

# 2.1 Ionic, Covalent & Metallic Bond

## Question Paper

Course	AQA GCSE Chemistry
Section	2. Bonds, Structure & Properties of Matter
Topic	2.1 Ionic, Covalent & Metallic Bond
Difficulty	Hard

Time Allowed	60
Score	/47
Percentage	/100

**Question 1a**

This question is about sodium oxide.

Describe the structure and bonding in sodium oxide.

[4 marks]

**Question 1b**

Sodium is in Group 1 of the periodic table and oxygen in Group 6.

What is the formula of sodium oxide?

[1 mark]

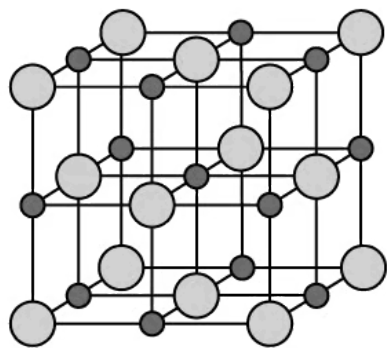
**Question 1c**

Draw dot and cross diagrams to represent the three ions formed by sodium oxide.

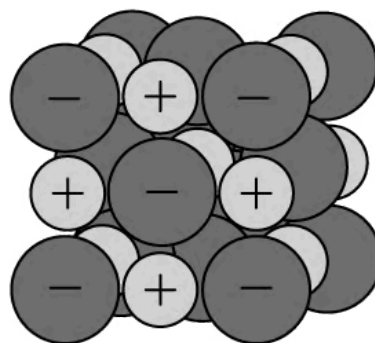
[3 marks]

### Question 1d

Figure 1 shows two other way of representing ionic compounds.



**Model 1**



**Model 2**

Compare the advantages and limitations of each model.

[4 marks]

### Question 2a

This question is about chemical bonds.

Aluminium and chlorine react to form aluminium chloride.

Write the balanced symbol equation for the reaction.

Include state symbols.

[3 marks]

**Question 2b**

Describe, in terms of electron arrangement, the type of bonding in a molecule of chlorine.

[3 marks]

**Question 2c**

Describe, in terms of electron arrangement, the type of bonding in the compound aluminium chloride.

[5 marks]

**Question 3a**

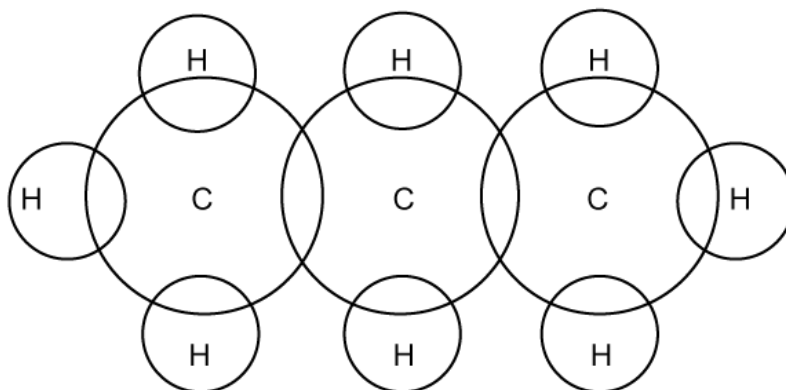
This question is about covalent bonding.

What is a covalent bond?

[1 mark]

**Question 3b**

Complete the dot and cross diagram to show the bonding in propane.



[1 mark]

**Question 3c**

Explain why propane cannot conduct electricity.

[2 marks]

**Question 3d**

Give **two** limitations of the dot and cross diagram in part (b).

[2 marks]

**Question 4a**

This question is about the properties of metals.

Copper is a typical metal.

Explain how the particles in copper are held together and why the metal is malleable.

You may use a diagram in your answer.

[5 marks]

**Question 4b**

Metals are good conductors of electricity.

Electrical conductivity increases across Period 3, from sodium to aluminium.

Explain why.

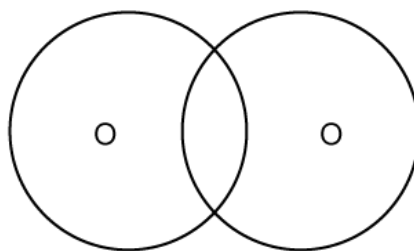
[4 marks]

### Question 5a

This question is about structure and bonding.

Complete the dot and cross diagram to show the covalent bonding in an oxygen molecule,  $O_2$ .

Show only the electrons in the outer shell.



[2 marks]

### Question 5b

Oxygen can react with magnesium to form magnesium oxide.

Describe the differences in the bonding and structure of magnesium oxide and oxygen.

[4 marks]

**Question 5c**

The melting points of magnesium oxide and sodium chloride are shown in **Table 1**.

**Table 1**

Substance	Melting point (°C)
Sodium chloride	801
Magnesium oxide	2852

Explain why magnesium oxide has a higher melting point than sodium chloride.

**[3 marks]**