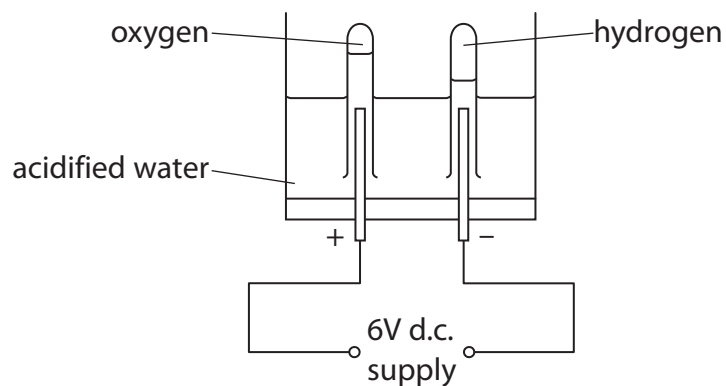


- 1 (a) Water, acidified with a small amount of dilute sulfuric acid, can be decomposed by electrolysis using the apparatus shown.



- (i) State the form of energy used to carry out the electrolysis.

(1)

- (ii) During the electrolysis, hydrogen is formed at one of the electrodes.

Describe a test to show that this gas is hydrogen.

(2)

- (b) Electrolysis is also used to produce chlorine on a large scale.

Name a raw material that can be electrolysed to produce chlorine.

(1)

(c) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Acids are neutralised by metal hydroxides to form

(1)

- A** salt only
- B** salt and hydrogen only
- C** salt and oxygen only
- D** salt and water only

(ii) Acids can also be neutralised by metal carbonates.

Dilute sulfuric acid is neutralised by copper carbonate as shown in the word equation.



Copper carbonate is a green powder.

Describe what you would **see** when copper carbonate powder is added to dilute sulfuric acid.

(2)

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- (d) Two experiments were carried out to test the effectiveness of tablets of three different indigestion remedies, A, B and C.

For each remedy, the experiments were carried out on both a whole and a crushed tablet.

In experiment 1, each tablet was added to excess hydrochloric acid and the time taken for the tablet to react completely was recorded.

In experiment 2, the volume of acid neutralised by each tablet was determined.

The table shows the results obtained for the investigation.

| tablet of | state of tablet | experiment 1 : time taken for the tablet to react completely / s | experiment 2 : volume of acid neutralised / cm <sup>3</sup> |
|-----------|-----------------|--|---|
| A         | whole           | 75   | 25.0  |
|           | crushed         | 30   | 25.0  |
| B         | whole           | 59   | 25.0  |
|           | crushed         | 19   | 25.0  |
| C         | whole           | 120  | 50.0  |
|           | crushed         | 44   | 50.0  |

- (i) Explain, using information from the table, which of the tablets contains the most of the active ingredient to overcome indigestion.

(2)

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- (ii) Explain, using information from the table, whether faster relief of indigestion is achieved by using a given tablet whole or crushed.

(1)

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**(Total for Question 1 = 10 marks)**

2 (a) Magnesium carbonate reacts with dilute nitric acid.

Give the names of the products formed in this reaction.

(2)

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(b) Zinc oxide, ZnO, reacts with dilute hydrochloric acid to form zinc chloride, ZnCl<sub>2</sub>, and water.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

This reaction is an example of

(1)

- A** combustion
- B** thermal decomposition
- C** neutralisation
- D** oxidation

(ii) Write the balanced equation for the reaction between zinc oxide and dilute hydrochloric acid.

(3)

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3 (a) Complete the sentence by putting a cross (☒) in the box next to your answer.

An acid reacts with a metal oxide to form

(1)

- A** a salt and hydrogen only
- B** a salt and oxygen only
- C** a salt only
- D** a salt and water only

(b) Acids also react with metal carbonates.

The word equation for the reaction of copper carbonate with dilute nitric acid is



(i) State **two** things you would **see** when solid copper carbonate reacts with dilute nitric acid.

(2)

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(ii) Write the balanced equation for the reaction of copper carbonate with dilute nitric acid.

(3)

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(c) Two gases can be produced by the electrolysis of water, under suitable conditions.

(i) Explain what is meant by **electrolysis**.

(2)

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(ii) One of the gases is oxygen.

Describe a test to show the gas is oxygen.

(2)

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**(Total for Question 3 = 10 marks)**