# Testing a variegated leaf for starch

**Student Notes**

We know that the plant converts the simple sugars made in photosynthesis into starch for storage.

In this practical, you’ll look to see if there is any starch in the non-green areas of the leaf.

**Apparatus**

Each group will need:

* Beakers 1 x 250 cm3 and 1 x 100cm3
* Access to just boiled water from a kettle or similar source of hot water
* Boiling tube plus holder
* Forceps
* Ethanol (~25cm3)
* Petri dish base or lid or a white tile
* Iodine solution in dropping bottle
* A variegated leaf from a plant which has been kept in the dark for 24-48 hours and then illuminated for 24-48 hours
* Access to waste bottles with lids for used ethanol

Hazard: Ethanol is highly flammable and must not be placed near a flame.

Heat the water using a kettle.

**Instructions**

1. Take a plant with variegated leaves which has been kept in the dark for 24-48 hours and then kept under bright light for 24-48 hours and remove one of the mature leaves.
2. Draw the leaf showing approximately where the green and non-green areas are.
3. Predict which areas you expect to find starch in.
4. Half fill a 250cm3 beaker with just boiled water from a kettle.
5. Hold the leaf with forceps and place the leaf in the just boiled water for one to two minutes. This gets rid of the waxy coating on the leaf.
6. Collect a boiling tube.
7. Use forceps to remove the leaf from the hot water and put the leaf into the boiling tube.
8. Pour ethanol into the boiling tube until the leaf is covered by the ethanol, the boiling tube will be about one third full.
9. Place the boiling tube with the leaf and ethanol into the beaker of just boiled hot water. Leave for 5 minutes and observe what happens. If the ethanol does not turn green, ask your teacher to change the water in the beaker for some hotter water from the kettle. The ethanol will remove the colour from the leaf because the chlorophyll is soluble in the ethanol.
10. Wait until you can see that the ethanol has turned green and leaf has lost most of its green colour – this will take about 5 minutes.
11. Pour the ethanol into a discard bottle with a screw top. Keep the leaf. Ensure the lid is screwed on to the discard bottle.
12. Use forceps to put the leaf in a beaker of clean hot water to rinse off the ethanol and soften the leaf.
13. Lay the leaf out in a Petri dish base or lid, or on a white tile.
14. Use a pipette to drip iodine solution all over the surface of the leaf.
15. Pour off any excess iodine solution and wait at least a minute.
16. Look for areas of the leaf where the iodine solution has turned blue-black, these areas contain stored starch.
17. Make a record of your observations by drawing the leaf again to show any colour changes.
18. Compare your drawings of the leaf. Was the starch found in the area that you predicted?

**Questions**

1. What is meant by saying a leaf is variegated?
2. Why is the leaf placed in boiling water?
3. Why is the leaf placed in ethanol?
4. Why is the leaf placed back in the water after it has been in ethanol?
5. What colour change in iodine solution shows that starch is present?

**Conclusion**

Compare your before and after drawings of the leaf.

Is the starch in the green, chlorophyll containing area of the leaf or in a different part of the leaf?

Was the starch found in the area where you predicted it would be?

Try to explain what has happened.

**Extensions**

**You could investigate other factors affecting photosynthesis**

Repeat this procedure with leaves kept in the dark for 24 – 48 hours and not put in the light or where paper has blocked light from part of the leaf for 24 – 48 hours.

Repeat the procedure using leaves deprived of carbon dioxide.

**You could also try to create an image or word on a leaf.** This is done by covering some areas of the leaf with foil or paper before placing the plant in the light for 24-48 hours. Can you explain what will happen to the covered areas when the iodine is added to this leaf?