

C3 Structure & Bonding HOMEWORK TASK 2

Q1.

This question is about reactions of metals.

A piece of magnesium reacts with dilute hydrochloric acid.

Magnesium chloride solution and a gas are produced.

(a) Which gas is produced?

Tick (✓) **one** box.

Chlorine

Hydrogen

Oxygen

(1)

(b) Give **two** observations seen during the reaction.

1 _____

2 _____

(2)

(c) Magnesium chloride is formed from Mg^{2+} ions and Cl^- ions. What is the formula of magnesium chloride?

Tick (✓) **one** box.

MgCl

MgCl₂

Mg₂Cl

Mg₂Cl₂

(1)

(d) Calcium is in the same group as magnesium in the periodic table.

What is the symbol for a calcium ion? Tick (✓) **one** box.

Ca⁺

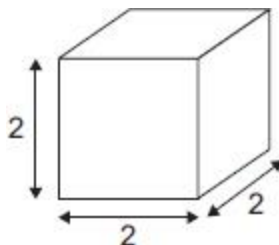
Ca⁻

Ca²⁺

Ca²⁻

(1)

(e) The figure below shows a cube of calcium.



How would you calculate the total surface area of this cube?

Tick (✓) **one** box.

Total surface area = $2 \times 2 \times 2$

Total surface area = $2 \times 2 \times 4$

Total surface area = $2 \times 2 \times 6$

Total surface area = $2 \times 4 \times 6$

(1)

(f) Complete the sentence.

Choose the answer from the box.

decreases

stays the same

increases

When a cube of calcium is cut into smaller pieces the

total surface area _____.

(1)

A teacher investigated the reaction between calcium and water.

The teacher used the same mass of three different forms of calcium.

The different forms of calcium were:

- powder
- small lumps
- large lumps.

The teacher measured the time for each reaction to be complete.

(g) What is the independent variable in the investigation?

Tick (✓) **one** box.

Form of calcium

Mass of calcium

Time for reaction to be complete

(1)

(h) Which form of calcium will react the fastest?

Tick (✓) **one** box.

Powder

Small lumps

Large lumps

(1)

(i) Which is the best way to display the results for the three different forms of calcium?

Tick (✓) **one** box.

Bar chart

Line graph

Pie chart

(1)

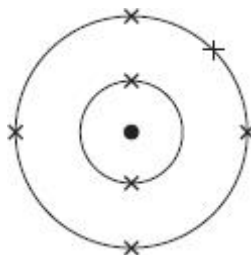
(Total 10 marks)

Q2.

This question is about structure and bonding.

- (a) **Figure 1** represents the electronic structure of an atom of an element.

Figure 1



Name the element in **Figure 1**.

Give **one** reason for your answer.

Use the periodic table.

Element _____

Reason _____

(2)

Sodium reacts with fluorine to produce sodium fluoride.

Sodium fluoride is an ionic compound.

- (b) An atom of sodium and an atom of fluorine react to form a sodium ion and a fluoride ion.

Complete the dot and cross diagram for the sodium ion and the fluoride ion.

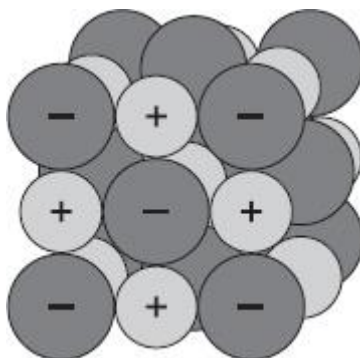
Show the charges on the ions.



(2)

(c) **Figure 2** represents the structure of sodium fluoride.

Figure 2



Describe how sodium ions and fluoride ions are held together in sodium fluoride.

(3)

(d) What is a property of sodium fluoride?

Tick (✓) **one** box.

Conducts electricity when solid

High melting point

Low boiling point

(1)
(Total 8 marks)

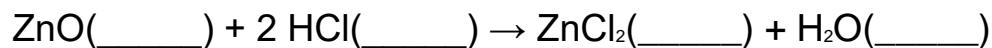
HIGHER TIER QUESTIONS

Q3.

This question is about acids, alkalis and bases.

A student reacted zinc oxide powder with hydrochloric acid to produce zinc chloride solution.

- (a) Complete the equation for the reaction by writing the state symbols.



(2)

- (b) Give **one** way that the student could speed up the reaction between zinc oxide powder and hydrochloric acid.

(1)

Hydrochloric acid was the limiting reactant.

- (c) How could the student know when all the hydrochloric acid has reacted?

(1)

- (d) How could the student obtain zinc chloride solution from the reaction mixture when all the hydrochloric acid has reacted?

(1)

- (e) Describe how zinc chloride crystals are produced from zinc chloride solution.

(2)

Sulfuric acid and sodium hydroxide react to produce sodium sulfate.

- (f) Sulfuric acid is gradually added to sodium hydroxide solution.

The pH of the mixture changes as the sulfuric acid is added until in excess.

Suggest the pH at:

- the start before sulfuric acid is added
- the end when sulfuric acid is in excess.

pH at start = _____

pH at end = _____

(2)

- (g) Complete the symbol equation for the preparation of sodium sulfate.

You should balance the equation.



(2)

- (h) A solution of hydrochloric acid had a hydrogen ion concentration of 1.0 mol/dm^3

Water was added to the hydrochloric acid until the pH increased by 1

What was the hydrogen ion concentration of the hydrochloric acid after water had been added?

Tick (✓) **one** box.

100 mol/dm^3

10 mol/dm^3

0.10 mol/dm^3

0.010 mol/dm^3

(1)

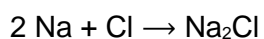
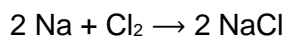
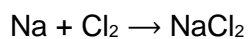
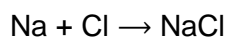
(Total 12 marks)

Q4. This question is about sodium.

- (a) Sodium reacts with chlorine.

What is the balanced equation for the reaction?

Tick (✓) **one** box.



(1)

- (b) Hot sodium is put in a gas jar of chlorine.

Describe the observations made before, during and after the reaction.

Before reaction _____

During reaction _____

After reaction _____

(3)

- (c) Explain why sodium is less reactive than potassium.

(4)

