Section A:

1. Select the correct chemical formula to complete the table below.

OH^-	HCl	NaCl	H^+	HNO_3	H_2SO_4

Chemical name	Chemical formula
Hydrochloric acid	
Nitric acid	
Sulphuric acid	
Sodium chloride	
Hydrogen ions	
Hydroxide ions	

2. Below shows the general equation for the reaction of a metal and an acid.

Metal + acid → salt + hydrogen

Complete the word equations below:

a. Magnesium + hydrochloric acid → magnesium chloride + _____

b. Zinc + hydrochloric acid → _____ + _____

c. Calcium + nitric acid → calcium nitrate + _____

d. Iron + sulphuric acid → iron sulphate + _____

e. Copper + nitric acid → _____ + _____

f. _____ + _____ → potassium nitrate + hydrogen

g. _____ + _____ → calcium sulphate + hydrogen

h. _____ + _____ → zinc chloride + hydrogen

3. Match each test with the correct description.

Test for hydrogen gas	Place universal indicator and the colour will change
Test for carbon dioxide gas	Place a lit splint in the sample and a squeaky pop sound is produced
Testing the pH of a solution	Shake the sample with lime water and the colour changes to cloudy

4. Neutralisation reactions are when acids are neutralised by alkalis or bases to produce a salt and water. Bases are insoluble metal hydroxides (for example, zinc hydroxide) and metal oxides. Alkalis are soluble metal hydroxides (for example, sodium hydroxide) that release OH^- in water.

   Complete the neutralisation reaction word equations below:

   a. Acid + base → _____ + water

   b. Hydrochloric acid + calcium carbonate → _____ + carbon dioxide + water

   c. Nitric acid + sodium hydroxide → sodium nitrate + _____

   d. Potassium hydroxide + sulphuric acid → _____+ _____

   e. Nitric acid + copper carbonate → _____ + _____ + _____

   f. _____ + _____ → magnesium chloride + water

Section B

1. Some metals are unreactive, this means that… _____
   _____.

2. Some metals are very reactive, this means that… _____
   _____.

3. This table shows the reactivity series of some metals.

potassium
sodium
lithium
magnesium
zinc
iron

   The most reactive metal shown on this reactivity series is _____ and the least reactive metal is _____ .

4. Describe what the reactivity series shows.
   Include examples of metals in your answer.
   _____
   _____
   _____

5. Magnesium can be oxidised.
   (a) Write a definition for oxidation.
   _____

   (b) Write the word equation for this reaction.
   _____

   (c) Write a metal that is more easily oxidised than magnesium.
   Explain your answer.
   _____
   _____

6. When magnesium is added to dilute nitric acid in a test tube, a fizzing sound and bubbles are produced.

   Suggest what would be observed if zinc was added to nitric acid in a test tube.
   Explain your answer.

   Use information from the reactivity series.
   _____
   _____
   _____

Section C

A student tested the reactivity of three metals. They used the method below.

- Place 2 g of magnesium powder in a test tube
- Add 5 cm^3 of each chloride solution to each test tube
- Observe whether a reaction takes place
- Repeat with copper powder and calcium powder

The results are shown in the table below.

	Was a reaction observed?		
	Magnesium	**Copper**	**Calcium**
Magnesium chloride	No	No	Yes
Copper chloride	Yes	No	Yes
Calcium chloride	No	No	No

1. Use the results shown in the table to place these metals in order of reactivity.

   Most reactive _____

   _____

   Least reactive _____

2. (a) State the dependent variable in this experiment.

   _____

   (b) Suggest what could have observed when a chemical reaction took place.

   _____

   (c) Suggest why potassium should **not** be used in this experiment.

   _____

3. (a) Is magnesium chloride an ionic or covalent substance? Explain your answer.

   _____

   (b) Compare magnesium chloride solution and molten (melted) magnesium chloride.

   _____

   _____

   _____