

Diffusion, Brownian Motion, Solids/Liquids/Gases

Question Paper

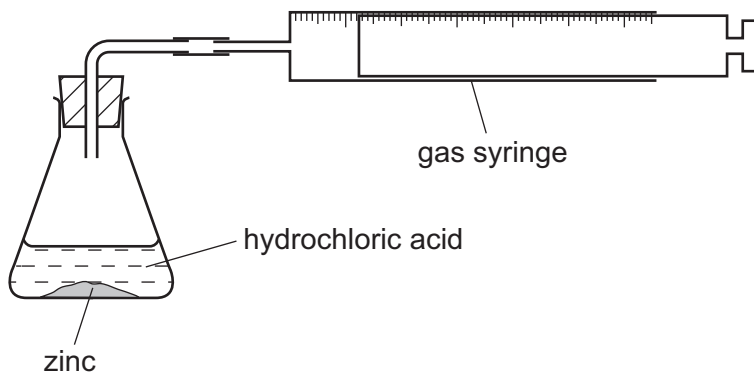
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|-------------------|---|
| Level | IGCSE |
| Subject | Chemistry |
| Exam Board | CIE |
| Topic | The Particulate nature of matter |
| Sub-Topic | Diffusion, Brownian Motion, Solids/Liquids/Gases |
| Paper Type | Alternative to Practical |
| Booklet | Question Paper |

Time Allowed: 46 minutes

Score: /38

Percentage: /100

- 1 A student investigated the reaction of zinc powder with dilute hydrochloric acid using the apparatus below.

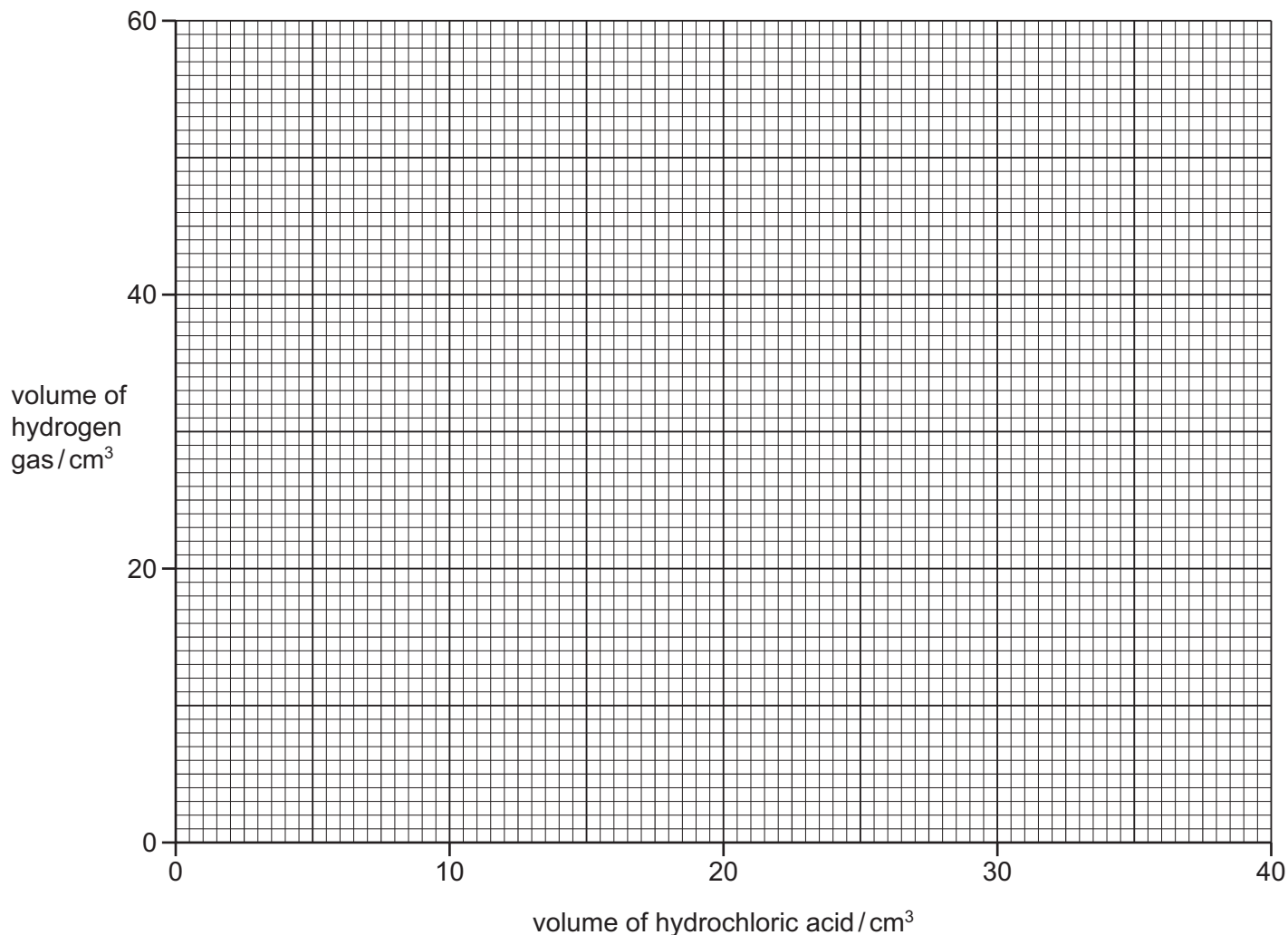


The same mass of zinc was added to different volumes of hydrochloric acid at room temperature, 20 °C. The total volume of hydrogen gas given off in each experiment was measured.

- (a) Use the gas syringe diagrams to record the volumes of hydrogen gas in the table.

| volume of hydrochloric acid / cm ³ | gas syringe diagram | volume of hydrogen gas / cm ³ |
|---|---------------------|--|
| 0 | | |
| 5 | | |
| 10 | | |
| 15 | | |
| 20 | | |
| 30 | | |
| 40 | | |

(b) On the grid, plot the points and draw a smooth line graph.



[4]

(c) Which point is inaccurate?

..... [1]

(ii) Suggest a possible reason for this inaccurate measurement.

..... [1]

(iii) **Use your graph** to work out the volume that would be expected to be formed. Show clearly **on the grid** how you got your answer.

..... [2]

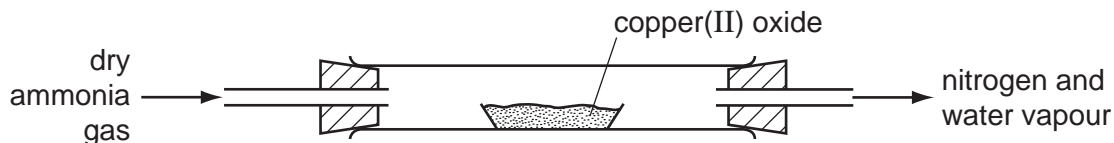
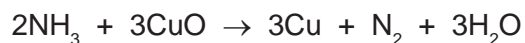
(d) Explain why the volume of hydrogen gas does not increase after 30 cm³ of hydrochloric acid.

.....
 [2]

(e) Sketch on the grid the graph you would expect if the experiments were repeated using the same mass of zinc granules. [2]

[Total: 15]

- 2 A student reacted dry ammonia gas with hot copper(II) oxide.
The apparatus used is shown below.
The equation for the reaction is



- (a) Indicate with an arrow where the heat is applied. [1]
- (b) The colour of the copper(II) oxide would change
from to [2]
- (c) Draw a labelled diagram to show how liquid water could be obtained from the water vapour produced.

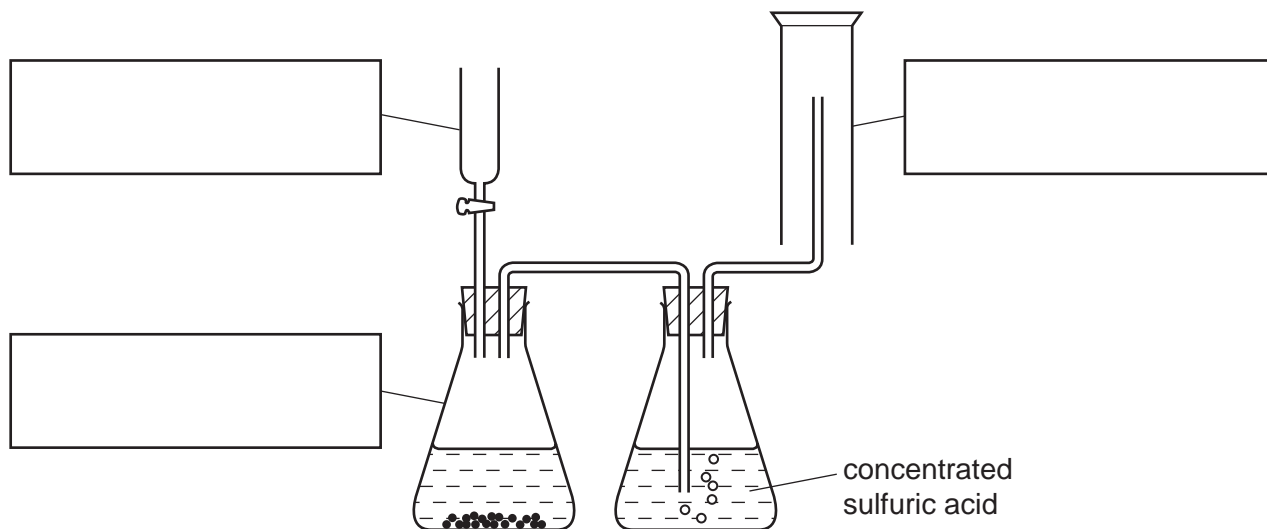
[2]

- (d) Suggest the effect of nitrogen on a lighted splint.

..... [1]

[Total: 6]

3 The diagram shows the apparatus used to prepare a gas. The gas is more dense than air.



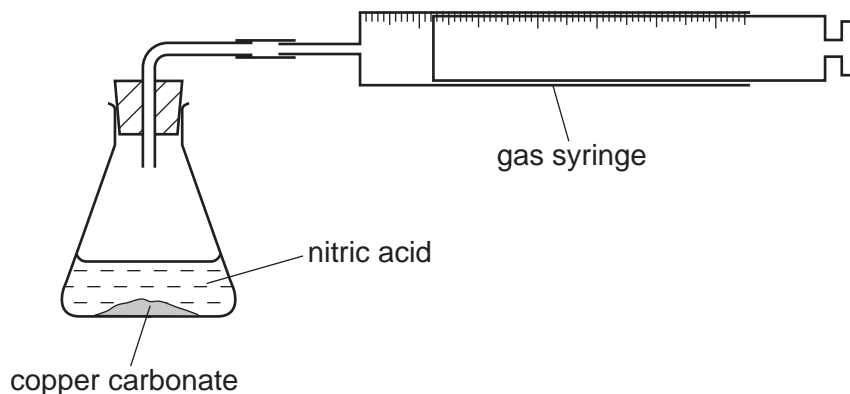
(a) Complete the boxes to name the apparatus. [3]

(b) Identify **one** mistake in the diagram.
..... [1]

(c) Suggest a reason why the gas is passed through concentrated sulfuric acid.
..... [1]

[Total: 5]

- 4 The speed of reaction between excess copper carbonate and dilute nitric acid was investigated using the apparatus below.
The temperature of the nitric acid was 20 °C.

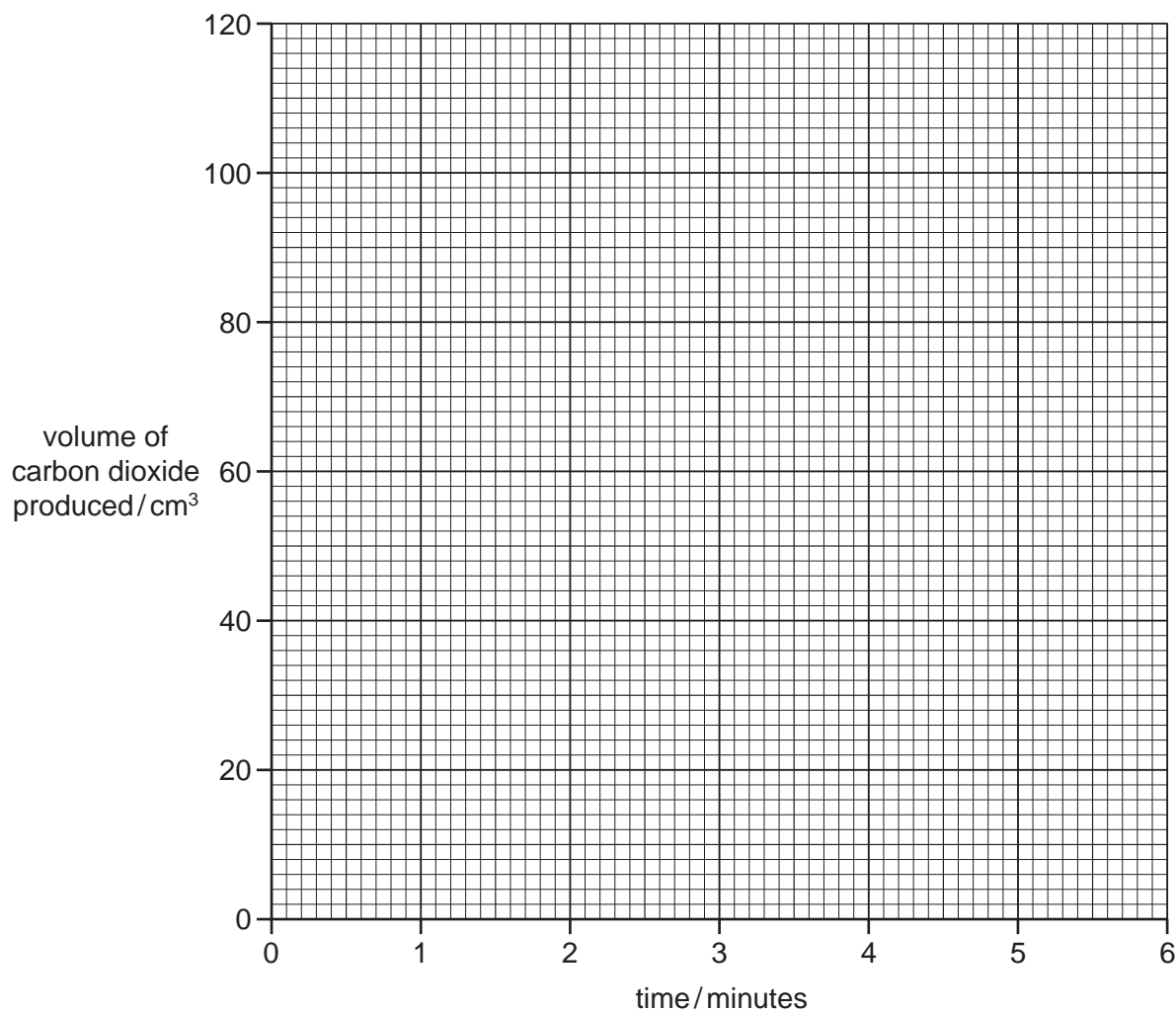


The volume of carbon dioxide produced was measured every minute for six minutes.

(a) Use the gas syringe diagrams to complete the table of results.

| time / minutes | gas syringe diagram | total volume of carbon dioxide produced / cm ³ |
|----------------|---------------------|---|
| 0 | | |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |

(b) Plot the results on the grid below and draw a smooth line graph.



[4]

(c) Which point appears to be inaccurate? Explain why.

.....
 [2]

(d) Sketch on the grid, the graph you would expect if the experiment was repeated using nitric acid at a temperature of 60 °C. [2]

[Total: 12]