

# PHYSICAL SCIENCES

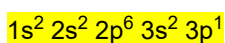
## GR 10 RESOURCE



### EXERCISE 1.7

#### QUESTION 1

The sp-notation for an unknown element **X** is shown below.



1.1 For element **X** write down the:

1.1.1 number of valence electrons

1.1.2 period where this element is found on the periodic table

1.1.3 highest energy level in which electrons occur

1.1.4 symbol

1.2 Element **X** combines with chlorine to form a compound.

1.2.1 Write down the type of bond that forms between element **X** and chlorine.

1.2.2 Draw an Aufbau diagram for the chlorine atom.

1.2.3 Draw Lewis dot diagrams to show the bond formation between element **X** and chlorine.

1.3 Two chlorine atoms can bond with each other to form a molecule.

1.3.1 Define the term molecule.

1.3.2 Name the type of bond that forms between two chlorine atoms.

1.3.3 Represent a chlorine molecule by means of a Lewis dot diagram.

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#### QUESTION 2

The diagrams below show 4 different substances **A** to **D**.

| Substance A | Substance B | Substance C | Substance D |
|-------------|-------------|-------------|-------------|
|             |             |             |             |

2.1 What type of bond is illustrated by structure **A**? Explain how this bond is formed.

2.2 For substance **C**:

2.2.1 What type of bond exists between the particles?

2.2.2 What is this type of structure called?

2.2.3 Give ONE example of the structure mentioned in QUESTION 2.2.2.

2.3 Magnesium and fluorine reacts to form the compound magnesium fluoride.

2.3.1 Which substance (**A** to **D**) can be a representation of magnesium fluoride? What type of compound is this?

2.3.2 Give the name of the group in the Periodic Table to which magnesium belongs.

2.3.3 Use Lewis diagrams to illustrate the formation of magnesium fluoride

2.4 Nitrogen gas and hydrogen gas react to form ammonia ( $\text{NH}_3$ ).

2.4.1 Write down the sp-notation for nitrogen.

2.4.2 How many valency electrons does nitrogen have?

2.4.3 Name the type of bond that forms between nitrogen and hydrogen atoms to form ammonia.

2.4.4 What is the new unit that is formed, called?

2.4.5 Write down the Lewis diagram of the compound ammonia.

## EXERCISE ANSWERS

### QUESTION 1

1.1.1 3 valence electrons

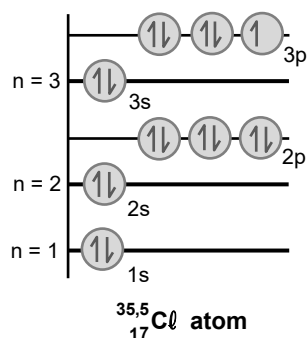
1.1.2 Period 3

1.1.3 Energy level 3

1.1.4  $Al$

1.2.1 Ionic bond

1.2.2



1.2.3 ①  $\cdot\dot{\text{Al}} \rightarrow \text{Al}^{3+} + 3\text{e}^-$

②  $3:\ddot{\text{Cl}}\cdot + 3\text{e}^- \rightarrow 3\left[:\ddot{\text{Cl}}:\right]^-$

③  $\text{Al}^{3+} + 3\left[:\ddot{\text{Cl}}:\right]^- \rightarrow \text{Al}^{3+} 3\left[:\ddot{\text{Cl}}:\right]^- \rightarrow \text{AlCl}_3$

1.3.1 A molecule is a group of two or more atoms that are covalently bonded and that functions as a unit.

1.3.2 covalent bond

1.3.3  $:\ddot{\text{Cl}}:\ddot{\text{Cl}}:$

### QUESTION 2

2.1 Metallic bond

This bond is formed by the force of attraction between positive metal ions and delocalised valence electrons, which hold the metal together.

2.2.1 covalent bond

2.2.2 covalent network structure

2.2.3 diamond

2.3.1 substance B; ionic compound

2.3.2 alkaline earth metals

2.3.3  $\text{Mg} \cdot \rightarrow \text{Mg}^{2+} + 2\text{e}^-$

$2:\ddot{\text{F}}\cdot + 2\text{e}^- \rightarrow 2\left[:\ddot{\text{F}}:\right]^-$

$\text{Mg}^{2+} + 2\left[:\ddot{\text{F}}:\right]^- \rightarrow \text{Mg}^{2+} 2\left[:\ddot{\text{F}}:\right]^- \rightarrow \text{MgF}_2$