

Carbonates

Question Paper 1

Level	IGCSE
Subject	Chemistry
Exam Board	CIE
Topic	Carbonates
Sub-Topic	
Paper Type	Alternative to Practical
Booklet	Question Paper 1

Time Allowed: 45 minutes

Score: /37

Percentage: /100

- 1 A student investigated the reaction between aqueous sodium carbonate and two different solutions of dilute hydrochloric acid, **A** and **B**.
The reaction is:



Three experiments were carried out.

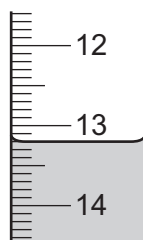
(a) *Experiment 1*

Using a measuring cylinder, 25 cm³ of aqueous sodium carbonate were poured into a conical flask.

Thymolphthalein indicator was added to the conical flask.

A burette was filled up to the 0.0 cm³ mark with solution **A** of dilute hydrochloric acid. **A** was added to the flask, until the solution just changed colour.

Use the burette diagram to record the reading in the table.



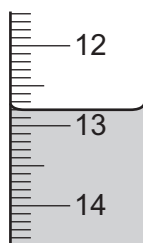
final reading

Experiment 2

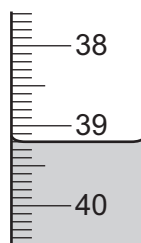
Experiment 1 was repeated using methyl orange indicator instead of thymolphthalein.

Methyl orange is red-orange in acidic solutions and yellow in alkaline solutions.

Use the burette diagrams to record the readings in the table and complete the table.



initial reading



final reading

	experiment 1	experiment 2
final burette reading / cm ³		
initial burette reading / cm ³		
difference / cm ³		

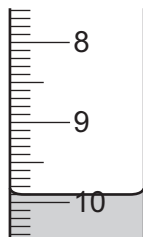
(b) What colour change was observed in the flask in experiment 2?

from to [1]

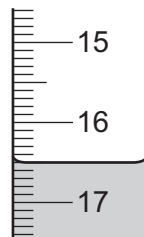
(c) Experiment 3

Experiment 1 was repeated using solution **B** of acid instead of solution **A**.

Use the burette diagrams to record the readings in the table and complete the table.



initial reading



final reading

	experiment 3
final burette reading / cm ³	
initial burette reading / cm ³	
difference / cm ³	

[2]

(d) Suggest **one** observation, other than colour change, that is made when hydrochloric acid is added to sodium carbonate.

..... [1]

(e) Complete the sentence below.

Experiment needed the largest volume of hydrochloric acid to change the colour of the indicator. [1]

(f) What would be a more accurate method of measuring the volume of the aqueous sodium carbonate?

..... [1]

- (g) What would be the effect on the results, if any, if the solutions of sodium carbonate were warmed before adding the hydrochloric acid? Give a reason for your answer.

effect on results

reason

[2]

- (h) (i) Determine the ratio of volumes of dilute hydrochloric acid used in experiments 1 and 3.

..... [1]

- (ii) Use your answer to (h)(i) to deduce how the concentration of solution **A** differs from that of solution **B**.

..... [1]

- (i) Suggest a **different** method, using standard laboratory chemicals, to determine which of the solutions of dilute hydrochloric acid, **A** or **B**, is more concentrated.

.....
.....
.....
.....
..... [3]

[Total: 17]

2 Calcium burns in air to form calcium oxide. The reaction is vigorous and some of the calcium oxide can be lost as smoke.

Plan an investigation to determine the maximum mass of oxygen that combines to form calcium oxide when 2g of calcium granules are burnt in air.

You are provided with common laboratory apparatus and calcium granules.

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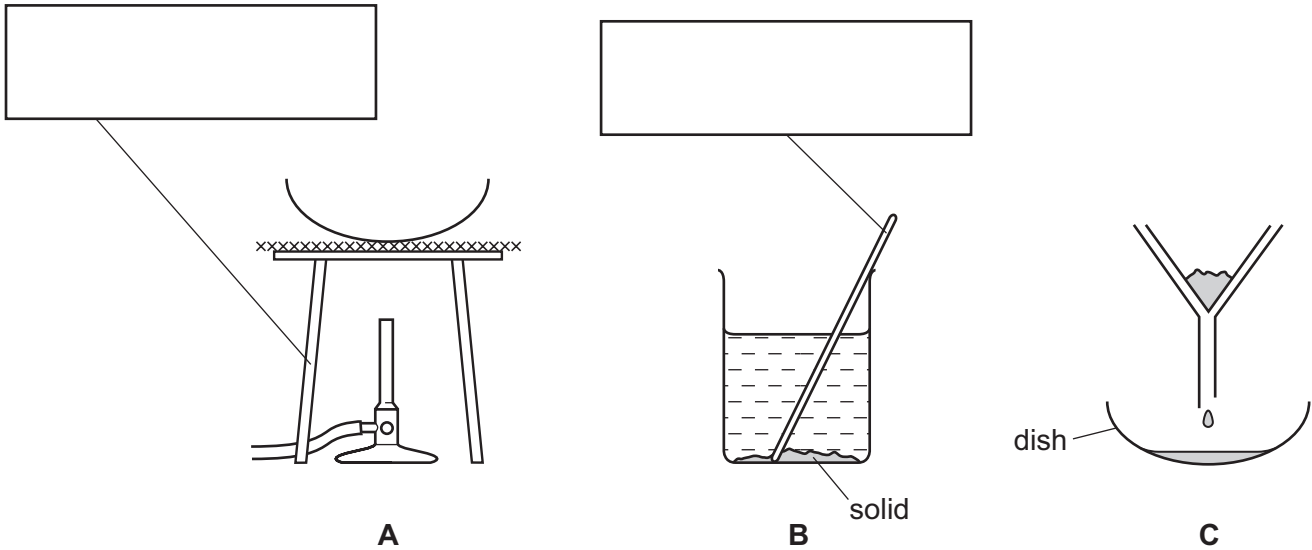
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[6]

[Total: 6]

- 3 The diagrams show the apparatus used to obtain crystals of calcium chloride from a mixture of solid calcium chloride and solid calcium carbonate.
Calcium chloride is soluble in water and calcium carbonate is insoluble in water.



(a) Complete the boxes to name the apparatus. [2]

(b) (i) Write down the order in which the apparatus should be used in this experiment. [1]

.....

(ii) Name the separation process in C. [1]

.....

(c) (i) What has been added to the mixture in B? [1]

.....

(ii) What is the general name given to the liquid in the dish in C? [1]

.....

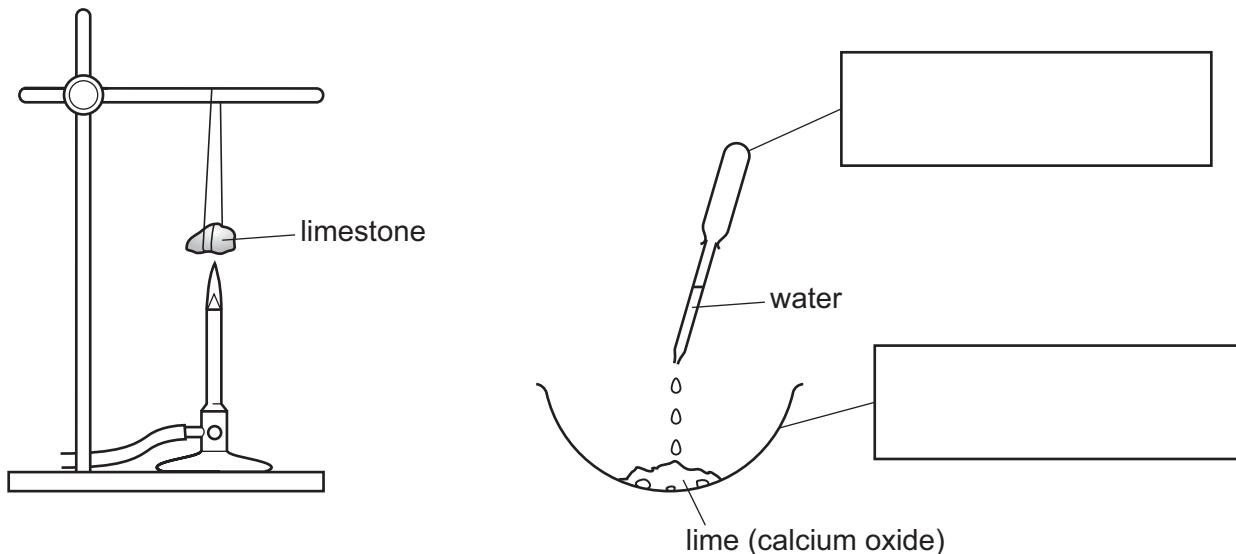
(d) How would you know when to stop heating the dish in A? [1]

.....

.....

[Total: 7]

- 4 A piece of limestone was heated strongly for ten minutes. The solid was then left to cool. Cold water was added to the solid. The solid reacted with the water to form a solution, **A**.



(a) Complete the boxes to label the pieces of apparatus. [2]

(b) Suggest what could be used to hang the piece of limestone from the stand over the heat. Explain your answer.

.....

 [2]

(ii) In what position should the air hole of the Bunsen burner be?

..... [1]

(c) Predict the effect of

(i) solution **A** on pH indicator paper,

..... [1]

(ii) carbon dioxide on solution **A**.

..... [1]

[Total: 7]