

EXAM A

1) Write down the electron configuration of the following elements: 5 points

a) K ($Z = 19$):

b) C ($Z = 6$):

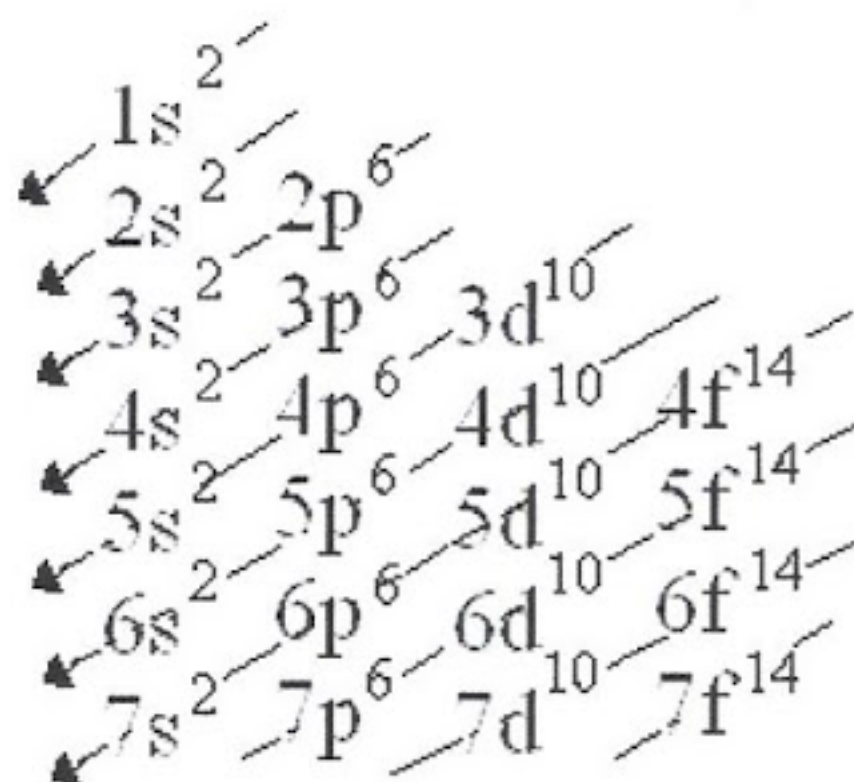
c) I ($Z = 53$):

d) Ne ($Z = 10$):

e) Cr ($Z = 24$):

ANSWER:

To write the electron configuration we need Möller's diagram:



a) K ($Z = 19$): $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$

b) C ($Z = 6$): $1s^2 2s^2 2p^2$

c) I ($Z = 53$): $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^5$

d) Ne ($Z = 10$): $1s^2 2s^2 2p^6$

e) Cr ($Z = 24$): $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^4$

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2) Write down the valence electrons of the elements in the previous activity. 5 points

ANSWER:

- a) K ($Z = 19$): $4s^1 \Rightarrow$ 1 valence electron.
 b) C ($Z = 6$): $2s^2 2p^2 \Rightarrow$ 4 valence electrons.
 c) I ($Z = 53$): $5s^2 5p^5 \Rightarrow$ 7 valence electrons.
 d) Ne ($Z = 10$): $2s^2 2p^6 \Rightarrow$ 8 valence electrons.
 e) Cr ($Z = 24$): $4s^2 \Rightarrow$ 2 valence electrons.

3) Circle the pairs of isotopes:

a) $^{10}_5\text{B}$, ^9_4Be , $^{14}_7\text{N}$, $^{11}_5\text{B}$ 5 points

b) $^{27}_{13}\text{Al}$, $^{30}_{14}\text{Si}$, $^{28}_{14}\text{Si}$, ^7_3Li 5 points

ANSWER:

a) $^{10}_5\text{B}$, ^9_4Be , $^{14}_7\text{N}$, $^{11}_5\text{B}$

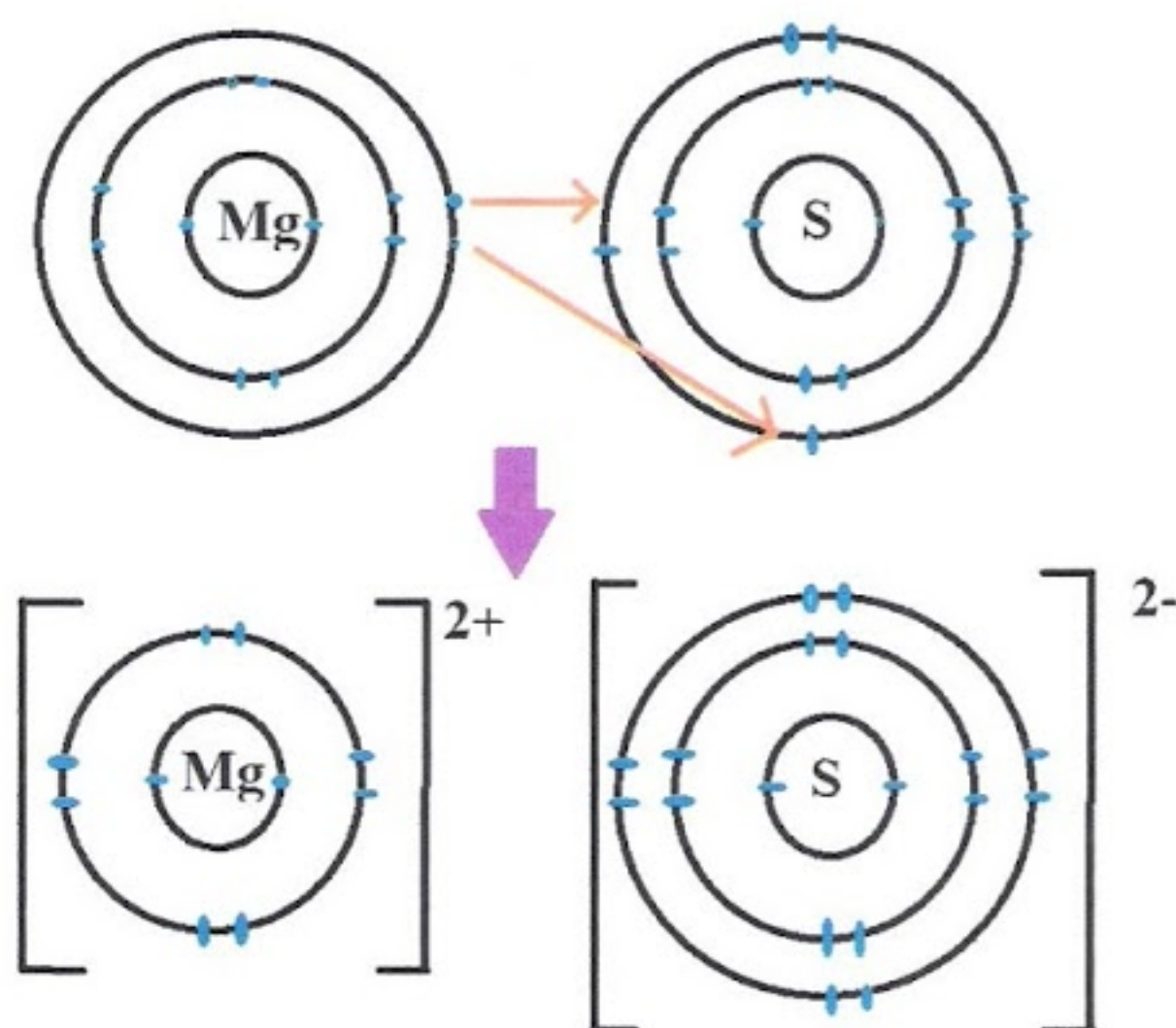
b) $^{27}_{13}\text{Al}$, $^{30}_{14}\text{Si}$, $^{28}_{14}\text{Si}$, ^7_3Li

4) What is the chemical bond between ^{12}Mg and ^{16}S like? 5 points

ANSWER:

^{12}Mg : metal } $\Rightarrow$ IONIC BOND
 ^{16}S : non-metal }

Element	Electron configuration	Valence electron	Ion	Formula
^{12}Mg	$1s^2 2s^2 2p^6 3s^2$	2	Mg^{2+}	MgS
^{16}S	$1s^2 2s^2 2p^6 3s^2 3p^4$	6	S^{2-}	



5) What is the chemical bond between $_{11}\text{Na}$ and $_{17}\text{Cl}$ like?

5 points

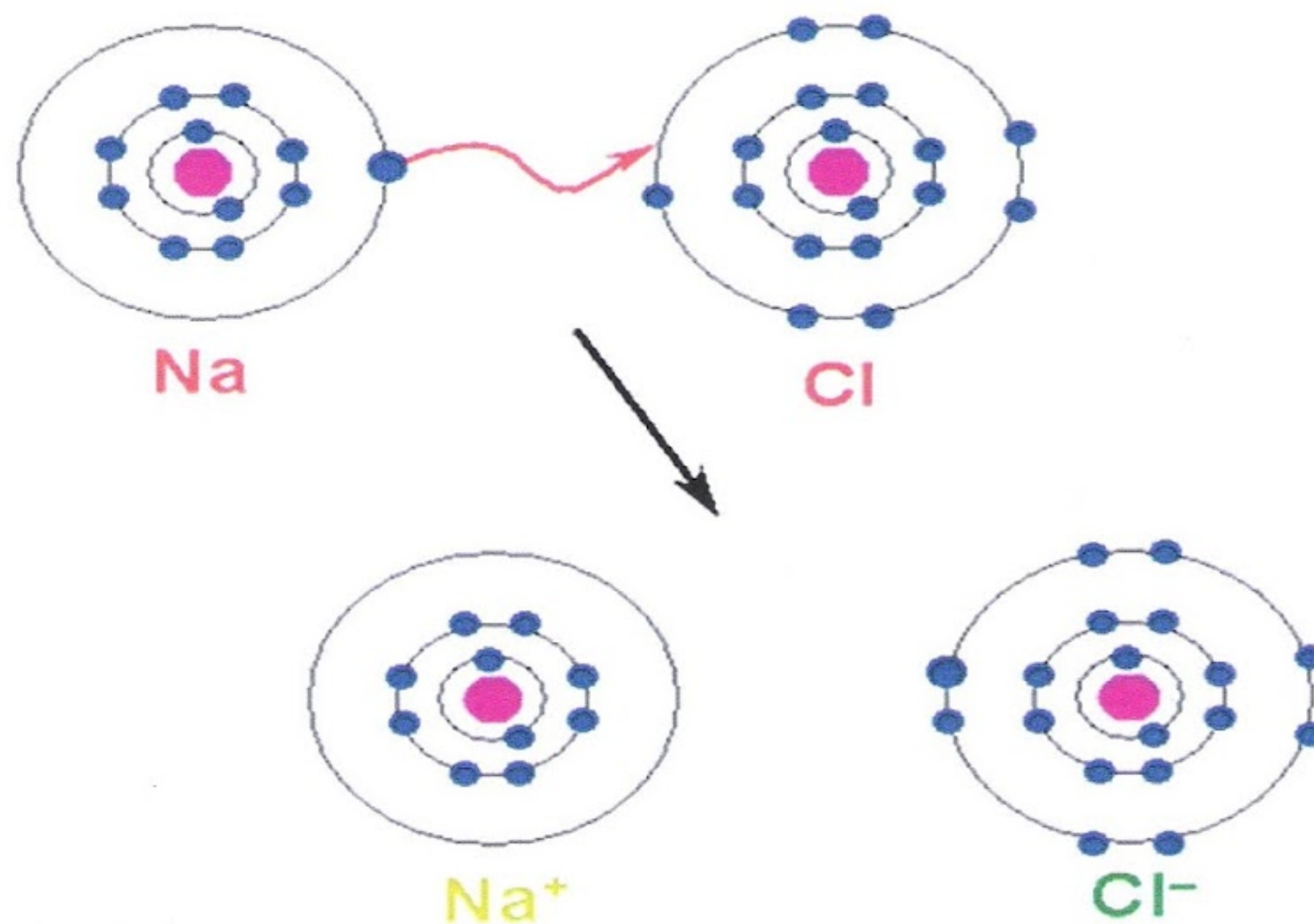
ANSWER:

$_{11}\text{Na}$: metal

$_{17}\text{Cl}$: non-metal

⇒ IONIC BOND

Element	Electron configuration	Valence electron	Ion	Formula
$_{11}\text{Na}$	$1s^2 2s^2 2p^6 3s^1$	1	Na^+	NaCl
$_{17}\text{Cl}$	$1s^2 2s^2 2p^6 3s^2 3p^5$	7	Cl^-	

6) What is the chemical bond between ${}_1\text{H}$ and ${}_{16}\text{S}$ like?

5 points

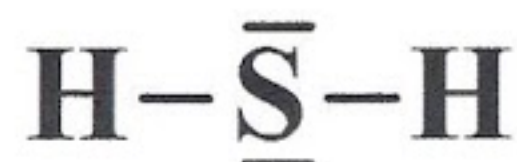
ANSWER:

${}_1\text{H}$: non - metal
 ${}_{16}\text{S}$: non - metal

$\Rightarrow$ **COVALENT BOND**

Element	Electron configuration	Valence electrons	Need	Formula
${}_1\text{H}$	$1s^1$	1	1	H_2S
${}_{16}\text{S}$	$1s^2 2s^2 2p^6 3s^2 3p^4$	6	2	

LEWIS DIAGRAM:



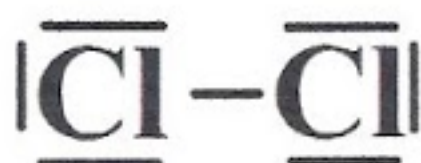
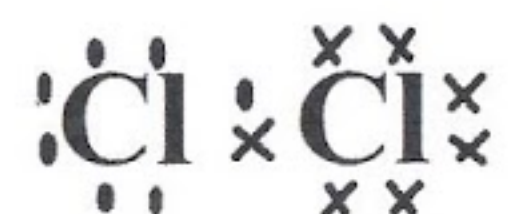
7) What is the chemical bond between $_{17}\text{Cl}$ and $_{17}\text{Cl}$ like? 5 points

ANSWER:

$_{17}\text{Cl}$: non - metal
 $_{17}\text{Cl}$: non - metal
 }
 $\Rightarrow$
COVALENT BOND

Element	Electron configuration	Valence electrons	Need	Formula
$_{17}\text{Cl}$	$1s^2 2s^2 2p^6 3s^2 3p^5$	7	1	Cl_2
$_{17}\text{Cl}$	$1s^2 2s^2 2p^6 3s^2 3p^5$	7	1	

LEWIS DIAGRAM:



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8) List the properties of metallic bonds.

5 points

ANSWER:

- They form crystals.
- Luster (surface light reflectivity).
- Electrical and thermal conductivity.
- Ductility and malleability.
- Tensile strength.

9) Explain a potassium crystal ($Z = 19$)

5 points

ANSWER:

Element	Electron configuration	Valence electron	Ion	Formula
$_{19}\text{K}$	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$	1	K^+	K

