

Atoms

Question Paper

Level	GCSE
Subject	Chemistry
Exam Board	Edexcel IGCSE
Module	Double Award (Paper 1C)
Topic	Principles of Chemistry
Sub-Topic	Atoms
Booklet	Question Paper

Time Allowed: 82 minutes

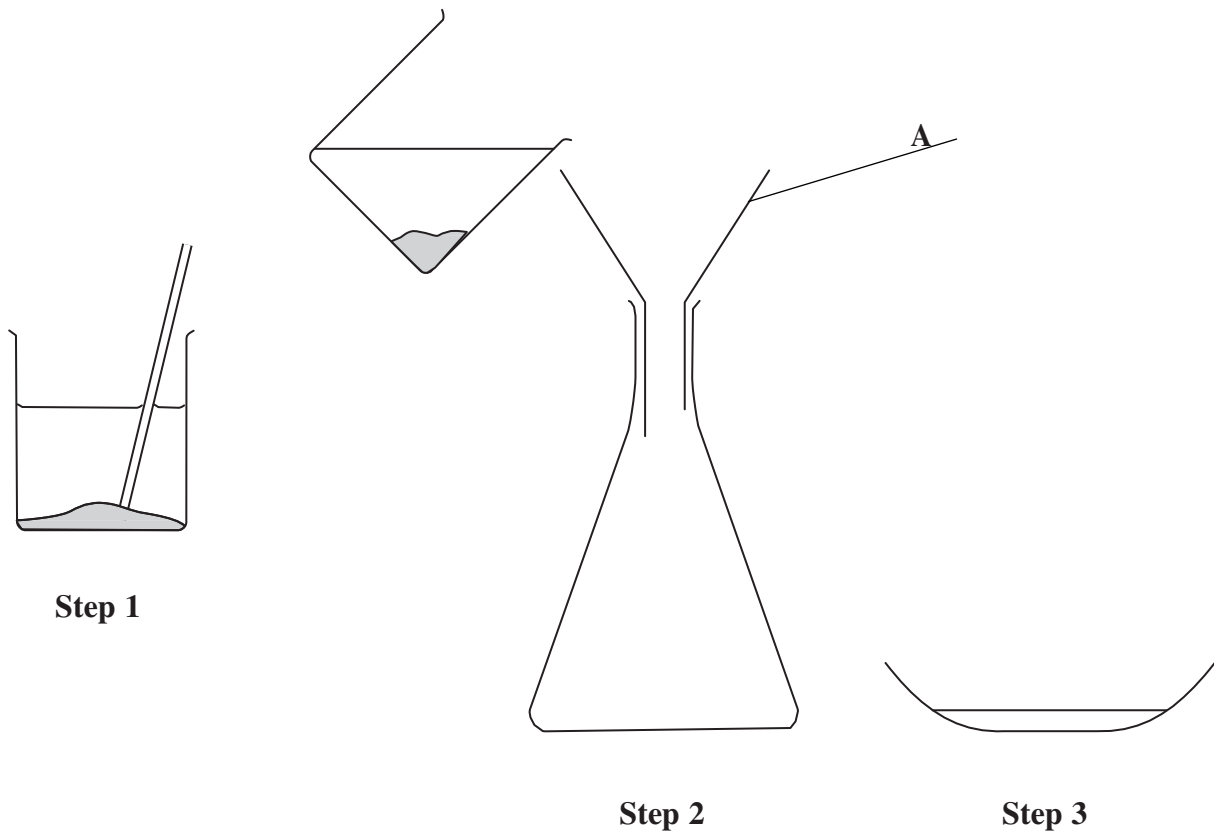
Score: /68

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	70%	60%	55%	50%	<50%

- 1 Salt is soluble in water, but sand is insoluble in water. This difference allows a mixture of salt and sand to be separated using this apparatus.



- (a) Use words from the box to complete the sentences. Each word may be used once, more than once or not at all.

(6)

beaker	Bunsen burner	burette	conical flask
funnel	glass rod	thermometer	water

In **Step 1**, the mixture of salt and sand is placed in a
 containing and stirred with a

In **Step 2**, the mixture from **Step 1** is poured through a
 into a

In **Step 3**, the liquid is transferred to a basin to allow the.....

(b) (i) What should be placed in **A** before the mixture from **Step 1** is poured through it? (1)

(ii) What is the solid removed in **Step 2**? (1)

(c) Place crosses (☒) in **two** boxes to show the names of two processes used in this separation. (2)

- chromatography
- condensation
- distillation
- evaporation
- filtration
- sublimation

(Total for Question 1 = 10 marks)

2 Ammonium chloride contains oppositely charged ions.

(a) State the formula of each ion.

(2)

Positive ion

Negative ion

(b) (i) Describe a chemical test to show that a substance contains ammonium ions.

(3)

.....
.....
.....
.....
.....
.....
.....

(ii) Describe a chemical test to show that a substance contains chloride ions.

(3)

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.....
.....
.....
.....
.....
.....

(c) Ammonium chloride decomposes when heated:

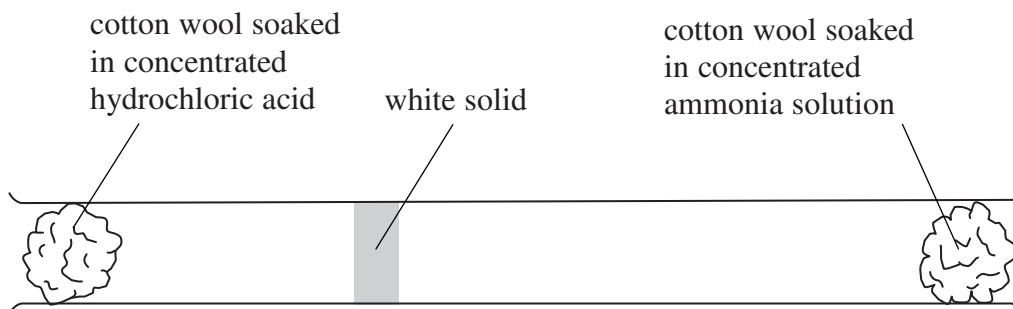


What does the \rightleftharpoons symbol indicate about the reaction?

(1)

.....
.....

(d) The reaction between ammonia and hydrogen chloride can be used to illustrate diffusion with the following apparatus.



After a few minutes, a white solid appears inside the tube.

(i) Identify the white solid. (1)

(ii) What does the diagram show about the speed of the ammonia molecules compared to the speed of the hydrogen chloride molecules? (1)

(e) State the main hazard when using concentrated hydrochloric acid in the experiment in (d).

Suggest **one** precaution you could use to minimise this hazard. (2)

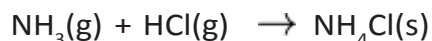
Hazard

Precaution

(Total for Question 2 = 13 marks)

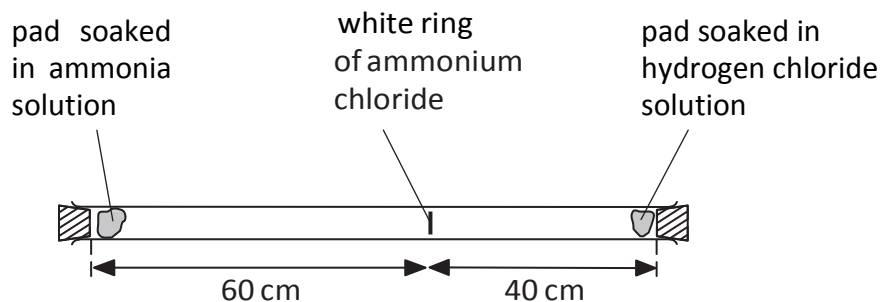
- 3 When ammonia gas and hydrogen chloride gas mix, they react together to form a white solid called ammonium chloride.

The equation for the reaction is:



A cotton wool pad was soaked in ammonia solution and another was soaked in hydrogen chloride solution. The two pads were then put into opposite ends of a dry glass tube at the same time.

After five minutes, a white ring of solid ammonium chloride formed.



- (a) (i) What name is given to the movement of the two gases?

(1)

- (ii) Identify which gas is moving faster and give a reason for your choice.

(1)

- (b) The experiment was repeated at a higher temperature.

State and explain how this change would affect the time taken for the white ring to form.

(3)

(c) Gas particles move at a speed of several hundred metres per second at room temperature.

Suggest **one** reason why it took five minutes for the white ring to form.

(1)

.....

.....

(Total for Question 3 = 6 marks)

4 This question is about the element beryllium.

(a) Use words from the box to complete the sentences about beryllium.

Each word may be used once, more than once or not at all.

(7)

Electrons	negative	neutral	neutrons
Nucleus	positive	protons	shells

An atom of beryllium has a central that contains particles called and Around these particles there are orbiting in

An atom of beryllium has no charge because it contains equal numbers of and

The particles with the lowest mass in an atom of beryllium are called

(b) Beryllium forms a compound with the formula $\text{Be}(\text{OH})_2$

(i) How many different elements are there in $\text{Be}(\text{OH})_2$?

(1)

(ii) What is the total number of atoms in the formula $\text{Be}(\text{OH})_2$?

(1)

(Total for Question 4 = 9 marks)

5 Rock salt is a mixture of salt and sand. Crystals of pure salt can be obtained from rock salt by using the method below.

Use words from the box to complete the sentences.

You may use each word once, more than once or not at all.

(5)

crystals dissolve evaporate filter solution solvent

- Grind the rock salt into a fine powder.
- Add the powder to hot water and stir to the salt.
- Filter the mixture. The salt passes through the filter paper leaving behind the sand.
- Boil the filtrate to some of the water.
- Leave the saturated solution to cool so that of salt form.
- Finally, the cold mixture to separate the crystals from the remaining solution.

(Total for Question 5 = 5 marks)

6 This is a description of how the orange colouring can be extracted from rose petals.

- crush the petals using a pestle and mortar
- add the crushed petals to some ethanol in a beaker
- heat to about 60°C and stir to produce an orange solution
- separate the orange solution from the petals

(a) (i) Suggest why ethanol is used instead of water.

(1)

(ii) Ethanol is a flammable liquid.

Suggest how it could be heated safely.

(1)

(iii) How could the orange solution be separated from the petals?

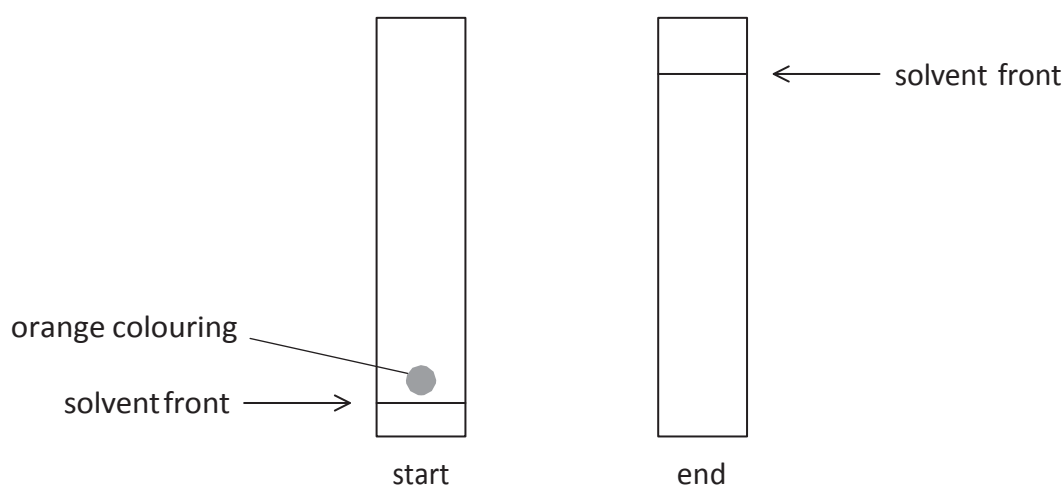
(1)

(b) The orange colouring is analysed using chromatography and is found to consist of two different colours, red and yellow.

The diagram shows the chromatography paper at the start of the experiment.

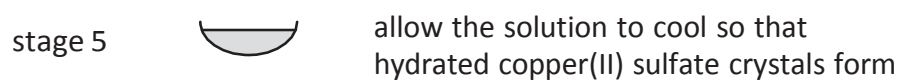
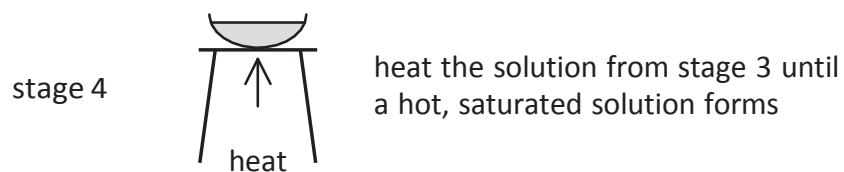
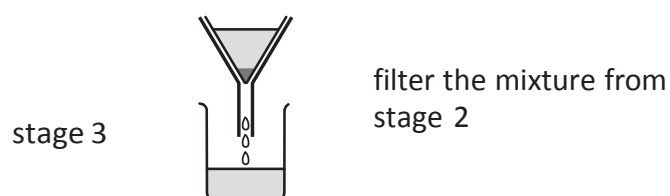
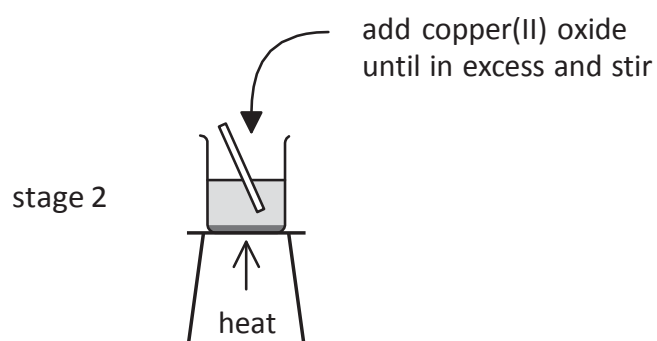
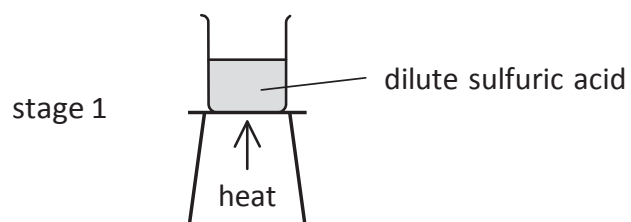
Complete the diagram to show a possible result at the end of the experiment.

(2)



(Total for Question 6 = 5 marks)

7 The diagram shows how hydrated copper(II) sulfate crystals can be made by reacting copper(II) oxide with dilute sulfuric acid.



(a) Why is the sulfuric acid heated in stage 1?

(1)

.....
.....

(b) How would you know when the copper(II) oxide is in excess in stage 2?

(1)

.....
.....

(c) Why is the mixture filtered in stage 3?

(1)

.....
.....

(d) Why do crystals form when the hot saturated solution is cooled in stage 5?

(1)

.....
.....

(e) State the colour of the crystals formed in stage 5.

(1)

.....

(f) The crystals are removed by filtration and then dried.

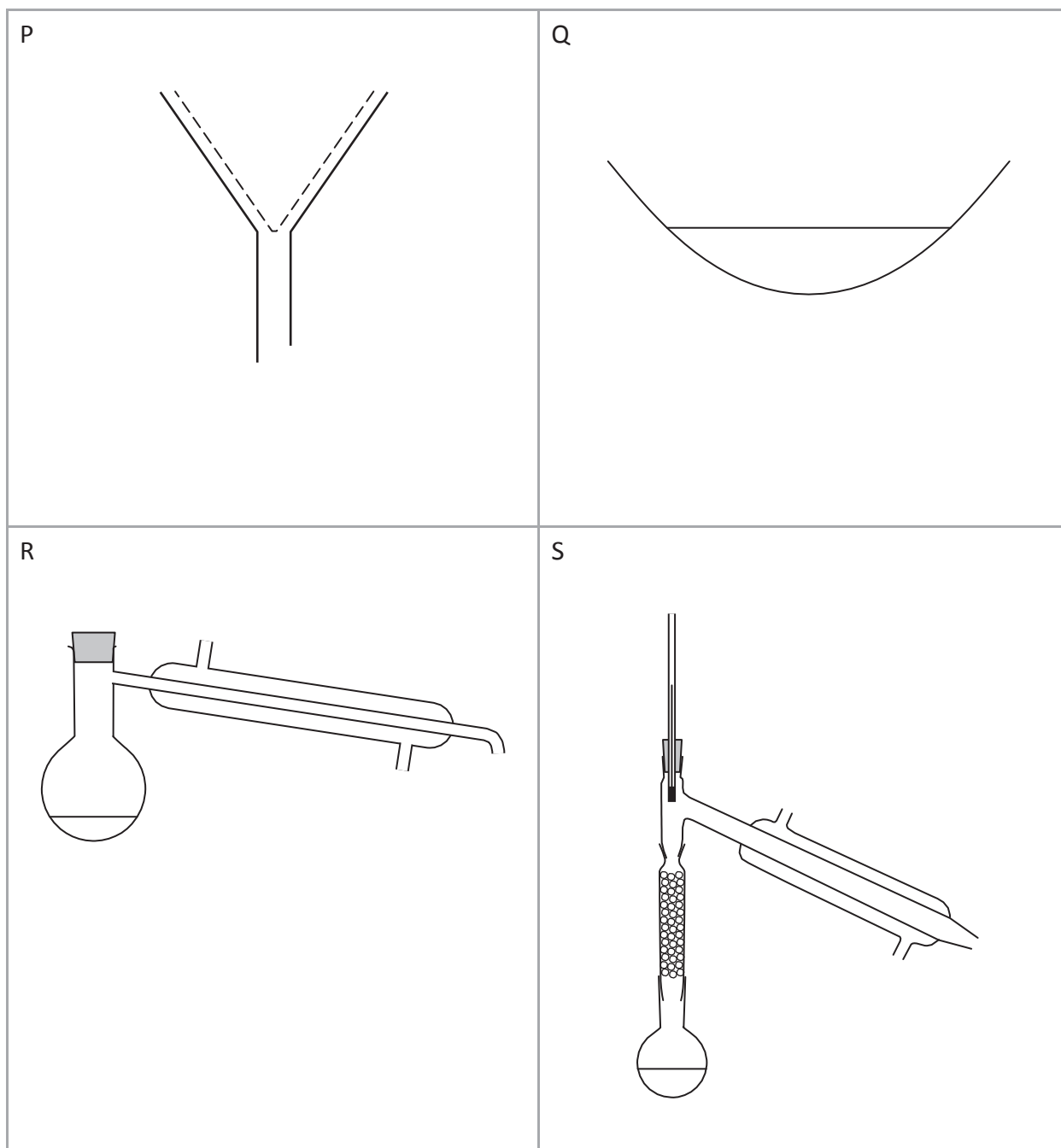
Suggest a suitable method of drying the crystals.

(1)

.....
.....

(Total for Question 7 = 6 marks)

8 The diagram shows four pieces of apparatus used in the separation of mixtures.



(a) (i) The apparatus labelled P is used for

(1)

- A crystallisation
- B filtration
- C fractional distillation
- D simple distillation

(ii) The apparatus labelled S is used for

(1)

- A crystallisation
- B filtration
- C fractional distillation
- D simple distillation

(b) (i) Which method of separation should be used to obtain sand from a mixture containing salt, sand and water?

(1)

- A crystallisation
- B filtration
- C fractional distillation
- D simple distillation

(ii) Which method of separation should be used to obtain pure water from a mixture containing salt, sand and water?

(1)

- A crystallisation
- B filtration
- C fractional distillation
- D simple distillation

(iii) Which method of separation should be used to obtain copper(II) sulfate from a mixture containing copper(II) sulfate and water?

(1)

- A crystallisation
- B filtration
- C fractional distillation
- D simple distillation

(ii) Suggest why food colouring F did not move during the experiment. (1)

.....

.....

(iii) How many food dyes are there in food colouring E? (1)

.....

(iv) How many known food dyes are there in food colouring H? (1)

.....

(v) Dyes are often identified by their R_f values.

$$R_f = \frac{\text{distance moved by dye}}{\text{distance moved by solvent}}$$

Record the results for the dye in G and calculate its R_f value.

(3)

distance moved by dye in mm	
distance moved by solvent in mm	
R_f value of G	

(Total for Question 8 = 14 marks)
