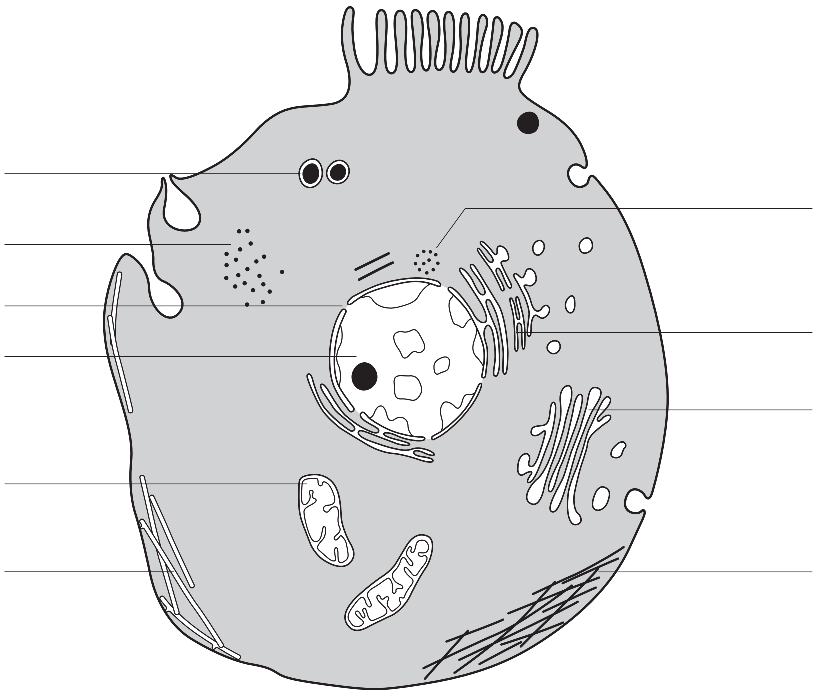
Cell ultrastructure

Use the resources available to research the structure and function of the cell organelle that your team has been allocated. Discuss the information and prepare an oral presentation for the rest of your class. Your presentation should be supported by pictures, drawings, overhead transparencies or PowerPoint slides. You may also wish to provide a handout sheet.

In doing your research try to answer the following questions:

- Where is the organelle found?
- How large is it?
- Which cells have the organelle?
- How many are in a cell?
- What does it look like?
- What is its external structure?
- What is its internal structure?
- What is its function?
- To what other structures does it relate?
- What would happen if it malfunctioned?

From the research carried out by your team and the presentations made by other research teams, label as many structures as you can on the cell diagram below and give the function of the parts you have labelled.



Allotropes of sulfur

Monoclinic sulfur

1 Gently warm about 3 cm of powdered roll sulfur in a test-tube. Do not overheat.

2 When the sulfur has just melted and is a freely running liquid, pour it into a filter paper in a filter funnel.

3 Allow the sulfur to cool until the top has turned solid but the main body of the sulfur is still liquid.

4 Open out the filter paper. Note the long needle-like crystals of monoclinic sulfur.

5 Leave a sample of the crystals on a watch glass and note any changes over a period of two weeks.

Rhombic sulfur

1 Heat a beaker of water to boiling and switch off the burner.

2 Place about 1 cm of sulfur in a test-tube and fill to 3 cm with methylbenzene.

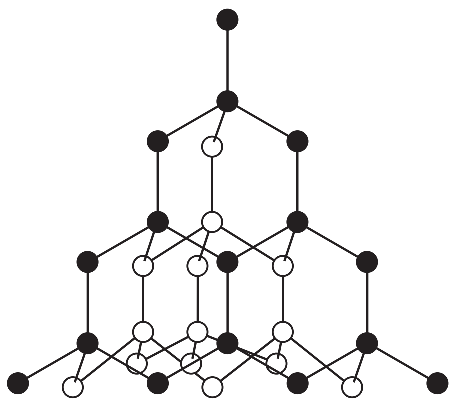
3 Warm the test-tube in the hot water and stir to dissolve the sulfur.

4 Decant the clear solution onto a watch glass and leave it for several days in a fume cupboard to crystallise.

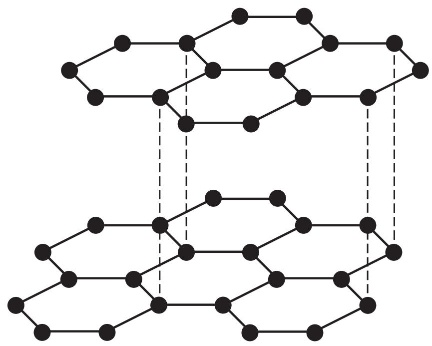
5 Look at the rhombic crystals formed and compare their shape with crystals of monoclinic sulfur.

Some giant covalent structures

Two common allotropes of carbon

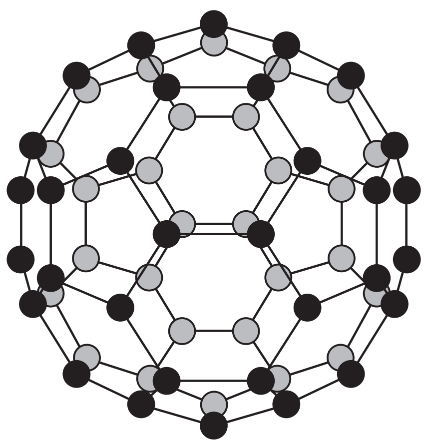


diamond



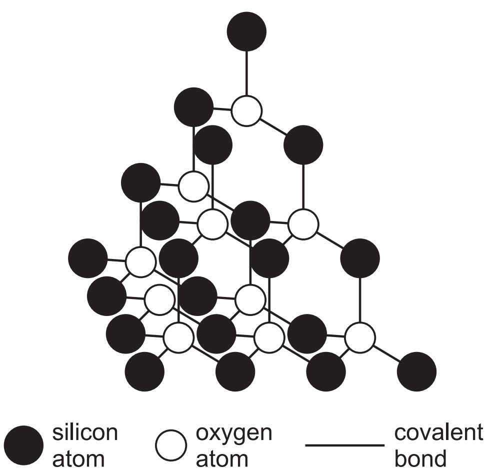
graphite

A third allotrope of carbon



fullerene

Sand has the same structure as diamond



silicon dioxide (sand)

The effect of concentration on rate of reaction

Part 1

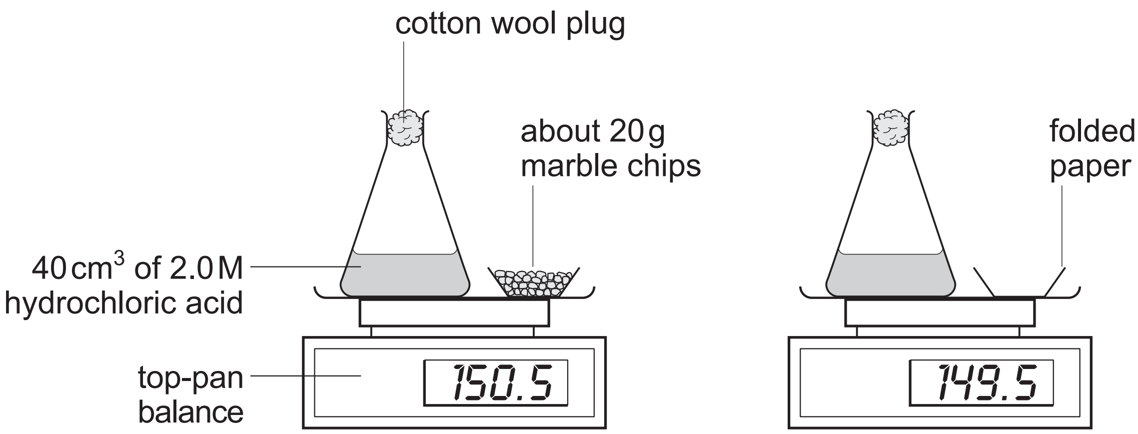
1 Put 40 cm^3 of 2.0 M hydrochloric acid in a beaker and 20 g granular calcium carbonate on a top-pan balance as shown in the diagram below (left). Read the total mass.

2 Add the calcium carbonate to the acid, put in the cotton wool plug to stop loss of acid and start the timer. Put the container that held the calcium carbonate back on the balance pan (right). Gas will evolve and the mass registered by the balance will decrease.

3 Read the total mass every minute until the reaction has slowed almost to a stop.

4 Plot a graph showing the decrease in mass against time.

5 Repeat steps 1 to 4 with different concentrations of acid. Plot all graphs on the same axes.



Part 2

1 From the graph, determine the time taken for 1 g of gas to be lost for each curve.

2 Convert this into a table showing: initial molarity of the acid (column 1); time to lose 1 g CO_2 (column 2); the reciprocal of the time to lose 1 g (column 3).

3 Plot a graph showing how the time to lose 1 g of gas varies with initial acid concentration.

4 Plot a graph showing how the rate of reaction (reciprocal of the time) varies with initial acid concentration.