

Goop to Go!

Polymers can be flexible, stretchy, and sometimes even bouncy. In this activity, you'll make 2 squishy polymers by mixing different liquids.

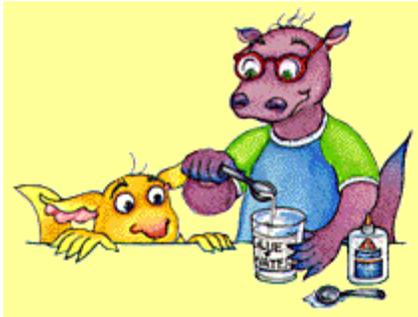
Materials:

- Elmer's glue
- Tide powdered laundry detergent
- Liquid starch (not aerosol can)
- Paper towels
- Measuring spoons
- Water
- Small plastic cups
- Straws or spoons for stirring

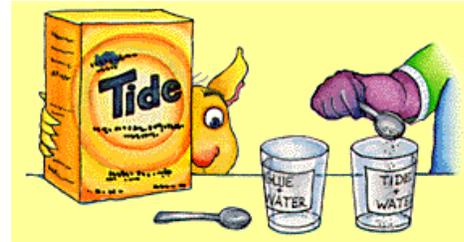
Procedures:

Polymer I

1. Place 1 teaspoon of Elmer's glue and 1 teaspoon of water into a small cup. Stir to mix.



2. Place 1 teaspoon of Tide powdered laundry detergent into a different small cup. Add 1 tablespoon of water. Stir to mix.



3. While stirring the glue-water solution with a straw, your partner should slowly add the Tide-water solution until a white glob forms in the cup. (This may take between half and all of the detergent solution.)



4. Remove the glob and place it between two paper towels. Press down gently to soak up some of the excess liquid. Pick up the glob and see what it feels like. Does it stretch, wiggle, or bounce? Can it be molded?



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Polymer II

1. Place 1 teaspoon of Elmer's glue into a small cup.
2. While stirring with a straw, your partner should slowly add liquid starch until a white glob forms in the cup. (This will probably take between 2 and 3 tablespoons of liquid starch.)
3. Remove the glob and place it on a paper towel. What do you notice about this polymer compared to the first one you made? Take it off the paper towel and move it between your hands.

Think about this ...

You can make a third polymer by adding Elmer's glue, Tide detergent, water, and liquid starch. See if you can come up with a combination that makes a polymer that has characteristics somewhere between Polymer I and Polymer II. Try making other polymers by changing the quantities of the ingredients. Which characteristics do you like?

Where's the Chemistry?

When you poured the laundry detergent into the glue solution, your blob of glue did not act like regular glue anymore. It became stretchier and was not as sticky. This change happened because of a change with the polymer in the glue.

The polymer in Elmer's glue is called polyvinyl acetate. Like many other polymers, polyvinyl acetate is arranged in the glue like many strands of thread. These strands of polyvinyl acetate slide past each other as the glue flows. A chemical in Tide is able to connect the strands together, so they can't slide as much. This new polymer will be soft or stiff depending on the amounts of glue, water, and laundry detergent you use. The glue with liquid starch polymer is similar. A chemical in the

starch solution binds the polyvinyl acetate molecules together. The way that these strands are connected by the other chemical gives each polymer its unique characteristics.



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The American Chemical Society develops materials for elementary school age children to spark their interest in science and teach developmentally appropriate chemistry concepts. The *Activities for Children* collection includes hands-on activities, articles, puzzles, and games on topics related to children's everyday experiences.

The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

Find more activities, articles, puzzles and games at www.acs.org/kids.

Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to www.acs.org/education and click on "Safety Guidelines".

