



► **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 3: Detecting starch**

In the previous class, the students discovered that mixing starch and water produces a sticky substance. Starch is a natural raw material. But where does it come from? How can starch be obtained? What is starch?

In this class, the students learn how to use a solution of iodine and potassium iodide (Lugol's solution) to detect starch. This "detection method" is one of the tools used by researchers. Both a (positive) blank sample containing cornstarch and a negative sample containing a substance that looks similar to cornstarch (confectioners' sugar) are used. This procedure confirms the validity of the detection method. Using the detection method on the glue stick (only Pritt contains starch) confirms that starch is present. This makes the goal clear: A natural raw material containing starch needs to be found from which starch can be isolated.

Materials needed

- Lugol's solution (iodine/potassium iodide solution)
- Disposable pipettes
- Test tubes or watch-glasses in which the substances to be tested can be mixed well with Lugol's solution
- Cornstarch and confectioners' sugar for the blank samples
- Starchy foods, such as potatoes, soaked wheat grains and cornmeal
- Non-starchy foods, such as cucumber



Part 1: Foods that contain starch

In the first step, the students are introduced to a range of different foods that might contain starch, including potatoes, cucumber, milk, and crushed grains of rice or corn kernels. Before they start the experiment, the students should first think about which foods might contain starch. They then test their assumption using the detection method they just learned and record their results.

Part 2: Testing the food

To test for the presence of starch, put the powder substances on a watch-glass with a little water and add a few drops of Lugol's solution. If starch is present, the substance will turn dark blue/purple or black. If you use potatoes, cucumber or grains of wheat, it is advisable to have the students grate or crush the food beforehand. Potatoes and cucumbers ought to be cut into slices.



► Worksheets for students

► Lesson 3: Detecting starch

You have discovered that when starch is mixed with water, a sticky substance is produced. Does a glue stick also contain starch? How can we tell whether starch is present in a substance?

Today you will learn how to detect the presence of starch.

You can use a substance called Lugol's solution to detect the presence of starch. Lugol's solution is a pink to purple colored liquid that contains iodine. You may be familiar with iodine from its use in medicine. Iodine-containing medicine is used to disinfect a wound, for example. Iodine also has another property, however: It turns dark blue or black when starch is present.

Part 1: Testing Lugol's solution.

1. Use a small spatula to put a spatula tip of cornstarch into a test tube.
2. Add 2 ml (1/2 teaspoon) of water and carefully shake the test tube.
3. Then add 2 drops of Lugol's solution to the test tube.

Record your observations:



Part 2: Which foods contain starch?

Starch is present in a number of foods. You will be shown a selection of different types of food.

First think about which of the foods you are shown could contain starch. Record your assumptions in the table.

Use Lugol's solution to find out whether starch is present in various foods. Enter your results in the table.

Food	Instructions	Assumption	Result
Potato	Drizzle 2 drops of Lugol's solution over a slice of potato.	starch [] no starch []	starch [] no starch []
Cucumber	Cut a slice of cucumber and drizzle 2 drops of Lugol's solution over it.	starch [] no starch []	starch [] no starch []
Rice	Crush a few grains of rice in a mortar and put them on a watch-glass. Add 2 drops of Lugol's solution.	starch [] no starch []	starch [] no starch []
Corn	Crush a few corn kernels in a mortar and put them on a watch-glass. Add 2 drops of Lugol's solution.	starch [] no starch []	starch [] no starch []



Part 3: Is starch also present in your glue stick?

1. Take a glue stick and use a spatula to scrape off a small amount of the glue stick.
2. Put the glue stick substance into a test tube, add 3 ml ($\frac{3}{4}$ teaspoon) of water and carefully seal the test tube with a stopper.
3. Carefully shake the test tube.
4. Remove the stopper and add 2 drops of Lugol's solution to the test tube.

Is starch present in your glue stick?

Check the correct answer:

 Yes No