



## ► 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 1: Different types of adhesive

Children are often only familiar with household and craft adhesives. However, these cannot be used to glue everything. A very wide variety of adhesives is therefore available.

The first few experiments are designed to give the students an idea about the variety of different adhesives available. To this end, they are given assignments and problems for which they have to find a suitable adhesive. Finally, the most suitable adhesives for the different problems need to be assigned.

#### Materials needed:

- Clothing (pants) with holes over which the students need to glue a patch
- Sheets of paper, notebooks or photo albums in which the students need to stick photos
- Shoes with loose soles (alternative: bike inner tubes)
- Strips or other pieces of wood to be glued together
- Broken plastic toys

#### Part 1

First of all, put special adhesives into neutral bottles so that the students do not recognize them, for example:

- Wood glue (UniBond No More Nails Wood Glue)
- Craft glue (Pritt PVA)
- Modelmaking glue (Pritt All Purpose Glue)
- Textile adhesives (Copydex)
- Superglues (Loctite)





It is best if the students work in groups of four. Each group of four students is given one type of adhesive and a set of four different problems (see worksheets for students). Depending on the size of the class and number of groups, the number of assignments and adhesives may need to be adapted. Here is an example of a test matrix:

| Adhesive type \ Problem   | 1 | 2 | 3 | 4 | 5 (Optional) |
|---------------------------|---|---|---|---|--------------|
| <b>Wood</b>               |   |   |   |   |              |
| <b>Fabric</b>             |   |   |   |   |              |
| <b>Photo/Paper</b>        |   |   |   |   |              |
| <b>Shoe sole/rubber</b>   |   |   |   |   |              |
| <b>Plastic (Optional)</b> |   |   |   |   |              |

### Part 2

Within each group of four, two of the students should work on two of the problems individually. After the students have glued their objects together with the assigned adhesive, the objects are placed in a drying oven at 50°C (125°F) for a total of 30 minutes. (Alternatively, a regular oven can be used or a longer drying time selected.)

### Part 3

When assessing the performance of the adhesive, the students are introduced to the smiley face system for rating the adhesives. There are three rating options: a smiley face, a face with a straight mouth and a sad face.





Alternatively, the students could develop their own rating systems. When they subsequently compile the results as a class, they would then notice that this makes it more difficult to compare the results. This could be used as a starting point for a discussion about why unified standards and units of measurement are defined in a wide range of fields both nationally and internationally.

|               |   |   |   |   |   |
|---------------|---|---|---|---|---|
| <b>WOOD</b>   | 😊 | 😞 | 😊 | 😐 | 😞 |
| <b>FABRIC</b> | 😊 | 😐 | 😞 | 😞 |   |
| <b>PAPER</b>  | 😊 |   | 😊 | 😊 |   |
| <b>SHOE</b>   | 😐 | 😞 | 😊 | 😐 |   |
|               |   |   |   |   |   |

## Conclusions

In this first double period, the students learn that different materials need to be glued with different adhesives. They also discover that adhesive strength depends on using the correct adhesive in the correct way. In addition, this lesson can also introduce the importance of unified standards and measurements.

For the next class: take a photo of the chalkboard.



## ► Worksheets for students

### ► Lesson 1: Different types of adhesive

There are many different types of adhesive. They help to join different materials together. But it is not always easy to find the right adhesive for the job. Work as a team with your partner. Check the team to which you and your partner belong:



**Today you will be testing an unknown adhesive.**

You will test your adhesive in two situations. This means that you will be carrying out two adhesive tests. Your partner will do the same. Cut out the different problems and glue them into your notebook. Then you can start the adhesive tests.

Afterwards, put your adhesive test samples in a drying oven (or regular oven) at 50°C (125°F) for about 30 minutes so that they dry more quickly.

#### **Problems and research assignment for Team A**

The sole of your favorite shoes has come loose in one place. Glue the sole back on as quickly as possible because your dad already wants to get rid of the shoes. Does your adhesive do the job?



You would like to stick a photo in a scrapbook that a classmate gave you. Does your adhesive do the job?



The sole of your favorite shoes has come loose in one place. Glue the sole back on as quickly as possible because your dad already wants to get rid of the shoes. Does your adhesive do the job?



You would like to stick a photo in a scrapbook that a classmate gave you. Does your adhesive do the job?



### **Problems and research assignment for Team B**

You were given a wooden construction set for your last birthday. However, the adhesive that you need is missing from the set. Does your adhesive do the job?



Your favorite pants have a hole in them that you want to repair. However, you don't want to wait for your mom to sew a patch over the hole so you would like to glue the patch on. Does your adhesive do the job?



You were given a wooden construction set for your last birthday. However, the adhesive that you need is missing from the set. Does your adhesive do the job?



Your favorite pants have a hole in them that you want to repair. However, you don't want to wait for your mom to sew a patch over the hole so you would like to glue the patch on. Does your adhesive do the job?



**Different types of adhesive**

Name:

Team:

**Problem and adhesive assignment 1:**

Glue the first task here.

Does your adhesive do the job?

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**Problem and adhesive assignment 2:**

Glue the second task here.

Does your adhesive do the job?

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**Discuss the findings in your group and put all the results together.  
Enter your results in the table:**

| Adhesive type<br>Problem      | 1 | 2 | 3 | 4 | 5<br>(Optional) |
|-------------------------------|---|---|---|---|-----------------|
| <b>Wood</b>                   |   |   |   |   |                 |
| <b>Fabric</b>                 |   |   |   |   |                 |
| <b>Photo/Paper</b>            |   |   |   |   |                 |
| <b>Shoe sole/rubber</b>       |   |   |   |   |                 |
| <b>Plastic<br/>(Optional)</b> |   |   |   |   |                 |

### **Different types of adhesive**

While your adhesive test samples are drying, you can continue to investigate the properties of your adhesive.

Adhesive:

### **Record your observation:**

What colour is the adhesive?

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What does the adhesive smell like?

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Is the adhesive fairly solid or fairly liquid?

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Write the number of your adhesive on a sheet of paper. Put a drop of the adhesive on the paper and then leave it to dry.