



## ► School Lessons with Pritt

These materials are part of the Researchers' World education initiative. The teaching concept and program were developed under the guidance of Prof. Dr. Katrin Sommer, Chair of Chemistry Didactics at Ruhr University Bochum, Germany, with the support of Henkel adhesive experts. The experiment is suitable for third or fourth grade students.

### ► Lesson 6: Starch paste containing soap as a structural strengthener

#### Materials needed

- Starch obtained by the students or commercial corn starch
- 1 bar of basic soap, with no fragrance, if possible
- 1-2 fire-resistant glass jars or cooking pans
- Hotplate, two-ring stove or oven
- 1-2 glass rods or spoons for stirring
- 1 thermometer
- Construction paper, thin cardboard or other strong paper for the test strips

#### Part 1: Starch paste containing soap

The students now attempt to make starch paste using different proportions of soap and discover that adding soap affects the properties of the mixture. For instance, adding 1 or 2 g ( $\frac{1}{4}$  or  $\frac{1}{2}$  teaspoon) of soap produces a sensory feel like a face cream, adding 3 g ( $\frac{3}{4}$  teaspoon) of soap makes the product more solid – similar to an ointment – and adding just 4 g (1 teaspoon) of soap produces a sticky product that forms threads if it is drawn apart between two fingers.



## Part 2: Experiment instructions for the students

1. Grate approximately fourth of the bar of soap using the potato grater.
2. In a 150 ml (5 fl. oz.) beaker, dissolve 1 g ( $\frac{1}{4}$  teaspoon) of the grated soap in 14 ml (1 tablespoon) of water as thoroughly as possible; this will produce a lather.
3. Add 4 g (1 teaspoon) of starch to the lather mixture and mix well with the glass rod.
4. Heat the mixture on a hotplate to a temperature of 75°C (167°F), stirring occasionally with the glass rod.
5. Repeat steps 2) to 4) using 2 g ( $\frac{1}{2}$  teaspoon), 3 g ( $\frac{3}{4}$  teaspoon) and 4 g (1 teaspoon) of soap. Does this change the properties of the adhesive substance?

Finally, the students should use the adhesive they made to glue together paper strips approximately 5 cm (2 inches) wide and 30 cm (12 inches) long, with the glued section starting approximately 10 cm (4 inches) above one end. The students should write their names clearly on the paper strips.



## ▶ Worksheets for students

### ▶ Lesson 6: Starch paste containing soap as a structural strengthener

**Soap is said to make a starch paste more solid. Try it out!**

1. Use a potato grater to grate about a fourth of a bar of soap.
2. In a 150 ml (5 fl. oz.) beaker, dissolve 1 g (1/4 teaspoon) of the grated soap in 14 ml (1 tablespoon) of water as thoroughly as possible; this will produce a lather.
3. Add 4 g (1 teaspoon) of starch to the lather mixture produced and mix well with the glass rod.
4. Heat the mixture on a hotplate to a temperature of 75°C (167°F), stirring with the glass rod occasionally.
5. Repeat steps 2. to 4. using 2 g (1/2 teaspoon), 3 g (3/4 teaspoon) and 4 g (1 teaspoon) of soap.

Do the properties of the adhesive substance change when you add soap?  
Record your observations.

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Which of the 4 glue stick substances is most similar to the original glue stick?  
How much soap, water and starch did you use for this sample?  
Write down the recipe (also known as the formulation):

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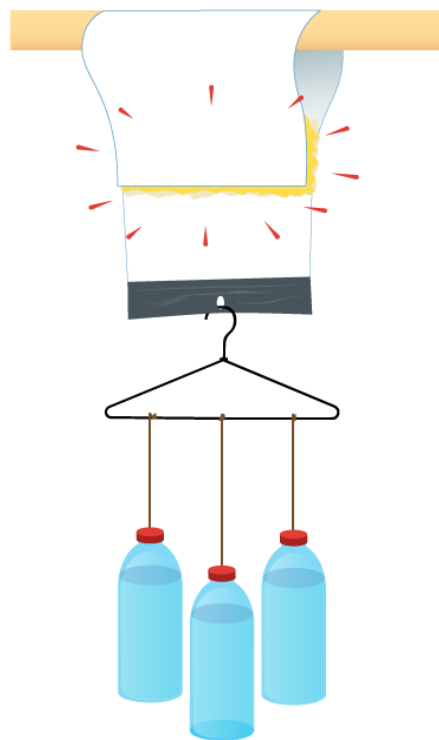


## Making test strips

You will be testing the strength of your adhesives in a later class. To do this, you will need test strips. You can already prepare the test strips.

1. Cut some paper strips approximately 5 cm (2 inches) wide and 30 cm (12 inches) long out of construction paper or cardboard.
2. Make a loop with the strips and glue one of the ends with your adhesives so that about 10 cm (4 inches) of the paper strip is left over at the bottom.
3. Put some power tape on the bottom of the power strip and make a tiny hole into it.

It should look something like this:



Write your name on the paper strip and write down which adhesive you used.