

Lab #



# Playing with Polymers

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

## Background:

Many of the materials we use everyday, like starch, are made up of molecules called polymers. POLY means many and MER means unit. Because the units in chains are so long, they interfere with the ability of solids to flow.

In this lab activity, we will be creating three polymers - Oobleck, Goop, and Glurch. We will then compare the physical properties of the three substances.

## Materials:

|                     |                      |                             |
|---------------------|----------------------|-----------------------------|
| Measuring spoons    | 1 table salt         | 7 plastic cups              |
| Hand lens           | 75 g cornstarch      | 3 zipper-type sandwich bags |
| Safety goggles      | 30 mL water          | 1 m of wax paper            |
| 30 mL liquid starch | 30 mL white glue     | Ruler                       |
| 30 mL glue mixture  | 30 mL borax solution | Marker                      |

## Procedure:

1. At the materials distribution center, get 7 plastic cups. Label the plastic cups with the names starch, white school glue mixture, table salt, cornstarch, water, white school glue, and borax solution. Place a small sample of each material in its labeled plastic cup (see the necessary sample amounts in the materials list above). Be sure to wash and dry the measuring spoon with water and a clean paper towel after each use.
2. Observe the physical appearance of each sample of material. In the table below, record your observations of the physical properties of the starch, white glue mixture, table salt, cornstarch, water, white glue, and borax solution. Include descriptions of what you see, hear, and feel.

| Sample Material    | Observations |
|--------------------|--------------|
| Starch             |              |
| White glue mixture |              |
| Table Salt         |              |
| Cornstarch         |              |
| Water              |              |
| White Glue         |              |
| Borax Solution     |              |

3. Now you will observe how these materials interact with each other. Carefully follow the directions for each gunk recipe. Mix and test the Glurch recipe first. Then mix and test Oobleck, and finally mix and test Goop.

### **Glurch**

30 mL liquid starch  
30 mL glue mixture  
1 g table salt

Mix the starch and table salt together in the sandwich bag. Knead the bag for 2-3 minutes until the substances are well mixed. Then add the white glue mixture, again kneading the bag until the substances are well mixed. When a lump forms and it is hard to knead, take the lump out of the bag and squeeze out any excess liquid into a waste container.

### **Oobleck**

75 g cornstarch  
30 mL water

Add the water to the sandwich bag. Next, slowly add the cornstarch a little at a time to the water. Knead the bag to mix the substances together, making sure all of the cornstarch is wet. You may need to add a little more or less cornstarch so that the oobleck has a consistency light enough so it will flow through your fingers but solid enough to squeeze.

### **Goop**

30 mL white glue  
30 mL borax solution

Squeeze approximately 30 mL of white glue [not the glue mixture] into one corner of a zipper-type sandwich bag. Add 30 mL of borax solution. Seal the bag and then knead the contents until a new substance is formed. Make certain both substances are thoroughly mixed together.

4. Test each gunk recipe three times using the science methods listed below. Record your results in your data table.

#### **A. Roll Test**

Roll your gunk into a snake on the wax paper and see how long a skinny snake you can make before it breaks. Measure the length to the nearest centimeter.

**B. Pancake Test**

Press your gunk into a pancake on the wax paper. Make the largest pancake you can, but you must be able to lift it off of the wax paper without it breaking apart. Measure the diameter of your pancake to the nearest centimeter.

**C. Bounce Test**

Roll your gunk into a ball and drop it from the height of your desk. Measure the distance, to the nearest centimeter, that it bounces back up from the floor.

**D. Stretch Test**

Roll your gunk into a ball and then pull it apart to see how far you can stretch it before it breaks. Measure the distance of the stretch to the nearest centimeter.

**Oobleck Test Results**

|                              | <b>Test 1</b> | <b>Test 2</b> | <b>Test 3</b> | <b>Average</b> |
|------------------------------|---------------|---------------|---------------|----------------|
| Roll test<br>(nearest cm)    |               |               |               |                |
| Pancake test<br>(nearest cm) |               |               |               |                |
| Bounce test<br>(nearest cm)  |               |               |               |                |

### Goop Test Results

|                              | Test 1 | Test 2 | Test 3 | Average |
|------------------------------|--------|--------|--------|---------|
| Roll test<br>(nearest cm)    |        |        |        |         |
| Pancake test<br>(nearest cm) |        |        |        |         |
| Bounce test<br>(nearest cm)  |        |        |        |         |

### Glurch Test Results

|                              | Test 1 | Test 2 | Test 3 | Average |
|------------------------------|--------|--------|--------|---------|
| Roll test<br>(nearest cm)    |        |        |        |         |
| Pancake test<br>(nearest cm) |        |        |        |         |
| Bounce test<br>(nearest cm)  |        |        |        |         |

Questions:

1. Why do you test each recipe three times instead of just once?
2. On what test does Glurch do best?  
Oobleck?  
Goop?
3. How would you change the recipe for either Glurch, Oobleck, or Goop to make the results for one of the tests even better? Tell your teacher which substance (Glurch, Oobleck, or Goop) your group will modify. Record your new recipe below. Remember to change only one variable in your recipe. If you want to change more than one variable, make another recipe. Get the additional materials you need to test your recipe. Construct a table to report your test results.