1 What is the electronic configuration for the particle $^{27}_{13}Al^{+}$?

A $1s^2 2s^2 2p^6 3s^1 3p^1$

B $1s^2 2s^2 2p^6 3s^2$

C $1s^2 2s^2 2p^6 3s^2 3p^2$

D $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7 4s^1$

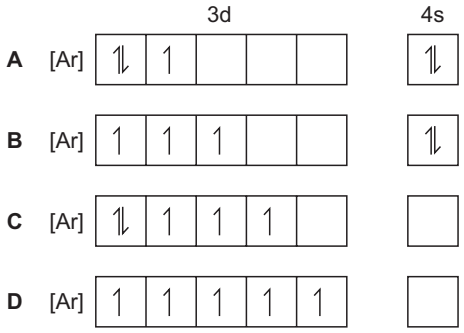
2 The data in the table gives the 5th to the 10th ionisation energies of three elements from Period 3 of the Periodic Table.

element	ionisation energy / kJ mol^{-1}					
	5th	6th	7th	8th	9th	10th
X	6274	21 269	25 398	29 855	35 868	40 960
Y	7012	8 496	27 107	31 671	36 579	43 140
Z	6542	9 362	11 018	33 606	38 601	43 963

What are the correct identities of these three elements?

	element X	element Y	element Z
A	Na	Mg	Al
B	Mg	Al	Si
C	P	S	Cl
D	S	Cl	Ar

1 What is the electrons in boxes notation for the Fe^{3+} ion?



2 Which equation has an energy change that is equal to the first ionisation energy of bromine?

A $Br(g) \rightarrow Br^{+}(g) + e^{-}$

B $Br(g) \rightarrow Br^{-}(g) - e^{-}$

C $\frac{1}{2}Br_2(g) \rightarrow Br^{+}(g) + e^{-}$

D $\frac{1}{2}Br_2(g) \rightarrow Br^{-}(g) - e^{-}$

4 Which statement is correct?

A The relative atomic mass of a ^{35}Cl atom is 35.5.

B The relative molecular mass of O_2 is 16.0.

C The relative formula mass of $CaCO_3$ is 100.1.

D The relative isotopic mass of a ^{24}Mg atom is 24.3.

7 X and Y are different elements in Period 3.

Atoms of X and Y each have only one completely filled orbital in their highest occupied energy sub-shell.

Y has a greater first ionisation energy than X.

Which row shows the structure and bonding in X and Y?

	X	Y
A	giant metallic	giant metallic
B	giant metallic	simple molecular
C	giant covalent	simple molecular
D	simple molecular	simple molecular

1 Helium forms an ion $^{3}_{2}He^{+}$.

Three statements about this ion are listed.

1 It contains two protons.

2 It contains three neutrons.

3 It contains one electron.

Which statements are correct?

A 1, 2 and 3 **B** 1 and 3 only **C** 2 and 3 only **D** 2 only

2 The table shows the first five ionisation energies of element X.

element	ionisation energy / kJ mol^{-1}				
	1st	2nd	3rd	4th	5th
X	736	1450	7740	10 500	13 600

Element X is in Period 3 of the Periodic Table.

What is element X?

A sodium

B magnesium

C silicon

D argon

3 Methanethiol, CH_3SH, burns as shown.

$$CH_3SH + 3O_2 \rightarrow CO_2 + SO_2 + 2H_2O$$

A sample of 10 cm^3 of methanethiol gas was reacted with 60 cm^3 of oxygen. Both samples were measured at room conditions.

What would be the final volume of the resultant mixture of gases measured at room temperature?

A 20 cm^3 **B** 30 cm^3 **C** 50 cm^3 **D** 70 cm^3