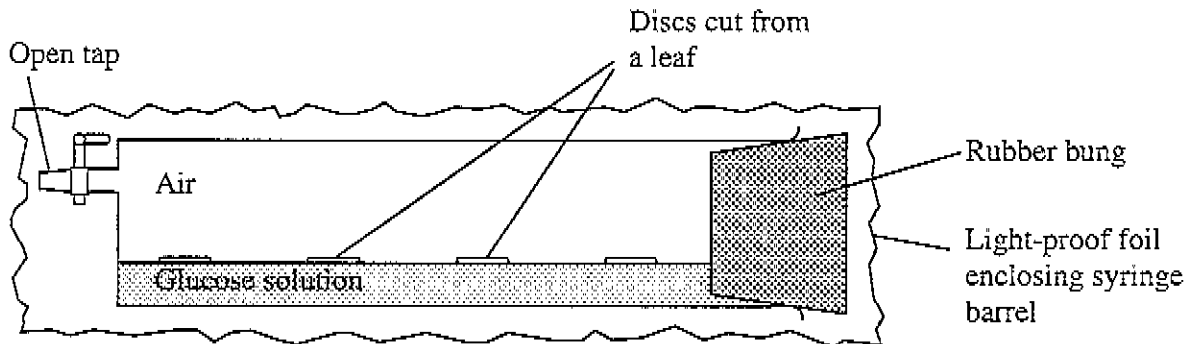


4 In an initial investigation (Investigation 1) of starch production in leaves, the apparatus shown in Figure 1 was set up and incubated at 20 °C for 24 hours.

Figure 1



The leaf discs were then removed and tested for starch by immersing in boiling water, decolourising in boiling ethanol and soaking in iodine solution. The test showed that some starch was present.

(a) Why were the leaf discs:

(i) immersed in boiling water;

(ii) decolourised in ethanol?

(2)

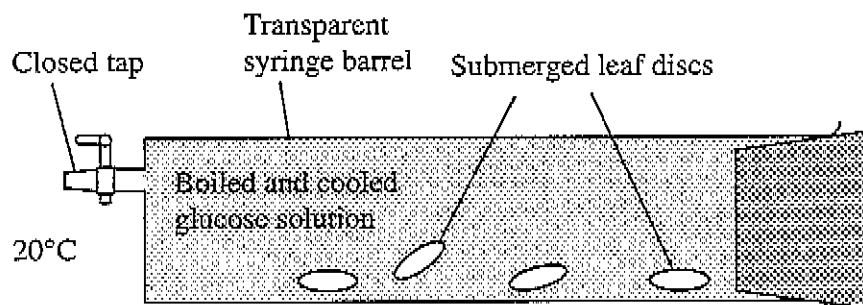
In an attempt to explain how the starch was produced in the leaf discs, two further investigations were carried out. In Investigation 2, apparatus identical to that shown in Figure 1 was set up but it was incubated at 4 °C. In Investigation 3, glucose solution that had been boiled to remove oxygen and then cooled, was used to fill the syringe completely. This was incubated at 20 °C. All the discs from Investigation 2 and Investigation 3 were removed after 24 hours and tested for starch. None tested positive.

(b) Explain why starch was produced in the discs from the apparatus used in Investigation 1 but not in the discs from Investigations 2 or 3.

(3)

A fourth investigation was set up using the apparatus shown in Figure 2. This was identical to that used in Investigation 3 except that the foil was removed and the leaf discs were exposed to bright light.

Figure 2



After 24 hours, all the discs were floating at the top of the syringe, whereas the leaf discs in Investigation 3 had remained at the bottom of the syringe barrel.

(c) Fully explain this difference in leaf buoyancy.

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(2)

Leaf discs were also used in an investigation to determine which wavelengths of light are most important for starch production in photosynthesis.

(d) Describe how such an investigation would be carried out and how reliable results would be obtained. State the results that would be expected.

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(8)

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