Particle model of solids, liquids and gases/ solutions

7G & 7H

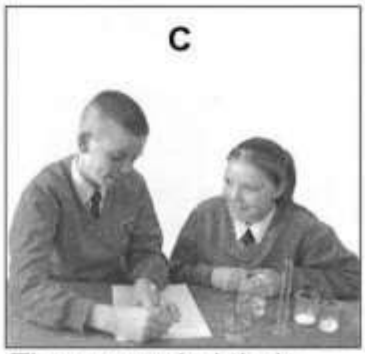
32 min
32 marks
Q1-L3, Q2-L4, Q3-L4, Q4-L5, Q5-L5, Q6-L6

1. Some pupils carried out an investigation to find out whether more sugar or more salt dissolved in water at 60°C.

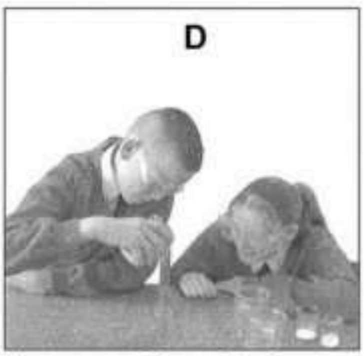
Here are some of the steps in their investigation.
They are **not** in the correct order.

They added salt to one beaker of water at 60°C and sugar to the other beaker of water at 60°C.

They stirred the mixtures.



They recorded their results.



They put 20 cm^3 of water at 60°C into two beakers.

They collected this equipment.

(a) Put the letters **A**, **B**, **C**, **D** and **E** in the boxes below to show the correct order of the steps in their investigation.

1st ☐ 2nd ☐ 3rd ☐ 4th ☐ 5th ☐

1 mark

(b) Why did they use a measuring cylinder?

....

1 mark

(c) They used water at 60°C in both beakers.

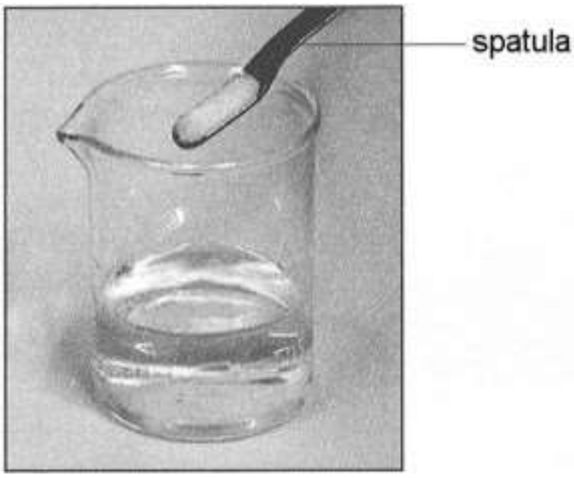
What else did they do to make their investigation fair?

....

....

1 mark

(d) They counted the number of spatulas of sugar or salt added to the water until **no** more would dissolve.



(i) Why was this **not** an accurate method of measuring how much sugar or salt they added?

....

....

1 mark

(ii) Suggest a more accurate method of measuring how much sugar or salt they added.

....

....

1 mark

(e) Jane predicted that more sugar than salt would dissolve.

Complete the table to show a result which would support Jane's prediction.

	sugar	salt
number of spatulas	32	

1 mark

maximum 6 marks

2. The list below shows properties that different elements can have.

- magnetic
- can be compressed
- very high melting point
- very low melting point
- good conductor of heat
- poor conductor of heat
- good conductor of electricity
- poor conductor of electricity

(a) Which **two** properties from the list above make aluminium suitable for saucepans?

1. ....

2. ....

2 marks

(b) Which property in the list above explains why:

(i) copper is used in the cable of a television?

....

1 mark

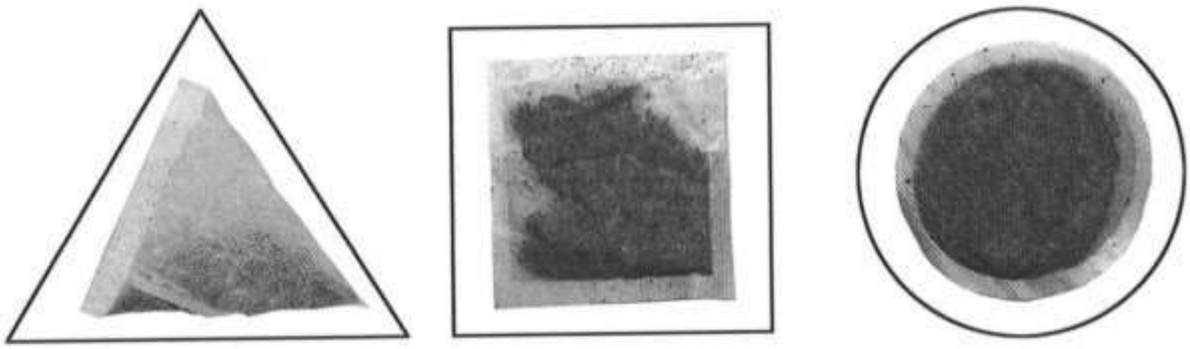
(ii) a lot of oxygen gas can be pumped into a very small container?

....

1 mark

Maximum 4 marks

3. Tea bags are made in different shapes.



triangle **square** **circle**

Some pupils want to find out which shape of tea bag lets tea dissolve most quickly.
They make two plans for their investigation as shown below.

FIRST PLAN
We will use 3 tea bags and 3 beakers

SECOND PLAN *Collect three beakers.*
Collect three different tea bags.
Put one tea bag in each beaker.
Add 150 cm³ of water at 65°C.
Keep the temperature of the water the same.
Measure the time taken for the tea to dissolve.
Find out which is the quickest for making tea.

(a) How is the second plan better than the first plan?

....

....

1 mark

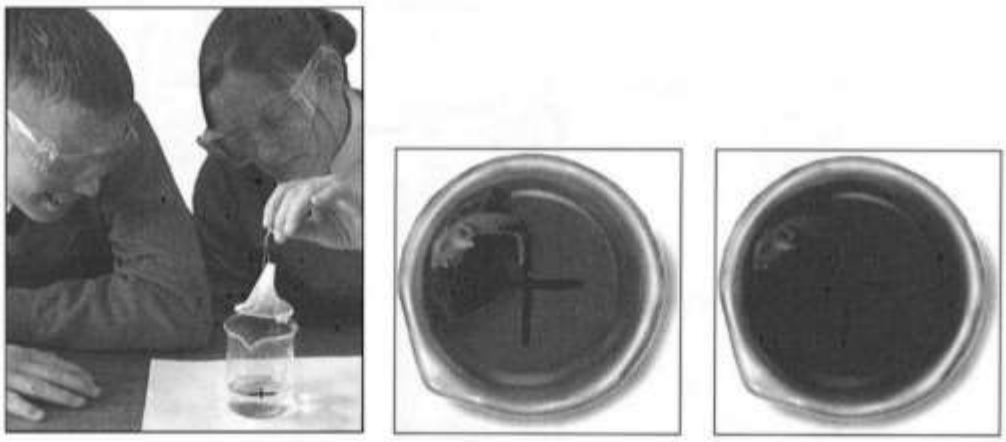
(b) Why should they take care when they add hot water at 65°C to the tea bags?

....

....

1 mark

(c) Ben and Vicky drew a cross on some paper. They put each beaker, in turn, over the cross. They poured hot water into the beaker, dropped in the tea bag and watched the water change colour.



To see which shape of tea bag let the tea dissolve the quickest, they measured the time until the liquid was too dark for them to see the cross.

How did the cross help to make their test more accurate?

....

1 mark

(d) (i) They recorded their measurements in a table as shown below.

shape of tea bag	**time taken untill cross cannot be seen (minutes)**
triangle	8
square	15
circle	10

Which part of their investigation was recorded in the table?
Tick the correct box.

explanations ☐ results ☐

conclusions ☐ plans ☐

1 mark

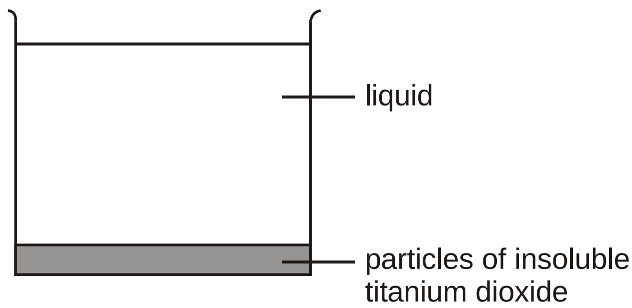
(ii) Give the **three** shapes of tea bags in the order in which the tea dissolved.
Use the table above to help you.

quickest ________________ ________________ ________________ slowest

1 mark

maximum 5 marks

4. (a) Samantha opened a tin of white paint. The paint consisted of a liquid and particles of titanium dioxide that are insoluble in the liquid.
The paint had separated into two layers, as shown below.



(i) What type of substance is the paint?
Tick the correct box.

a compound ☐ an element ☐ a mixture ☐

1 mark

(ii) What type of substance is titanium dioxide?
Tick the correct box.

a compound ☐ an element ☐ a mixture ☐

1 mark

(iii) Why did the particles of insoluble titanium dioxide sink to the bottom?

....

....

1 mark

(b) Samantha stirred the paint and used it to paint a window frame.

She got some of the paint on the glass.

Samantha could **not** get the paint off the glass with water.
When she used a different liquid called white spirit the paint came off.

Why could she remove the paint with white spirit but **not** with water?

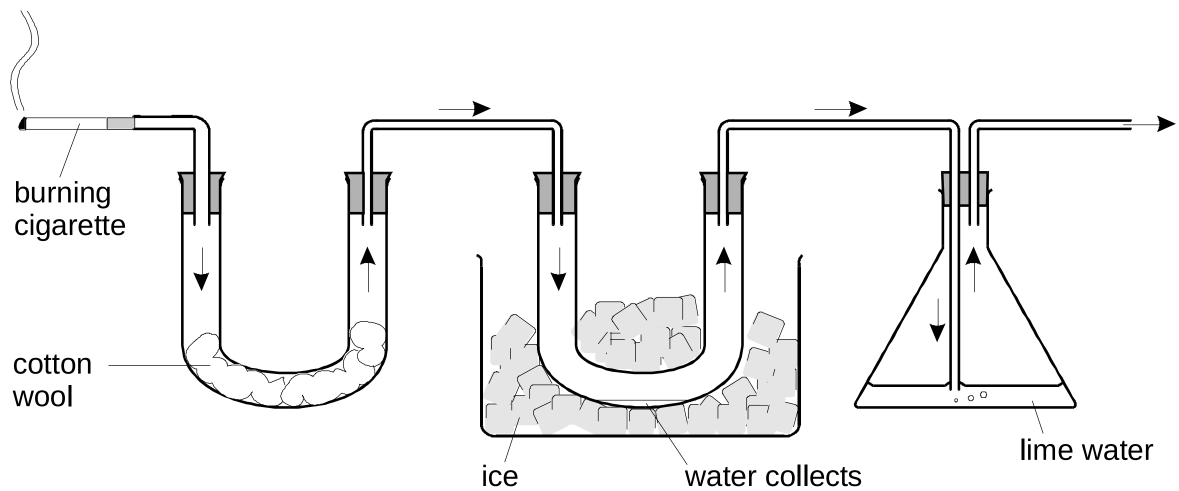
....

....

1 mark

maximum 4 marks

5. A teacher set up the following apparatus to separate the chemicals in cigarette smoke.
The chemicals pass through the apparatus in the direction of the arrows.



(a) In A, a brown sticky substance collected on the cotton wool. This substance causes lung cancer. Give the name of the brown substance.

....

1 mark

(b) As the cigarette burned, water vapour was produced and water collected in B.

(i) Why were ice cubes needed in B?

....

....

1 mark

(ii) In the boxes below, draw the arrangement of particles of water vapour and particles of liquid water.
Use a circle, O, to represent each particle.

particles of water vapour	particles of liquid water

2 marks

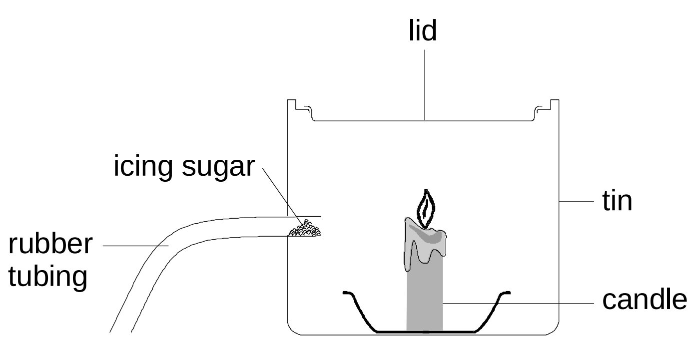
(c) The lime water in C became cloudy. What gas turns lime water cloudy?

....

1 mark

Maximum 5 marks

6. A teacher set up the following apparatus behind a safety screen.
She placed 1 g of icing sugar in the end of the rubber tubing inside the tin, as shown below.



The teacher blew through the other end of the rubber tubing.
The icing sugar came into contact with the flame.
There was a loud explosion and the lid was blown off the tin.

(a) Complete the following sentence describing the energy changes which took place.

.... energy in the icing sugar changed to

.... energy and .... energy.

3 marks

(b) As a result of the explosion, the lid of the tin was pushed off.
Explain what had happened to the gas molecules inside the tin to make this happen.

....

....

....

....

2 marks

(c) When icing sugar is burned in this experiment, the gas **used** and the gas **produced** are the same as when energy is released from sugar in the cells of the body.

(i) Which gas, in the air, is **used** when the icing sugar burns?

....

1 mark

(ii) Give the name of the gas **produced** when the icing sugar burns.

....

1 mark

(d) The table below shows the energy values of four food substances.

food substance	**energy value, in kJ per 100 g**
icing sugar	1680
curry powder	979
flour	1450
custard powder	630

The teacher repeated the experiment with 1 g of custard powder.
What difference would this make to the experiment?

....

....

1 mark

Maximum 8 marks