain a page from a newspaper and tear it from top to bottom. Describe the shape of the tear. Obtain another page of a newspaper and tear it from side to side. Describe how this tear is different from the one made from top to bottom. Suggest how the cellulose fibers must be arranged in the newspaper to account for the difference. Obtain a piece of polymer C. What is the special property observed?
  
8. Obtain a plastic bag from your instructor and fill it  $\frac{3}{4}$  full of water. Obtain a sharp pencil. While holding the filled plastic bag over a sink, use a swift, smooth action to jab the pencil through the bag so that the eraser end is sticking out one end of the bag and the tip is sticking out of the other. Try several more pencils in the same bag. Suggest an arrangement of the polyethylene polymers in the bag that explains this property of the bag.
  
9. Blow up a balloon and tie it off. Don't blow it up completely!! Obtain a bamboo skewer and cover it with a light coat of glycerin. Put a small amount of glycerin on the end of the balloon opposite to where it is tied off. Carefully push the bamboo skewer into the balloon using a twisting action until it comes out the other end. Suggest an arrangement of polymers in the balloon to account for the properties in the balloon.