

Try this: Breaking stains

See this activity with full colour pictures:

<http://www.csiro.au/helix/sciencemail/activities/Starch.html>

Warning: This activity uses laundry powder, which can be caustic. Pay attention to the safety directions on the box before using.

YOU WILL NEED

- Flour
- Iodine (from most pharmacies)
- Washing powder with enzymes
- Two jars
- Warm water
- Teaspoon

WHAT TO DO

Measure a teaspoon of flour into two glass jars and add enough warm water to each to turn the flour into a thin paste.

Add a quarter of a teaspoon of washing powder to one of the jars and stir. Allow it to sit for about five minutes and then stir again.

Add one or two drops of iodine to the paste in each jar.

Which one turns a dark blue-black?

WHAT'S HAPPENING?

Flour is essentially wheat that has been ground into a powder. As such, it is mostly made up of what you'd find in grass seeds, which includes glucose that is produced by the plant through the process of photosynthesis and used by the plant for energy. The glucose molecules in plants are linked together in long chains to create a form of energy storage called starch.

To test for the presence of starch in a material, you can drip some iodine onto it and see if it turns blue-black.

On its own, a tincture of iodine is a dark yellow colour. Chemicals have a colour because of the way they absorb and emit light, which has a lot to do with the positions of their electrons. When the iodine atoms sit inside the looped strings of glucose molecules, the bonds pull electrons into different positions, changing how they absorb and emit light. Now, instead of being yellow, they are a dark blue colour.

Adding the enzymes in laundry powder breaks the starch down into individual units of glucose. Without loops of glucose to sit inside, the iodine cannot change colour.

APPLICATIONS

Washing powders contain special chemicals that act like tiny scissors, selectively snipping long chains of chemicals. These enzymes are rather precise, cutting up some chemicals but not others. In your washing powder they are useful for breaking down many of the chemicals you'd find in stains.

In your body, you use enzymes to break down the food you eat. In your saliva, for example, there is an enzyme called 'amylase' that also breaks the starch into smaller glucose units. Other enzymes in your body can break down proteins, fats or nucleic acid. Enzymes are so precise they also build molecules back up again, creating new proteins and other kinds of glucose strings such as glycogen. They are like tiny chemical machines that are responsible for constructing and maintaining your body. **TS**

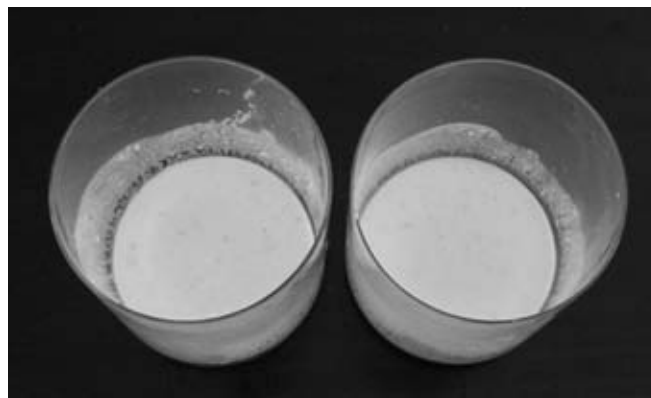


Figure 1: Example of paste.

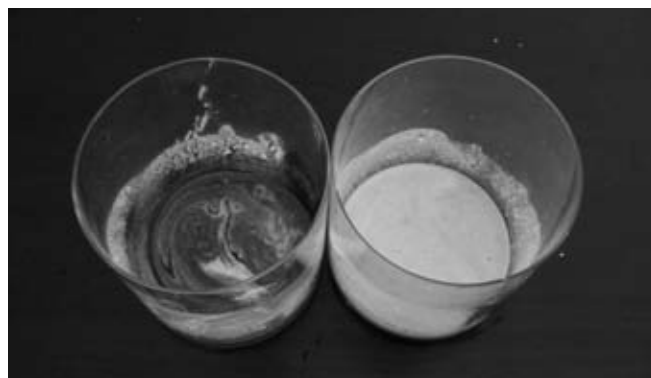


Figure 2: Which one turns a dark blue-black?