Qualitative biochemical tests on carbohydrates

The presence of different chemicals in a substance can be demonstrated by using simple biochemical tests. These will show the presence or absence of a substance, usually by a change in colour. The tests will not give any information on how much is present. Such a test is called a qualitative test.

Safety

All the tests have some hazards associated with them. This is because the reagents are corrosive or irritants. Wear eye protection when carrying out any of the procedures.   
Iodine solution can be an irritant and should not come into contact with the eyes.  
Benedict’s reagent is a low hazard material.

Heated water baths are a hazard. The water bath must be secure on the gauze above the Bunsen burner. When the experiment is completed, the water bath should be left to cool before dismantling.

Heating hydrochloric acid and non-reducing sugar may result in the acid spitting out of the boiling tube. Do not stand too close to the apparatus until the acid has finished boiling. Removal of the hot acid should be undertaken with care.

The starch test

**1** Place a drop of the solution to be tested on a white dimple tile. If the substance is a solid it may need to be crushed before testing.

**2** Add 2–3 drops of iodine dissolved in potassium iodide solution.

**3** Record the colour change observed.

A positive result would be the development of a dark blue-black colour.

Reducing sugar test

**1** Heat a water bath to about 80 ˚C.

**2** Place 2 cm3 solution of the test material in a boiling tube.

**3** Add 2 cm3 Benedict’s reagent and heat to 80 ˚C. Do not overheat.

**4** Record the colour change observed.

If reducing sugar is present, the Benedict’s reagent turns from blue to green, yellow, orange or red. The deeper the colour, the greater the quantity of reducing sugar.

Non-Reducing sugar test  
ONLY if reducing sugar is **not** present can you test for non-reducing sugars.  
  
Prior to heating with Benedict’s reagent the sample must be heated with hydrochloric acid to hydrolyse any non-reducing sugars into monosaccharides, all of which are reducing sugars.  
  
Then the solution is neutralised with an alkali such as sodium hydroxide.