UNDERSTANDING YOUR FOOD
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TEACHER NOTES

S2. Diagnosis of diabetes mellitus

Pupils test samples of 'urine' with Benedict's solution and Clinistix.

You will find that tube B will not clean after the test has been carried out; a small amount of bench HCl added to the tube will remove the orange colour.

Answers to questions on pupil sheet S2:

1. only sample B

2. sample B

3. The information from the second paragraph will help pupils form an answer.

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KS3 and KS4
science

Timing - 30 - 40 minutes

Pupil activity sheet S2 accompanies this activity.

Requirements

- *3 samples of 'urine':*
  water + food colouring - labelled A
  water + glucose + food colouring - labelled B
  water + food colouring - labelled C
  (the food colouring is to make the liquids look realistic!)
- *Benedict's reagent*
- *test tubes or boiling tubes*
- *test tube holder*
- *test tube rack*
- *water bath (beaker of water heated over Bunsen flame)*
- *safety goggles*
- *stop clocks*
- *Clinistix - available from pharmacists follow the instructions on the pack very carefully)*

The presence of **glucose** in the urine is one of the signs that a person may be suffering from diabetes.

There is a normal amount of glucose contained within the blood. When this blood is filtered as it passes through the kidney, all of the glucose is reabsorbed back into the bloodstream. This means that under normal circumstances glucose should not be present in the urine. However, in a person suffering from diabetes there is an abnormally high level of glucose in the blood. As this blood passes through the kidneys not all of the glucose can be returned to the blood. Hence, some of it will be present in the urine.

It is quite easy to test for the presence of glucose in a liquid such as urine. Glucose is an example of a reducing sugar. It can be detected using a test called the Benedict's test.

An unknown sample of liquid is boiled with Benedict's solution. If an orange-red precipitate appears then the unknown sample does contain glucose. This is a positive result.

You are given three samples of 'urine' labelled A - C (it is not real urine!). Carry out the following test on small samples of each 'urine'. Each test must be carried out in a separate test tube.

SAFETY NOTE
REMEMBER TO WEAR GOGGLES

1. Pour about 2 cm depth of 'urine' into a test tube.
2. Add an equal depth of Benedict's solution. This is a blue solution.
3. Place the tube in a boiling water bath.
4. After about 60 - 90 seconds record the colour of the mixture in the tube.
5. Repeat the test with the other samples.

Questions

1. Which of the samples contained glucose?
2. Which of the samples could be from a person suffering from diabetes?
3. Imagine you were the doctor carrying out similar tests. How would you explain simply the presence of glucose in the urine to the patient whose urine you had tested?

Doctors do not usually carry out a Benedict's test in their surgeries. Instead, they can carry out a test which takes just a few seconds. This test uses a special piece of equipment called a Clinistix. If these are available you could use them to confirm the results from your Benedict's tests.