Test yourself

Chapter 3

1 Which one of the following elements requires the **least** energy to remove one electron from one gaseous atom?

A Aluminium

B Chlorine

C Magnesium

D Sodium

2 The symbol for the nitride ion is N^{3-}. Which one of the following statements about the **outermost** electron sub-shell of this ion is correct?

A The sub-shell has three p-type electrons

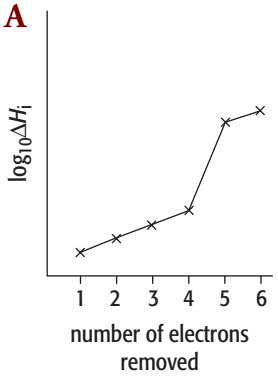
B The sub-shell has six p-type electrons

C The sub-shell has five p-type electrons

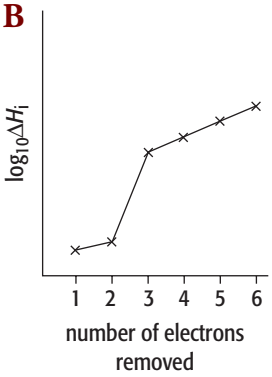
D The sub-shell has three s-type electrons

3 The following graphs represent the values of successive ionisation energies ($\log_{10}\Delta H_i$) plotted against the number of electrons removed. Which graph represents the successive ionisation energies for carbon (atomic number = 6).

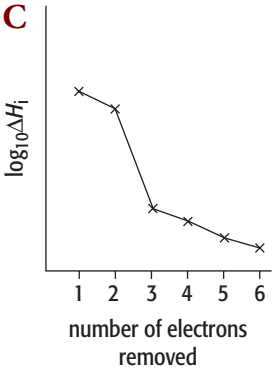
A



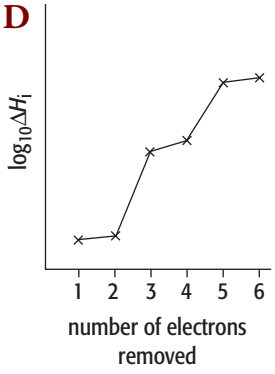
B



C



D



4 A Cr atom has the electronic configuration $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,3d^5\,4s^1$. Which one of the following electronic structures represents the electronic configuration of a Cr^{3+} ion?

A $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,3d^2\,4s^1$

B $1s^2\,2s^2\,2p^6\,3s^2\,3p^4\,3d^5$

C $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,3d^3$

D $1s^2\,2s^2\,2p^6\,3s^2\,3p^3\,3d^6$

5 To which group of the Periodic Table does the element with the electronic configuration $1s^2\,2s^2\,2p^3$ belong?

A Group 2

B Group 3

C Group 5

D Group 7

6 Which one of the following phrases best describes the term **2nd ionisation energy**?

A The energy needed to remove one electron from each atom in 1 mole of gaseous atoms

B The energy needed to remove one electron from each ion in 1 mole of gaseous 1+ ions

C The energy needed to remove one electron from each ion in 1 mole of gaseous 2+ ions

D The energy needed to add one electron to each ion in 1 mole of gaseous 1+ ions

7 Which one of the following diagrams represents the shape of a single p orbital?

A

B

C

D

8 Which one of the following equations represents the 3rd ionisation energy of calcium?

A $Ca(g) \rightarrow Ca^{3+}(g) + 3e^-$

B $3Ca^{2+}(g) \rightarrow 3Ca^{3+}(g) + 3e^-$

C $Ca^{3+}(g) \rightarrow Ca^{4+}(g) + e^-$

D $Ca^{2+}(g) \rightarrow Ca^{3+}(g) + e^-$

9 Which one of the following statements about 1st ionisation energy is correct?

A Across a period in the Periodic Table, the 1st ionisation energy increases as the proton number decreases

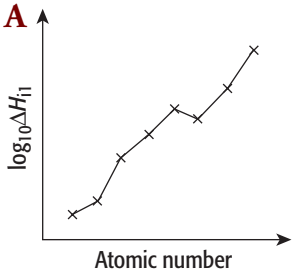
B Down a group in the Periodic Table, the 1st ionisation energy increases as the total number of electrons increases

C Down a group in the Periodic Table, the 1st ionisation energy decreases as the number of full electron shells between the outer electrons and the nucleus increases

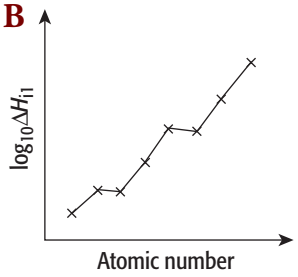
D The 1st ionisation energy increases the further the outer electron shell is from the nucleus

10 Which one of the following diagrams shows how $\log_{10}$ 1st ionisation energy varies with increasing atomic number in Period 3 of the Periodic Table?

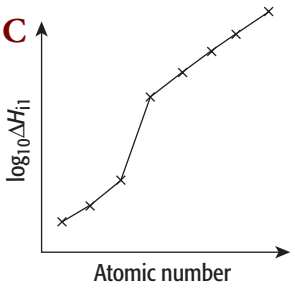
A



B



C



D