



ALDENHAM SCHOOL

13 + Entrance Paper

Science

Sample Paper 2009

CHEMISTRY (Section 2)

Length of examination – 20 Minutes

25 Marks

Name:

School:

Answer all the questions

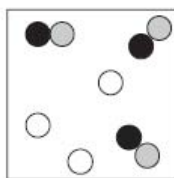
Q 1.

- (a) The diagrams below show the arrangement of atoms or molecules in five different substances A, B, C, D and E.

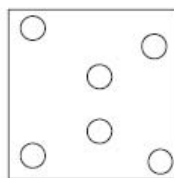
Each of the circles ,  and  represents an atom of a different element.



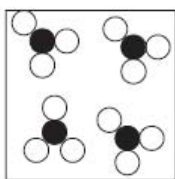
A



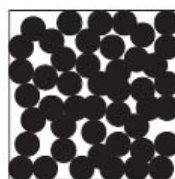
B



C



D



E

Give the letter of the diagram which represents:

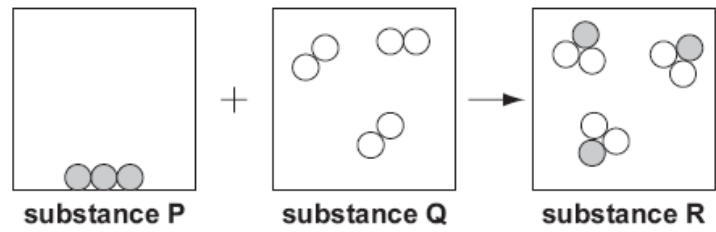
- (i) a mixture of gases;

1 mark

- (ii) a single compound.

1 mark

- (b) The diagram below shows a model of a chemical reaction between two substances.



- (i) How can you tell from the diagram that a chemical reaction took place between substance P and substance Q?

1 mark

- (ii) Substance P is carbon.

Suggest what substances Q and R could be.

substance Q _____

1 mark

substance R _____

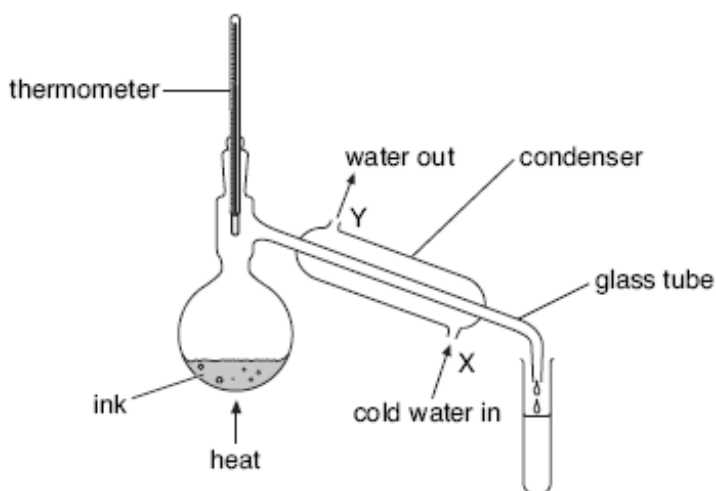
1 mark

- (iii) How does the diagram show that mass has been conserved in this reaction?

1 mark

Q 2.

Rema used the apparatus below to distil 100 cm³ of water-soluble ink.



apparatus A

not to scale

- (a) Which processes occur during distillation?
Tick the correct box.

condensation then evaporation

evaporation then condensation

melting then boiling

melting then evaporation

1 mark

- (b) Give the name of the colourless liquid that collects in the test-tube.

.....

1 mark

- (c) What would the temperature reading be on the thermometer when the ink has been boiling for two minutes?

..... °C

1 mark

- (d) (i) Water at 15°C enters the condenser at X.
Predict the temperature of the water when it leaves the condenser at Y.

_____ °C

1 mark

Explain this change of temperature.

1 mark

- (ii) Give **two** ways in which the water vapour changes as it passes down the glass tube in the condenser.

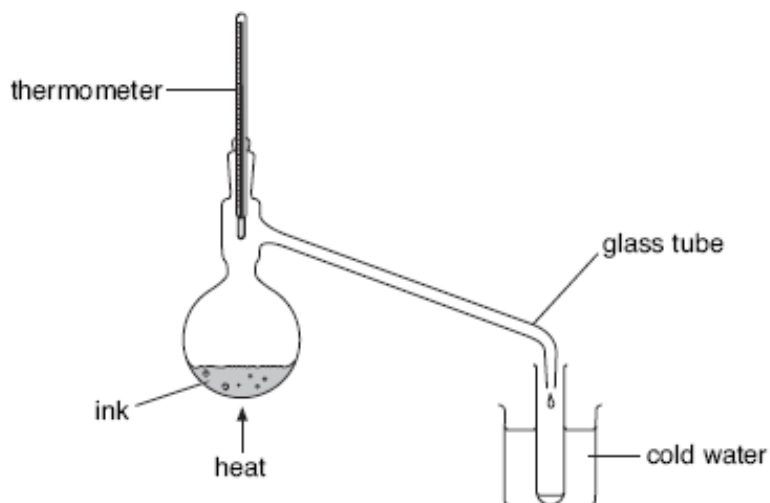
1. _____

1 mark

2. _____

1 mark

- (e) Peter used the apparatus below to distil 100 cm³ of water-soluble ink.



apparatus B

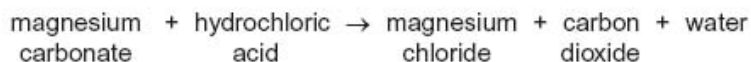
not to scale

Why is the condenser in **apparatus A** better than the glass tube and beaker of water in **apparatus B**?

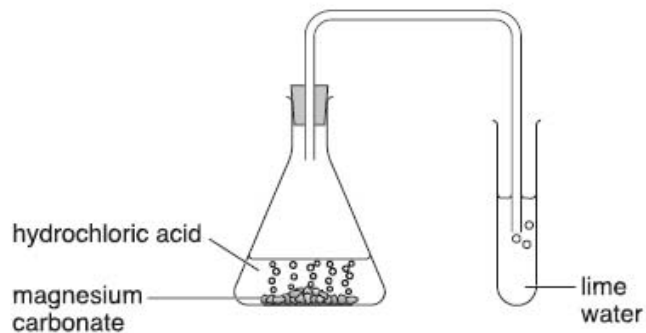
1 mark

Q 3.

The word equation for the reaction between magnesium carbonate and hydrochloric acid is shown below.



- (a) Sadiq added hydrochloric acid to magnesium carbonate in a flask.



- (i) Suggest the pH of hydrochloric acid.

1 mark

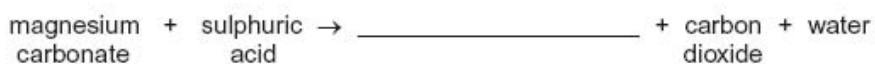
- (ii) The carbon dioxide produced was bubbled through lime water.

How would the lime water change?

1 mark

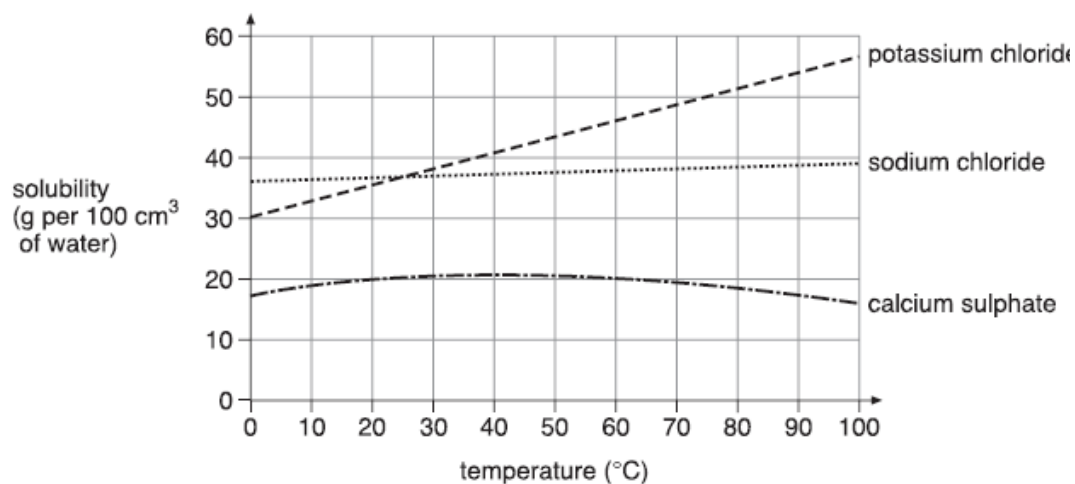
- (b) Sadiq repeated the experiment by adding **sulphuric acid** to magnesium carbonate.

Complete the word equation for the reaction that took place.



1 mark

Q 4. The graph below shows how the solubility of three salts, sodium chloride, potassium chloride and calcium sulphate, changes as the temperature changes.



(a) (i) Use the graph above to compare the solubility of sodium chloride and potassium chloride in the temperature range 10°C to 90°C.

1 mark

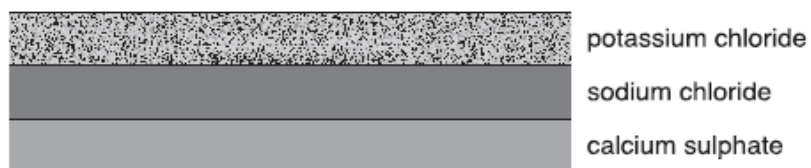
(ii) Ken had a beaker containing 54 g of potassium chloride dissolved in 100 cm³ of water at 90°C. He cooled the solution to 40°C.

What would he see in the beaker as the solution cooled to 40°C?
Use the graph to help you.

Explain your answer.

1 mark

- (b) The water in a lake had the three salts dissolved in it. The water evaporated from the lake and the salts were deposited in layers in the order shown below.



Look at the graph on the opposite page.

- (i) What evidence is there that these three salts were deposited at a temperature above 25°C?

1 mark

- (ii) In what order would the salts be deposited at 10°C?

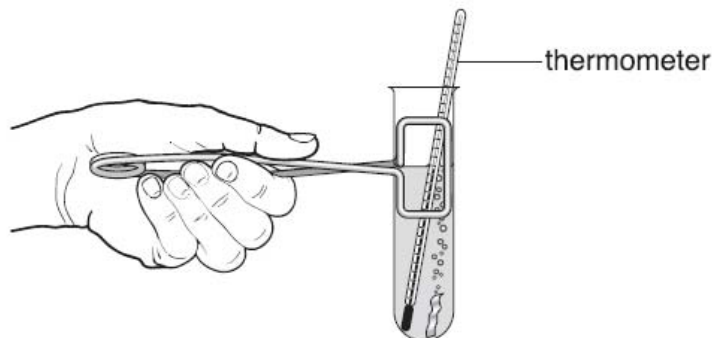
top _____

middle _____

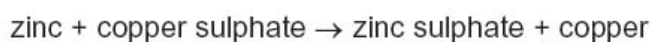
bottom _____

1 mark

- Q 5.** Harry mixed zinc with copper sulphate solution in a test-tube. A displacement reaction took place and the temperature increased.



- (a) The word equation for the reaction is shown below.



Why is this reaction called a displacement reaction?

1 mark

- (b) Harry repeated the experiment with two other metals. He wanted to calculate the temperature rise each time. His results are shown below.

metal added to copper sulphate	temperature at the start (°C)	highest temperature reached (°C)	rise in temperature (°C)
zinc	20.0	36.5	16.5
iron	25.5	38.5	13.0
magnesium	19.5	87.5	68.0

Harry used different starting temperatures. Explain why this did **not** affect his results.

1 mark

(c) Part of the reactivity series of metals is shown below.

most reactive	sodium
	calcium
	magnesium
	aluminium
	zinc
	iron
least reactive	lead
	copper

Use the reactivity series above to answer all the questions below.

(i) Why was the highest rise in temperature obtained with magnesium and copper sulphate?

1 mark

(ii) Why was the rise in temperature obtained with zinc and copper sulphate **not** much higher than the rise in temperature obtained with iron and copper sulphate?

1 mark

(iii) In which of the following mixtures would there be a rise in temperature? Write **yes** or **no** in each blank box.

mixture	Would there be a rise in temperature?
aluminium + sodium chloride	
calcium + zinc sulphate	
lead + zinc chloride	
magnesium + iron chloride	