

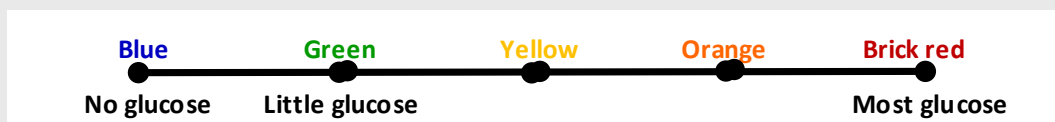
Background Information

Sugar (glucose) is not normally found in the urine. However, when blood glucose levels rise above a safe level (i.e. above 180 mg per 100 mL), the kidneys often release some of the excess glucose from the blood into the urine. This occurs when people have diabetes.

In the past, doctors tasted the urine of patients to test for diabetes, as 'sweet tasting urine' has high amounts of glucose present. In more modern times, doctors use blood tests. Urine testing gives a preliminary, but not final diagnosis.

Urine testing includes:

1. Testing for the presence of glucose
2. Smelling the urine to detect any odour
3. Testing the pH.
 - The Benedict's test is used to test for the presence of glucose. A small sample of urine is mixed with Benedict's solution and heated. If glucose is present, a chemical reaction will occur. A colour change provides evidence of this chemical reaction. The different colours that the mixture can change to indicate how much glucose is in the urine.



- The odour of normal urine varies between people and is affected by a number of factors, such as diet. Abnormal smells include "fruity", like acetone or fingernail polish remover, putrid (faecal smelling), or like ammonia.
- The pH of normal urine is between 5 and 7.

Your Task:

Urine samples have been obtained from three 'patients' who may have the disease diabetes.

Your task is to analyse each sample, record your observations and give a preliminary diagnosis for each patient.

Aim: To analyse samples of urine to give a preliminary diagnosis for the possibility of diabetes.

Equipment: Each group will need:

- 30mL of Benedict's solution
- 1 x 200mL beaker
- 200mL of boiling water
- 4 plastic droppers
- Safety glasses
- 1 test tube rack and 7 test tubes
- 1 pen for labelling test tubes and recording results
- 1 spotting tile
- 5 mL of universal indicator solution or 3 strips of pH test paper
- universal indicator chart.

SAFETY NOTE:

You should wear eye protection during this practical.

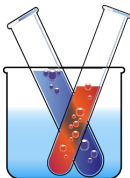
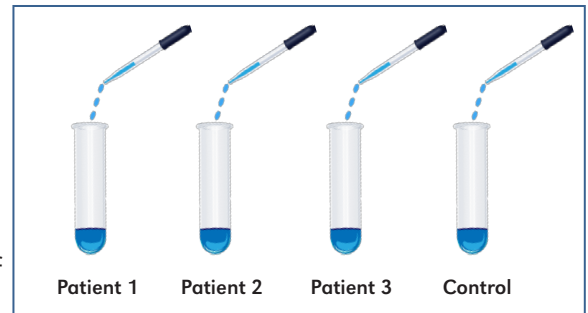


Method:

1. Collect 10mL of each urine sample provided and put into 3 separate test tubes.
2. Label each tube clearly with the patient number.
3. Carry out the following tests for each sample collected:
 - **Smell/odour:** Wave your hand across the top of the test tube towards your nose. Keep your face away from the test tube and DO NOT put your nose right over the sample. Note down your observation in the chart below.
 - **pH:** Place a strip of universal indicator paper in each of the samples, compare the colours against a universal indicator chart and record your results on the table below
OR
Using a pipette, place 3 drops of each of the samples into a clean spotting tile and one drop of universal indicator into each sample. Compare the colours against a universal indicator chart and record the result on the table below.

- **Glucose:**

1. Using a clean pipette, add 5 mL of Benedict's solution (blue colour) to the 4 remaining test tubes.
2. Label three of the test tubes with each patient number and the fourth test tube as your control.
3. Using a clean pipette each time, add 2mL of the urine samples to their labelled test tube.
4. Place the four test tubes in a 200mL beaker of boiling water (or use a water bath). Watch for a colour change. Note, it may take about 10 minutes to see a colour change.
5. Record the colour change on the table below for the sample from each patient.



	Patient 1	Patient 2	Patient 3
Smell/odour			
pH			
Glucose			
Result: abnormal or normal?			

Discussion questions:

What does a positive test for glucose indicate?

If a patient has glucose in their urine, can you explain how this has happened?

What advice would you give to a patient with an abnormal glucose urine test?