1. The table shows some properties of three substances at room temperature.

Substance	Colour	State
A	Silvery	Solid
B	White	Solid
C	Green	Gas

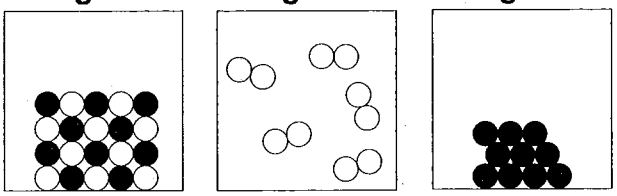
(a) Substance **A** reacts with substance **C** to make one product, which is substance **B**.

Give one piece of evidence from the table that suggests that a chemical reaction has occurred.

.....

(b) The diagrams below represent the arrangements of the particles in substances **A**, **B** and **C**.

Diagram 1 **Diagram 2** **Diagram 3**



(i) Which diagram represents substance **C**? .....

(ii) Which diagram represents the product of the reaction between **A** and **C**? .....

(c) 2.3 g of substance **A** reacts with substance **C** to make 5.9 g of substance **B**. What mass of substance **C** reacted?

..... grams

(4 marks)

2. Complete these word equations:

(a) Magnesium + oxygen → _____

(b) Iron + sulphur → _____

(c) Magnesium + copper sulphate → _____ + _____

(4 marks)

3. Four metals were added to cold water and to dilute hydrochloric acid. The results are shown in the table below.

metal	**with dilute hydrochloric acid**	**with cold water**
nickel	some bubbles of gas form if the acid is warm	no reaction
potassium	(cannot be done safely)	floats, then melts, a flame appears, and sometimes there's an explosion
platinum	no reaction	no reaction
zinc	bubbles of gas form and metal dissolves slowly	no reaction

(a) Write the names of the **four** metals in order of reactivity.

..... (most reactive)

.....

.....

..... (least reactive)

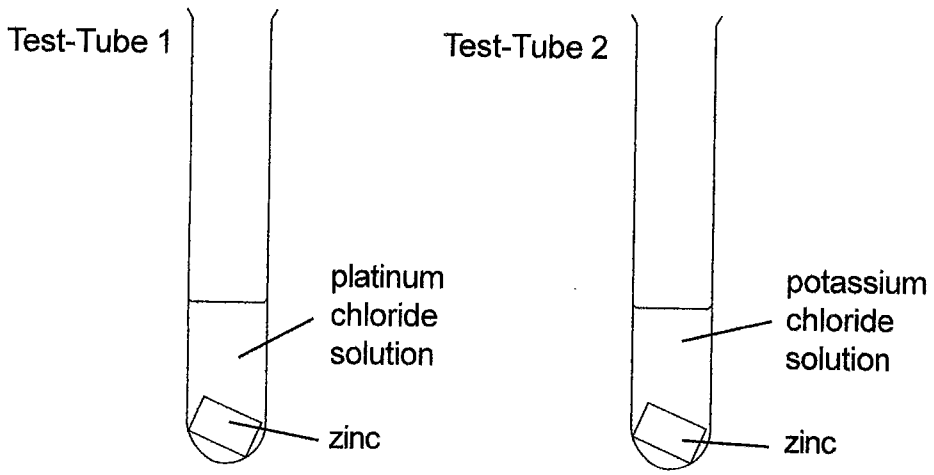
(b) (i) Name another metal, that is **not** in the table, which reacts in a similar way to potassium. .....

(ii) What is the gas which is formed when zinc reacts with dilute hydrochloric acid? .....

(iii) How would you test for the gas mentioned in b(ii)? .....

(6 marks)

(c) Two test-tubes have been set up as shown in the diagram below.



Nothing happened in Test-Tube 2.
In Test-Tube 1, the zinc was gradually covered with a grey deposit.

(i) **What** was the grey deposit that formed in Test-Tube 1?

.....

(ii) Why did **no** reaction take place in Test-Tube 2?

.....

.....

(2 marks)

4. Farmers add an alkali called calcium oxide to soils that are too acidic.

(a) Give the name of the type of reaction that occurs between calcium oxide and acids in the soil.

.....

(b) What happens to the soil pH when the farmer adds calcium oxide? Tick one box.

☐ pH goes down ☐ pH stays the same ☐ pH goes up

(c) Complete the word equation below.

calcium oxide + ... → calcium sulphate + water

(3 marks)

5. Professor Cryer is investigating reactions of copper oxide.
Here is his description of what he did.

> I heated some dilute sulphuric acid in a beaker. Whilst stirring, I added copper oxide to it until no more would react. The mixture became a clear blue colour. I then filtered the mixture into a dish. A black solid was left on the filter paper. After a week, the liquid had gone and blue crystals were left.

Use this information to answer these questions:

(a) (i) What is the black solid left on the filter paper?

.....

(ii) What is the blue solution in the beaker?

.....

(b) Complete the word equation for the reaction which took place in the beaker

..... + ... → ..... + water

(c) Why did Professor Cryer need to filter the mixture?

.....

.....

(4 marks)

6. Look at the following list of words:

carbon dioxide sulphur dioxide

oxygen copper oxide carbon monoxide

nitrogen carbon

(a) Name **three** elements from the words above:

1 .....

2 .....

3 .....

(b) Name **one** compound from the words above:

.....

(c) Give the two compounds which are both formed from the same two elements.

1 .....

2 .....

(d) Give the compound which traps heat to create the 'greenhouse effect'.

.....

(7 marks)
(Total 30 marks)