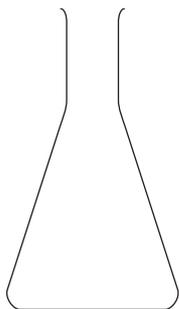


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1. (a) All of these pieces of apparatus are used for Chemistry practical work.

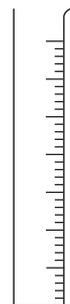
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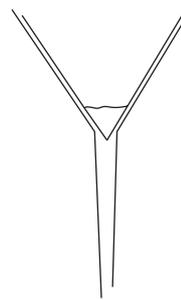
A



B



C



D

Name each piece of apparatus

A

B

C

D

(4)

(b) Which of the above pieces of equipment would you use to:

(i) measure out **roughly** 25 cm³ of liquid?

.....

(ii) measure out **exactly** 25 cm³ of liquid?

.....

(iii) separate clear water from a mixture of sand and water?

.....

(3)

Q1

(Total 7 marks)

--

2. (a) Some chemical tests are given below. Match up the chemical tests with the boxes shown on the right, by joining the boxes with straight lines. One has been done for you.

Leave blank

Chemical Test	Substance Tested For
This gas “pops” when a lighted splint is put into a test tube of gas.	An acid
This liquid turns universal indicator solution to red.	Hydrogen
This gas relights a glowing splint.	Oxygen
When this gas is bubbled through lime water, the lime water turns cloudy.	Carbon dioxide

(2)

- (b) Wasim was asked by his teacher to identify a white, powdery solid, labelled X. He carried out two tests. The results of these are given below.

Test	Procedure	Result
1	I dipped a wire loop into some concentrated hydrochloric acid. I then dipped the loop into powder X, and then put the wire into a colourless bunsen burner flame.	The bunsen flame turned bright orange/yellow.
2	I dissolved some of powder X in a little cold water, and added a few drops of dilute acid, followed by some barium chloride solution.	A thick white precipitate formed in the test tube.

- (i) In test 1, why was the wire loop dipped into the acid?

..... (1)

- (ii) From the result of test 1, suggest the identity of the metal in X.

..... (1)

- (iii) From the result of test 2 what is the chemical name for powder X?

..... (1)

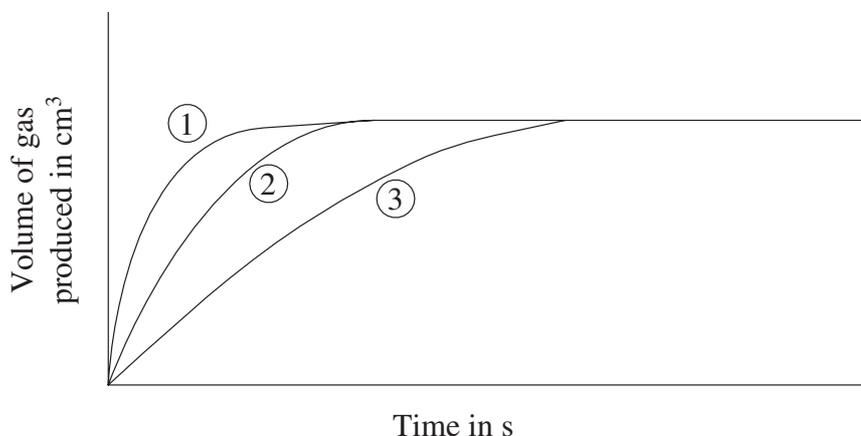
Q2

(Total 5 marks)

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Turn over

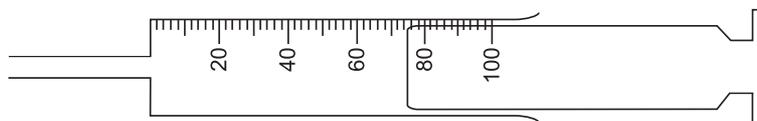
3. A student carried out an experiment to investigate the rate of reaction between magnesium ribbon and dilute hydrochloric acid. He carried out the reaction three times. He used different lengths of magnesium ribbon in each experiment. The sketch graph below shows his results.



- (a) (i) Which gas is produced when the metal magnesium reacts with hydrochloric acid?

..... (1)

- (ii) The student uses a gas syringe to collect the gas and measure its volumes accurately.



What is the reading on the gas syringe? cm³ (1)

- (b) (i) In which graph (1, 2 or 3) was the reaction finished in the shortest time?

..... (1)

- (ii) Name **two** things the student should have done to make each experiment a **fair test**.

1

2

(2)

- (c) Sophie carried out another investigation, to find out how the rate of reaction between 20 g of marble pieces and 40 cm³ of 2M hydrochloric acid is affected when the size of the pieces of marble is changed.

Sophie predicted that the reaction would be quickest with the largest pieces of marble.

She recorded the volume of gas given off every minute from 0 to 6 minutes. All data is given in cm³.

Her results were:

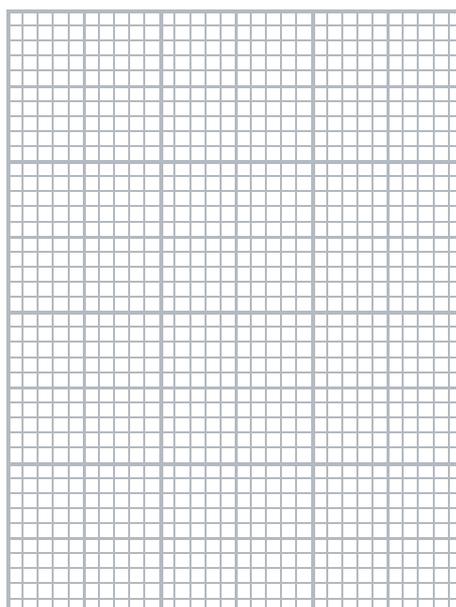
Expt 1	Using large marble pieces	0, 17, 30, 43, 53, 60, 60
Expt 2	Using medium sized marble pieces	0, 30, 40, 57, 60, 60, 60

- (i) Display her results in two tables, one for large marble pieces and one for medium sized marble pieces. Each table should show columns for time and volume of gas given off. Include units.

(2)

- (ii) Using the results given, plot two graphs of volume of gas released against time on the grid below. Draw two smooth line curves, on the same axes. Clearly label each line.

Volume of
gas released in
cm³



Time

(2)

Turn over

(iii) Give one similarity between the results of the two experiments.

.....
(1)

(iv) Give a reason for this similarity.

.....
(1)

(v) Sketch on your graph the shape of the line you would expect to see when Sophie repeated the test using 20 g of marble pieces ground to a **powder** and 40 cm³ of 2M hydrochloric acid.

(1)

(vi) Circle one point on your graph to show an anomalous result.

(1)

(vii) Given that Sophie found one anomalous result, what should she have done to check the accuracy of her other results?

.....
(1)

(Total 14 marks)

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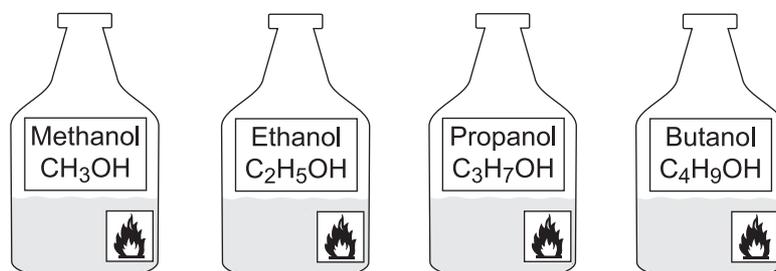
Q3

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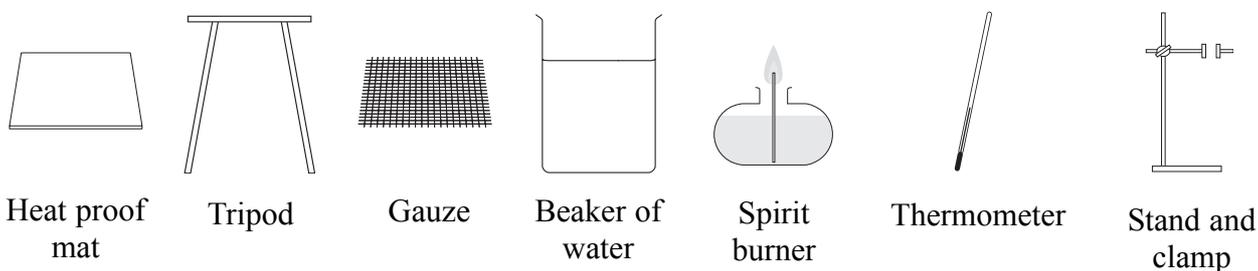
4. Rohan wanted to carry out an investigation, on the combustion of alcohols. He wanted to find out if there is any relationship between the number of carbon atoms in the molecules of four alcohols, and the heat energy released when the alcohols are burned in air.

Leave blank

The alcohols available to Rohan were:



Here is Rohan's equipment:



- (a) (i) In the space below, draw a diagram to show how Rohan should have assembled his equipment in order to carry out the task.

(2)

QUESTION CONTINUES ON THE NEXT PAGE

Turn over

(ii) Here are four steps Rohan took to carry out the task – **BUT NOT IN ORDER**.

Step 1 – Measure the water temperature after the alcohol has burned for 20 seconds.

Step 2 – Weigh out 2 g of each alcohol, in turn, into the crucible.

Step 3 – Pour 100 cm³ water into the beaker, and set up as shown in the diagram.

Step 4 – Ignite each alcohol in turn, and allow it to burn for 20 seconds.

What is the **correct** order in which to carry out these four steps?

.....
(1)

(iii) There is at least one step missing from Rohan's list. What else should Rohan have done before starting his tests?

.....
(1)

(iv) Give **two** safety precautions Rohan should have taken in order to carry out the tests in a safe way.

1

2

(2)

(v) List **two** things Rohan should have done in order to make his experiment a fair test:

1

2

(2)

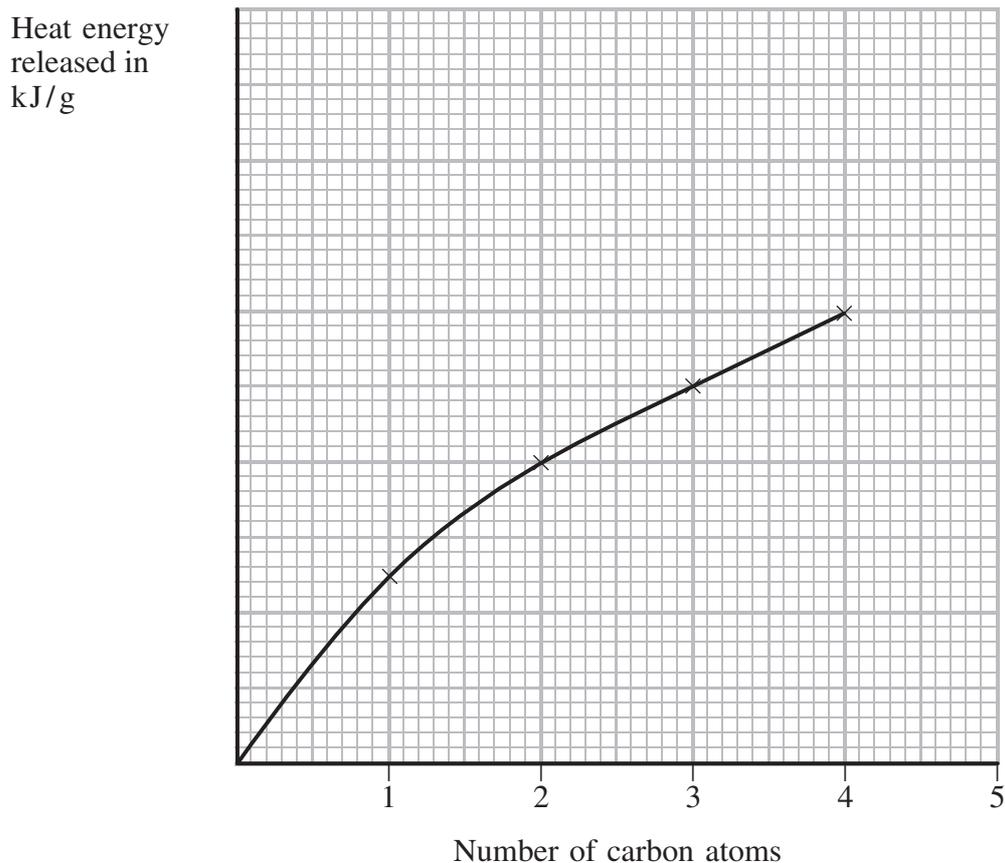
(vi) Suggest **one** change that could be made to the experiment to obtain more accurate results.

.....

.....
(1)

(b) The graph below shows Rohan's results.

Leave blank



(i) What conclusions can you draw from the shape of the graph?

.....

.....

.....

.....

.....

(2)

(ii) Show on the graph how Rohan could predict the value for the heat energy released for an alcohol containing 5 carbon atoms.

(1)

Q4

(Total 12 marks)

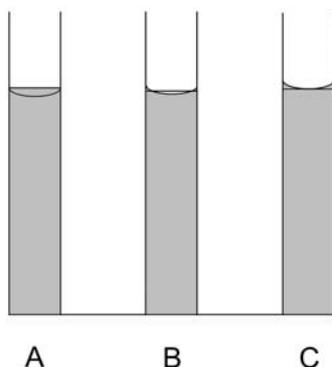
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Turn over

5. In an experiment, 25.0 cm^3 portions of sodium hydroxide solution, of unknown concentration, were titrated against hydrochloric acid of concentration $0.050 \text{ mol dm}^{-3}$.

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(a) (i) The following diagram shows the level of solution in a pipette.



In which pipette is the level of solution correct? (1)

(ii) State one precaution that should be taken when using a pipette to transfer the sodium hydroxide solution.

.....
..... (1)

(b) The following diagram shows the level of hydrochloric acid in the burette.



The reading on the burette = cm^3 (1)

(c) The following table shows the volume of hydrochloric acid used in three accurate titrations.

Leave blank

	1st titration	2nd titration	3rd titration
Final burette reading	20.3	40.1	31.5
Initial burette reading	0.6	20.3	11.9
Volume used / cm ³	19.7		

(i) Complete the table.

(2)

(ii) Calculate the average volume used.

.....
.....

(1)

Q5

(Total 6 marks)

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