Mandatory experiment 14.1

To show that starch is produced by a photosynthesising plant

Apparatus required: beaker; Bunsen burner; tripod; gauze; forceps; test-tube; test-tube holder; white tile

Chemicals required: alcohol; iodine solution

Also required: pot plant

Note: If we want to show that a plant produces starch during photosynthesis, we must use a plant that has no starch in it to begin with. We do this by placing the plant in the dark for 48 hours. This is known as **de-starching** the plant. Without light, the plant cannot make any food and it uses up its store of starch.

Method

1. Place the pot plant in the dark for 48 hours. This is necessary to de-starch the plant.
2. Cover part of some of the leaves with aluminium foil as shown in *Fig. 14.2(a)*.
3. Leave the plant in bright light for four to six hours. (This allows the plant to photosynthesise.)
4. Set up a water bath as shown in *Fig. 14.2(b)* and bring the water to the boil.
5. Remove one of the leaves with a foil strip and draw a sketch of it to show the position of the foil strip.
6. Remove the foil strip. Drop the leaf into the boiling water for one minute. (This kills the leaf.)
7. Turn off the Bunsen burner.
8. Half-fill a test-tube with alcohol.
9. Using the forceps, remove the leaf from the water. Gently push the leaf into the test-tube of alcohol.
10. Stand the test-tube in the warm water for about ten minutes, *Fig. 14.2(c)*. (The warm alcohol removes the chlorophyll from the leaf. This makes it easier to see the reaction of starch with the iodine solution.)
11. Use the forceps to remove the leaf from the test-tube. (The leaf will be creamy/white in colour and it will be very brittle.)
12. Dip the leaf into the warm water in the water bath, *Fig. 14.2(d)*. (This softens the leaf.)
13. Carefully spread the leaf out onto a white tile and cover with iodine solution. *Fig. 14.2(e)*. (Iodine solution tests for the presence of starch.)
14. Draw a new diagram of the leaf showing where starch is present and compare it with your first diagram.

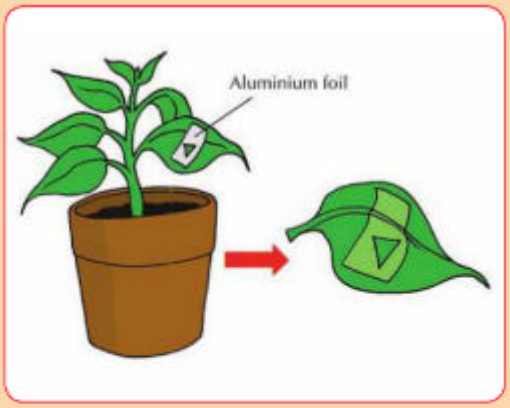

Fig. 14.2(a) Cover part of de-starched leaf with aluminium foil.

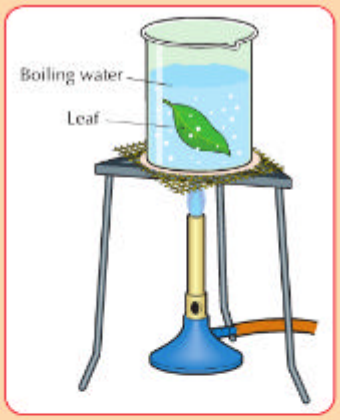

Fig. 14.2(b) Boil leaf in water – to kill leaf.

Fig. 14.2(c) Place in warm alcohol – to remove the chlorophyll.

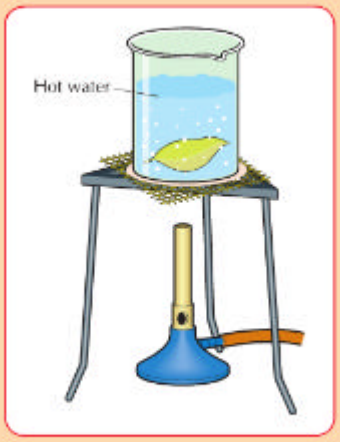

Fig. 14.2(d) Dip in warm water – to soften the leaf.

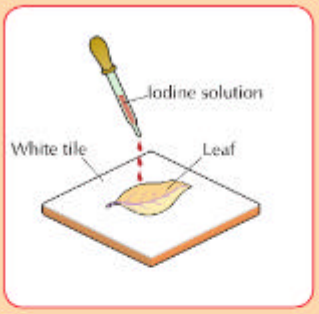

Fig. 14.2(e) Add iodine solution – to test for starch.

Results

Part of leaf in the light: the leaf turns a blue-black colour with iodine solution. This shows starch is present.

Part of leaf that was covered by foil: the leaf stays brown-yellow (the colour of iodine solution). This shows starch is not present.

Conclusion

Starch is only found in the part of the leaf that was exposed to light. Therefore starch is produced by photosynthesis.