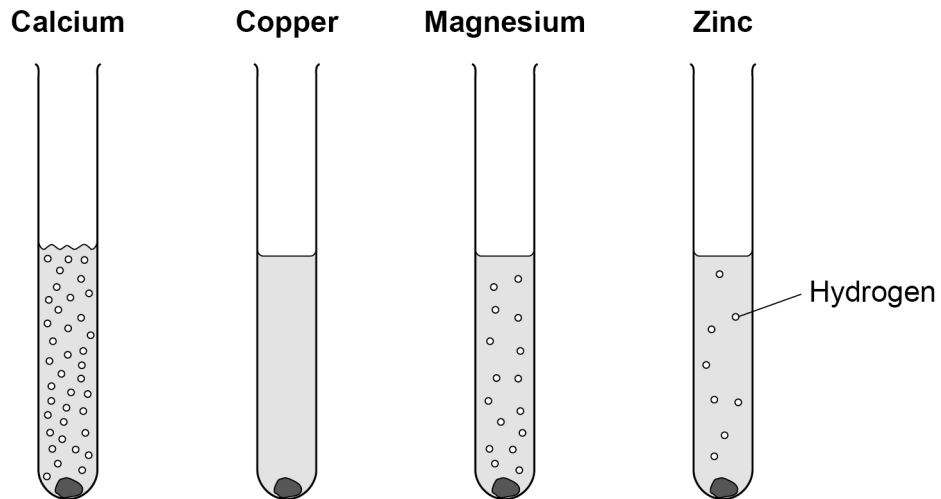


0 1

This question is about reactions of metals.

**Figure 1** shows what happens when calcium, copper, magnesium and zinc are added to hydrochloric acid.

**Figure 1**



0 1 . 1

What is the order of decreasing reactivity of these four metals?

**[1 mark]**

Tick (✓) **one** box.

Zn Ca Cu Mg

Ca Cu Mg Zn

Cu Zn Ca Mg

Ca Mg Zn Cu



A student wants to make a fair comparison of the reactivity of the metals with hydrochloric acid.

0 1 . 2 Name **two** variables that must be kept constant.

[2 marks]

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

0 1 . 3 What is the independent variable in this reaction?

[1 mark]

\_\_\_\_\_

\_\_\_\_\_

0 1 . 4 Predict the reactivity of beryllium compared with magnesium.

Give a reason for your answer.

Use the periodic table.

[2 marks]

\_\_\_\_\_

Reason \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

0 1 . 5 A solution of hydrochloric acid contains 3.2 g of hydrogen chloride in 50 cm<sup>3</sup>

Calculate the concentration of hydrogen chloride in g per dm<sup>3</sup>

[3 marks]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Concentration = \_\_\_\_\_ g per dm<sup>3</sup>

Turn over ►



Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	Ca Mg Zn Cu		1	AO3 5.4.1.2
01.2	any <b>two</b> from: <ul style="list-style-type: none"> <li>• mass (of metal / element)</li> <li>• surface area (of metal / element)</li> <li>• concentration (of acid)</li> <li>• volume (of acid)</li> <li>• temperature (of acid)</li> </ul>	allow weight  ignore size ignore length  ignore pH ignore strength  ignore room temperature	2	AO3 5.4.1.2
01.3	(type of) metal / element		1	AO2 5.4.1.2

<p><b>01.4</b></p>	<p>(beryllium is) less reactive</p> <p>any <b>one</b> from:</p> <ul style="list-style-type: none"> <li>greater attraction between nucleus and outer electrons</li> <li>more energy is needed to remove electrons</li> <li>loss of electrons is more difficult</li> <li>outer electrons closer to nucleus</li> <li>less shielding</li> </ul>	<p>allow converse answers for magnesium</p> <p>MP2 only if MP1 is correct</p>          <p>allow higher in <u>group</u></p> <p>allow reactivity increases down the <u>group</u></p> <p>ignore reactivity series</p>	<p>1</p>          <p>1</p>	<p>AO3 5.1.2.3 5.1.2.5 5.4.1.2</p>
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<p><b>01.5</b></p>	<p> <math>\frac{50}{1000}</math> (dm<sup>3</sup>)                      = 0.05 (dm<sup>3</sup>)  <math>(\frac{3.2}{0.05}) = 64</math> (g per dm<sup>3</sup>)                 </p> <p><b>alternative approach:</b></p> <p> <math>\frac{3.2}{50}</math> (1)                      = 0.064 (1)                      (× 1000) = 64 (g per dm<sup>3</sup>) (1)                 </p> <p><b>alternative approach:</b></p> <p> <math>\frac{1000}{50}</math> (1)                      = 20 (1)                      (× 3.2) = 64 (g per dm<sup>3</sup>) (1)                 </p>	<p>an answer of 64 (g per dm<sup>3</sup>) scores <b>3</b> marks</p> <p>an incorrect answer for one step does <b>not</b> prevent allocation of marks for subsequent steps</p>	<p>AO2 5.3.2.5</p> <p>1</p> <p>1</p> <p>1</p>	
<p><b>Total</b></p>			<p><b>9</b></p>	