Name: _____( ) Class:_____

Section B [20 marks]
Answer any **two** questions in this section.
Write your answers in the spaces provided.

9 Magnesium sulfate is formed from the reaction between a metal, M and an acid, N.

(a) Name M and N.

M ……

N ..... [2]

(b) Write the balanced chemical equation for the reaction between M and N.

..... [1]

(c) Describe how pure crystals of magnesium sulfate can be prepared using metal M and acid N.

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..... [4]

(d) Magnesium sulfate can also be prepared using acid N and another substance.

Name this substance.

..... [1]

9 **(e)** The labels on two bottles, one containing acid N and the other containing aqueous ammonia, were missing.

(i) Briefly describe a method you would use to distinguish between the two solutions.

.....

..... [1]

(ii) State the result you would expect for acid N using the method described in **(e)(i)**.

.....

.....[1]

[Total: 10]

10 Iron is a metal that is commonly used in the construction of ships and bridges.

(a) Iron is extracted from haematite using carbon in a blast furnace. Impurities from the iron are removed using limestone.

Describe how limestone is used to remove impurities from iron and include suitable chemical equations in your answer.

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..... [4]

(b) When iron is exposed to the environment for some time, it starts to rust.

(i) Bridges made of iron are painted to prevent rusting.

Explain how the layer of paint prevents iron from rusting.

.....

..... [1]

10 (b) (ii) Some ships that are made of iron prevent rusting by attaching blocks of zinc to its surface. After some time, it was observed the block of zinc corroded instead of iron.

Explain how attaching blocks of zinc help to prevent the ship from rusting.

.....

..... [1]

(iii) Predict what happens when blocks of silver metal are attached to the iron surface of the ship instead of zinc.

..... [1]

(iv) It was observed that ships in the sea tend to corrode more quickly than bridges.

Suggest a reason to explain this phenomenon.

.....

..... [1]

(c) In addition to the production of iron using the blast furnace, iron is also obtained through recycling.

Give two reasons why it is important to recycle metal.

1.....

.....

2.....

..... [2]

[Total: 10]

11 Egg shells are made up mainly of calcium carbonate. A pupil carried out an experiment to react egg shells with excess dilute hydrochloric acid. The gas that was produced was measured at a regular time interval to investigate the speed of the reaction.

(a) Predict the solubility of this gas in water.

..... [1]

(b) Complete the diagram in Fig. 11.1 to show the apparatus which could be used to measure the volume of gas produced.

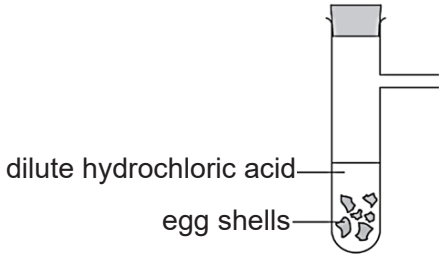

Fig. 11.1 [2]

(c) The results of this experiment are shown in Table 11.1.

Table 11.1

time/ s	0	20	40	60	140	180	200	220
volume of gas/ cm^3	0	14	25	32	48	50	50	50

(i) Plot the results on Fig. 11.2 and draw a smooth curve through the points.

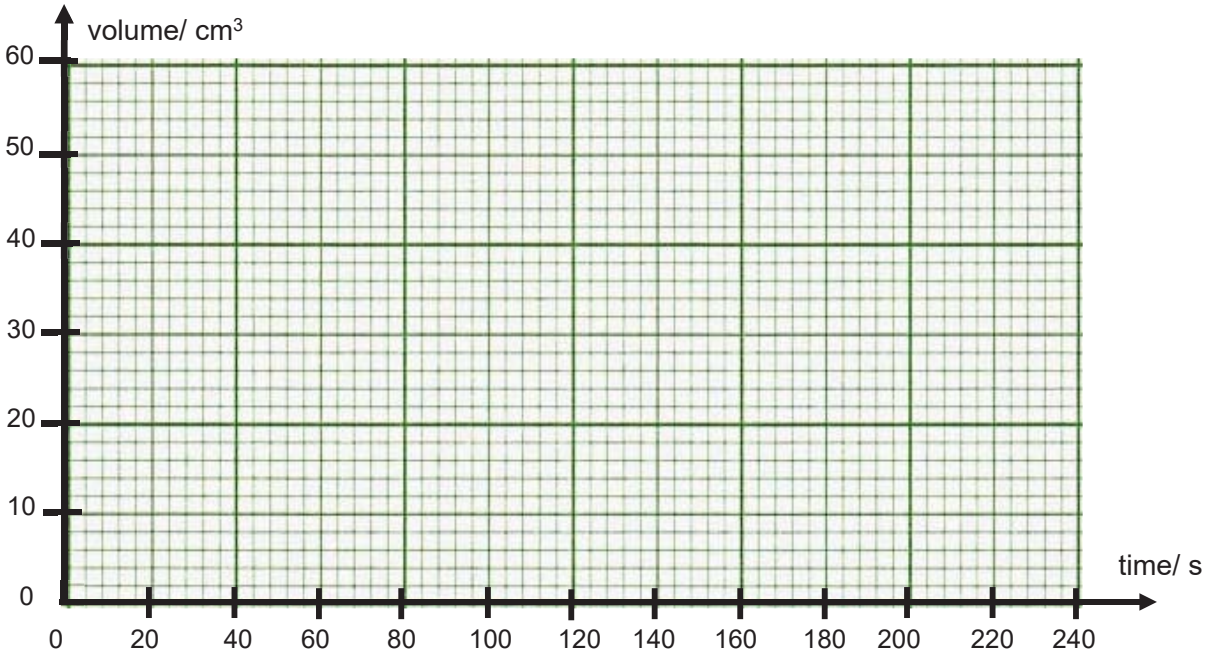

Fig 11.2 [2]

11 (c) (ii) Explain why no further measurements were taken after 220 seconds.

.....

..... [1]

(iii) Using the graph drawn in **(c)(i)**, estimate the volume of gas evolved for the first 100 seconds.

..... [1]

(iv) Calculate the average speed of reaction in cm^3/ s for the first 10 seconds of the reaction.
(Average speed = $\frac{\text{final volume - initial volume}}{\text{duration concerned}}$)

..... cm^3/ s [2]

(v) The experiment is repeated with crushed egg shell.
On the same axes in Fig. 11.2, draw the graph you would expect for the second experiment.
Labelled the graph as 'Q'. [1]

[Total: 10]

Data Sheet

Colours of Some Common Metal Hydroxides

calcium hydroxide	white
copper(II) hydroxide	light blue
iron(II) hydroxide	green
iron(III) hydroxide	red-brown
lead(II) hydroxide	white
zinc hydroxide	white