Qualitative biochemical tests on lipids and proteins

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.

Iodine solution can be an irritant and should not come into contact with the eyes.

Sodium hydroxide and hydrochloric acid are corrosive. These should be washed off the skin immediately with cold water. Wear eye protection.

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.

Benedict’s reagent is a low hazard material.

Ethanol is inflammable. When carrying out the lipid emulsion test, the ethanol must be kept away from a naked flame.

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.

Lipid emulsion test

Method

**1** Place 2 cm3 solution to be tested in a test tube.

**2** Add 2 cm3 of ethanol and shake well for 30 seconds.

**3** Allow to stand briefly and then decant the top layer into a test tube of cold water. Observe and record the results.

A positive result for lipid would be the formation of a white emulsion when the water and the ethanol mixture come into contact.

Questions

**1** Why is the lipid shaken in ethanol at the start?

**2** What is an emulsion?

**3** Why is this test unreliable?

Protein (biuret) test

Method

**1** Place 2 cm3 of the solution to be tested in a test tube. Add 2 cm3 of potassium hydroxide and shake.

**2** Trickle some dilute copper sulfate solution down the side of the tube into the unknown solution.

**3** Record any observations.

If protein is present in the unknown solution, a purple ring forms when the copper sulfate is added to the potassium hydroxide solution.

Questions

**4** The biuret test gives a purple colouration with protein. Why does this colour develop?

**5** Why would the biuret test give a negative result for a solution that had been boiled?

**6** Why would a solution of amino acids give a negative result for the biuret test?

**7** The biuret test also gives a positive result when urea is tested. Why?