LEVEL-8

CHEMISTRY

REVISION WORKSHEET-3

2019-20

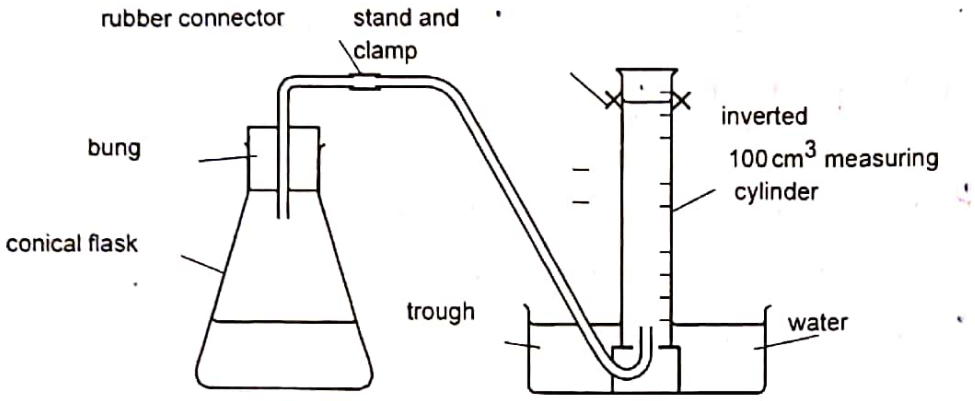
Paper-6

1. (1) A student investigated the rate of reaction between excess magnesium and two different dilute acids, X and Y.

Two experiments were carried out.

Experiment 1

The apparatus was set up as shown in the diagram. **(2016-SP-06)**



Using a measuring cylinder, 50 cm^3 of dilute acid X was poured into the conical flask.
0.5 g of magnesium ribbon was added to the conical flask and the bung added.

The timer was started and the volume of gas collected in the measuring cylinder was measured every 30 seconds for three minutes.

Use the measuring cylinder diagrams to record the volumes of gas collected.

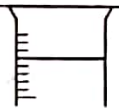
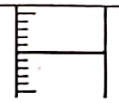
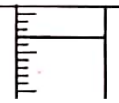
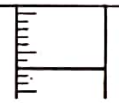
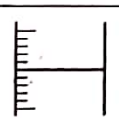
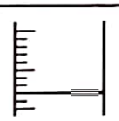
time/s	measuring cylinder diagram	total volume of gas collected/ cm^3
0	0 5 10 	0
30	10 15 20 	13
60	20 25 30 	22
90	25 30 35 	30
120	30 35 40 	36
150	40 45 50 	43
180	45 50 55 	49

[2]

Experiment 2

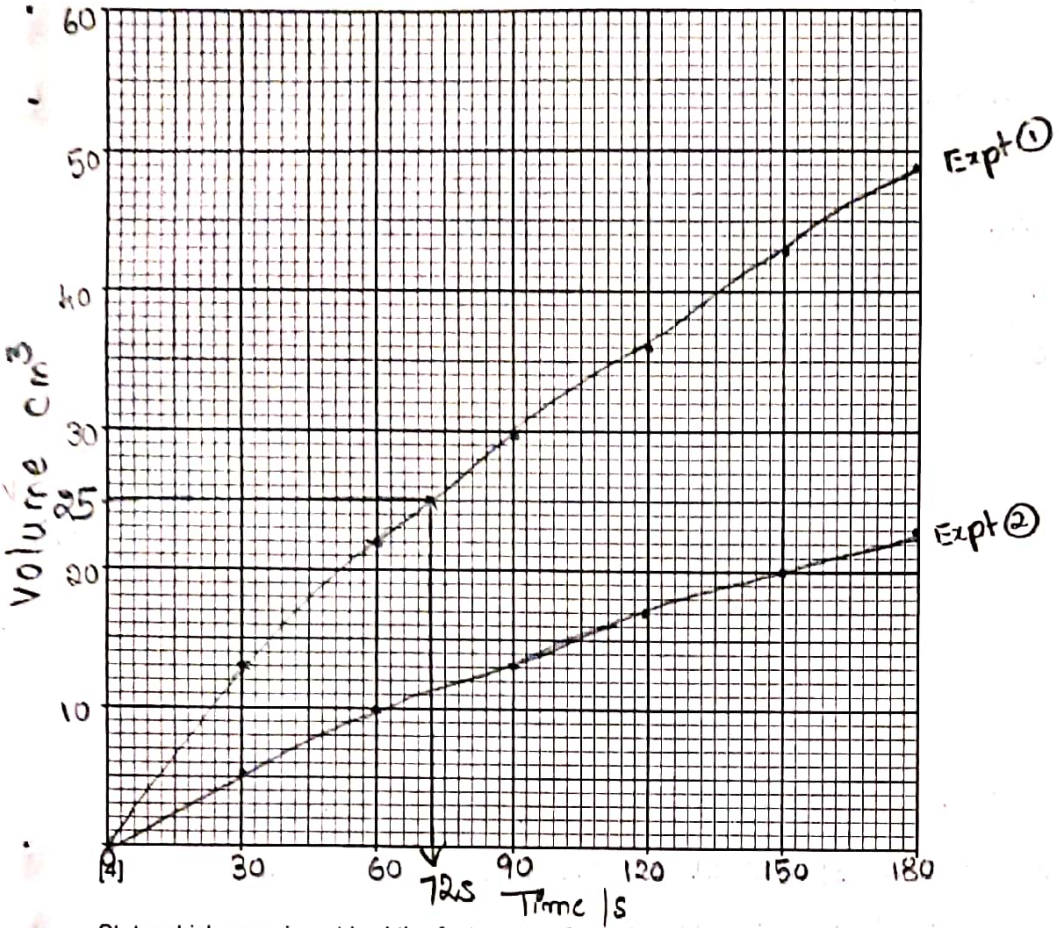
Experiment 1 was repeated using 50 cm^3 of dilute acid Y.

Use the measuring cylinder diagrams to record the volumes of gas collected.

time/s	measuring cylinder diagram	total volume of gas collected/ cm^3
0		0
30		5
60		10
90		13
120		17
150		20
180		23

[2]

Plot the results for both experiments on the grid below. For each set of results, draw a smooth line graph. Indicate clearly which line represents Experiment 1 and which line represents Experiment 2.



State which experiment had the faster rate of reaction and suggest why the rate was faster in this experiment.[1]

Experiment-1. Acid X is more concentrated.

From your graph, deduce the time required to collect 25 cm^3 of gas in Experiment 1. Show clearly on the graph how you worked out your answer.[1]

72sec

The rate of this reaction can be calculated using:

$$\text{rate} = \frac{\text{volume of gas / cm}^3}{\text{time taken / s}}$$ 3

For the experiment with the higher rate, calculate the rate of reaction for the first 30 seconds of the reaction. Deduce the units.

rate [2]

$\text{rate} = \frac{13}{30} = 0.43\ cm^3/sec$

Give one advantage and one disadvantage of using a measuring cylinder to add the acids to the flask.

advantage

Easy or quick to use

disadvantage [2]

Inaccurate measurement.

Suggest and explain one improvement to this experiment.[1]

To use pipette to measure volume of acid instead of measuring cyclinder. This will result in more accuracy.

[T-15]

2. A catalyst is a substance that speeds up the rate of a chemical reaction and remains unchanged at the end of the reaction. **(2015-J-61)**

Hydrogen peroxide solution, H_2O_2, breaks down to form oxygen. This decomposition is very slow if a catalyst is not used.
Plan an investigation to show that copper(II) oxide is a suitable catalyst for this reaction. You can use aqueous hydrogen peroxide and common laboratory apparatus.

Step 1 Show that copper(II) oxide catalyses the decomposition of hydrogen peroxide and measure the rate of the reaction.

Without catalyst :- a) Measure 100ml of H_2O_2 and pour into a beaker. b) Hold a glowing splint above the beaker and start a timer. c) when splint glows, record the time.

With catalyst :- a) Measure 100ml of H_2O_2 and pour into a beaker. b) Add 10g of copper(II) oxide (catalyst) to the beaker. c) Hold a glowing splint above the beaker and start the timer d) when splint glows record the time.

Observation :- With catalyst, reaction is faster.

Step 2 Show that the copper(II) oxide is unchanged at the end of the decomposition.

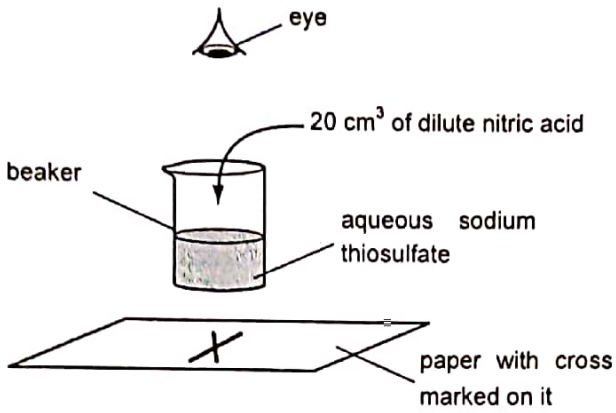
a) Filter the copper(II) oxide from the beaker.
b) Dry it for some time.
c) measure the weight of copper(II) oxide.
d) Record the weight of copper(II) oxide.

observation :- 10g of copper(II) oxide is measured. That means weight of copper(II) oxide unchanged at the end of the decomposition.

4. (3)A student carried out an experiment to investigate the speed of reaction between sodium thiosulfate solution and dilute nitric acid.
Sulfur is formed during this reaction and the mixture turns cloudy.

Experiment 1(2010-N-61)

Using a measuring cylinder, 100 cm^3 of sodium thiosulfate solution was poured into a 250 cm^3 beaker. The beaker was placed on a cross drawn on a piece of paper. 20 cm^3 of dilute nitric acid was added to the beaker and the timer started.



The time until the cross could not be seen was taken. The time was recorded in the table.

Experiment 1 was repeated using different volumes of sodium thiosulfate as shown in the table.
All experiments were carried out at 20 °C.

Table of results

experiment	volume of sodium thiosulfate solution / cm^3	volume of water / cm^3	time for cross to disappear / s
1	100	0	10
2	80	20	12
3	40	60	24
4	20	80	51
5	10	90	98

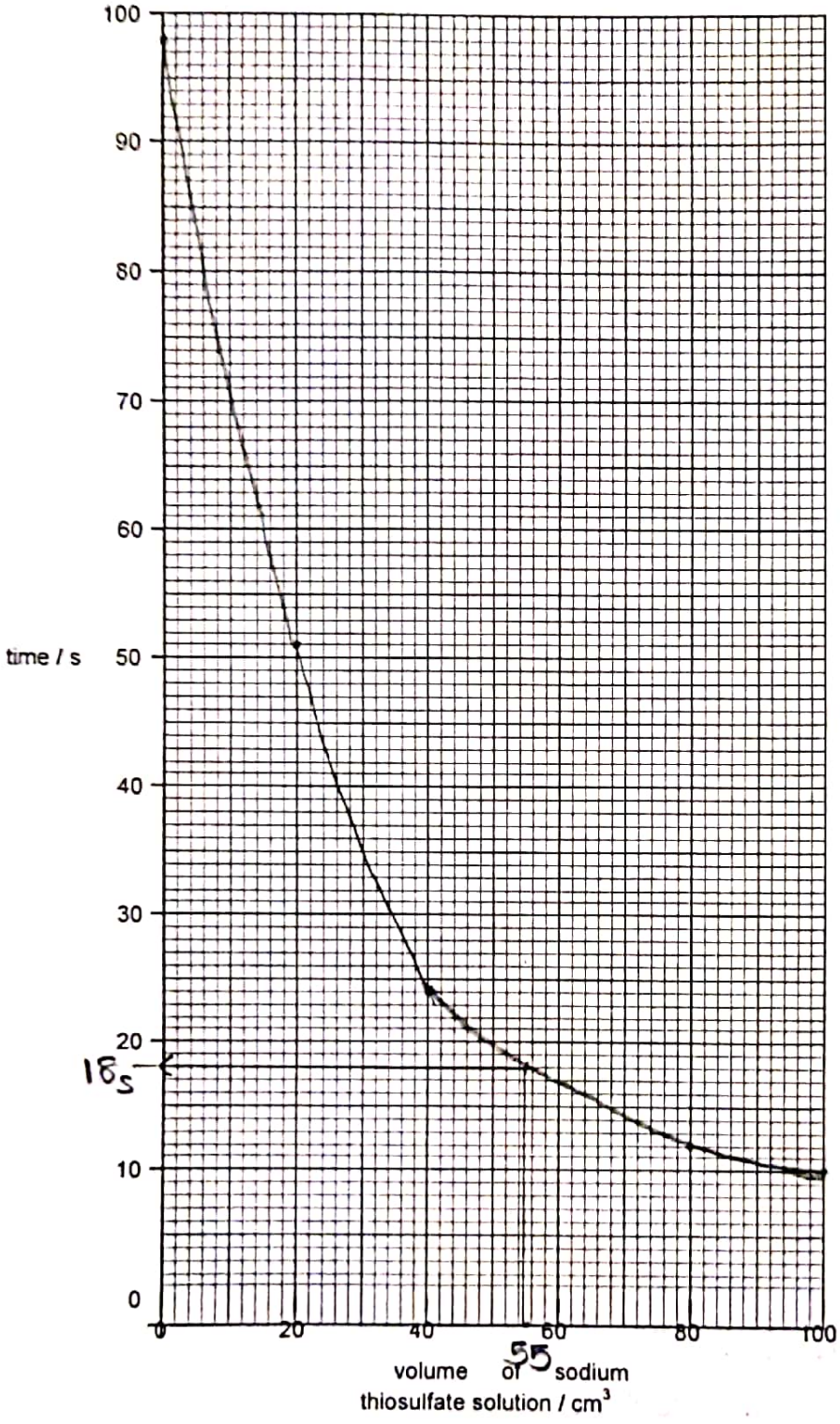
a) Why was the total volume of solution kept constant?

Idea of fair test- or
only one variable. [1]

(b) In Experiment 2, which is the last liquid to be added to the beaker?

Nitric acid [1]

(c) (i) Plot the results on the grid below. Draw a smooth line graph.



[4]

(ii) **Use your graph** to work out the time taken for the cross to disappear when 55 cm^3 of sodium thiosulfate solution and 45 cm^3 of water were used.
Indicate **on the graph** how you worked out your answer.

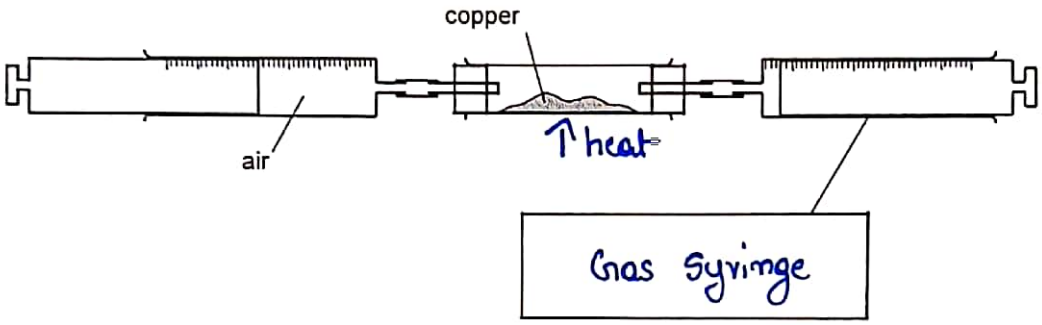
Value from the graph 18s [2]

The experiments were repeated at 40 °C. Suggest how the results would differ. Explain your answer.

At 40°C reaction will be faster. Because particles get more energy and hence increased collisions [2]

[Total: 10]

5. (1)A student investigated the reaction of air with copper. 100 cm^3 of air was passed continuously over heated copper using the apparatus below. When the volume remained constant, the apparatus was left to cool and the volume of gas was measured. **(2011-N-61)**



(a) **(i)** Complete the box to show the apparatus labelled. [1]

(ii) Indicate on the diagram, with an arrow, where heat is applied. [1]

(b) What should be used to transfer the copper from a bottle to the apparatus?

Spatula [1]

(c) The copper changed colour from brown to black [1]

(k) Why was the apparatus left to cool before measuring the final volume of gas?

To return to room temperature. Because at room temperature we can measure correct volume of gas. [2]

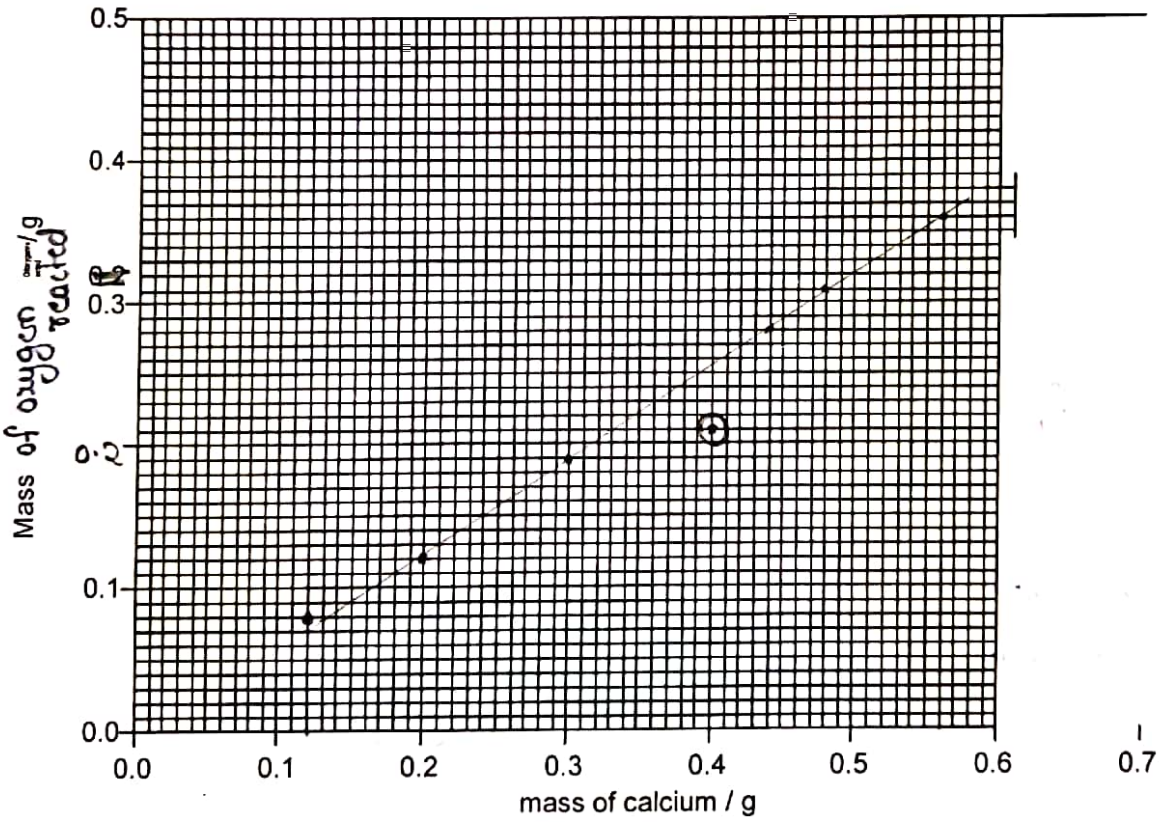
[Total: 6]

The table shows the results of experiments using different masses of calcium.

Experiment	mass of calcium / g	mass of calcium oxide / g	mass of oxygen reacted / g
1	0.12	0.20	0.08
2	0.20	0.32	0.12
3	0.30	0.49	0.19
4	0.40	0.61	0·21
5	0.44	0.72	0·28
6	0.48	0.79	0·31
7	0.56	0.92	0·36

(e) Complete the table of results. [1]

(f) Plot the results on the grid and draw a straight line graph.



(g) Which result is inaccurate?

Experiment 4. [1]

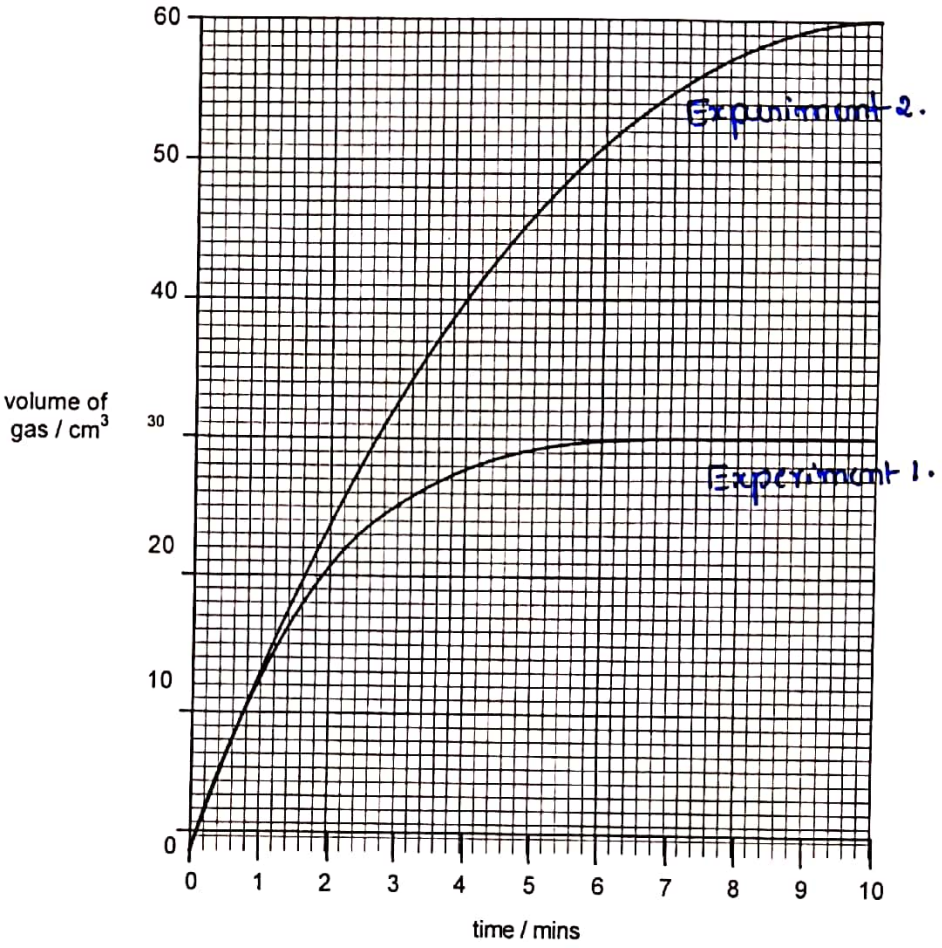
4. (2)A student carried out three experiments to investigate the rate of reaction between dilute hydrochloric acid and zinc powder. **(2014-J-63)**

Experiment 1

50 cm^3 of dilute hydrochloric acid were reacted with excess zinc powder. The volume of gas produced was measured every minute for ten minutes.

Experiment 2

Experiment 1 was then repeated using 100 cm^3 of the dilute hydrochloric acid. The results for these two experiments are shown below.



(a) Label the two lines to identify each experiment. [1]

Experiment 3

Experiment 1 was repeated using 50 cm^3 of dilute hydrochloric acid which was half as concentrated as in Experiment 1.

(i) How could the student prepare a solution of dilute hydrochloric acid which was half as concentrated as the acid in Experiment 1?

By adding 25cm^3 of water to 25cm^3 of dilute hydrochloric acid. [2]