

1. Food tests

A. Benedict's test for reducing sugars

Reducing sugars include all monosaccharides (e.g. glucose and fructose) and some disaccharides (e.g. maltose).

Benedict's solution contains copper sulphate. Reducing sugars reduce copper(II) ions present in the blue copper sulphate solution to insoluble brick-red copper(I) oxide which is a precipitate.



Fig.1 Benedict's solution

Procedure

1. Add 2 cm³ of 0.1% glucose solution to a test tube.
2. Add an equal volume of Benedict's solution.
3. Shake and boil the mixture.

Note

1. The initial blue colouration of the mixture turns green, then yellow and may finally form a brick-red precipitate. The amount of precipitate gives a rough indication of the amount of reducing sugars present.

CAUTION The mixture is likely to bump violently during heating and extra care should therefore be taken. It is safer to use a water bath to heat up the mixture.

B. Iodine test for starch

Starch is only slightly soluble in water and it forms a colloidal solution in water. Starch is a mixture of two polysaccharides, amylose and amylopectin. The relative amounts of the two polysaccharides vary widely in different types of starch. Amylose molecules consist of long straight chains of glucose units. Amylopectin has a complicated branched structure. The two polysaccharides combine with iodine to give the characteristic blue-black colour of the standard iodine test.

Procedure

1. Add 2 cm³ of 1% starch solution to a test tube.
2. Add a few drops of iodine solution.

Note

1. A blue-black colouration indicates the presence of starch due to the formation of a complex.

C. Sudan III test for lipids

Lipids include oils, fats and waxes.

Procedure

1. Add 2 cm³ of oil to 2 cm³ of water to a test tube.
2. Add a few drops of Sudan III and shake.

Note

1. Oils are stained red with Sudan III. Since they are less dense than water, they separate out as a red layer on the water surface.



Fig.2 Iodine solution



D. Biuret test for proteins

Egg albumen is a suitable material for Biuret test which tests for the presence of peptide bonds. When mixed with dilute alkaline copper sulphate solutions, nitrogen atoms in the peptide bonds form a violet complex with copper(II) ions.

Procedure

1. Add 2 cm³ of protein solution to a test tube.
2. Add an equal volume of 5% sodium hydroxide solution and mix.
3. Add 2 drops of 1% copper sulphate solution and mix.

Note

1. Violet colouration is developed in the presence of protein.
2. Biuret reagent can be used directly for detecting the presence of protein without heating.