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CAIE A LEVEL Chemistry Topic Questions / 9701

1.3.2-Determine-Electronic-Configuration-of-Atoms-and-Ions-set-1-qp

Total Questions: 11

Note:

- For questions with answer choices as statements 1, 2 and 3, follow these instructions for selecting options A/B/C/D:
- A= 1, 2 and 3 are correct
- B=1 and 2 only are correct
- C=2 and 3 only are correct
- D=1 only is correct

Questions

Question 1:

Which particle has equal numbers of protons and neutrons and an electronic structure of $1s^2 2s^2 2p^6 3s^2 3p^6$?

A $^{39}_{18}Ar$ **B** $^{40}_{20}Ca^{2+}$ **C** $^{16}_{8}O^{2-}$ **D** $^{32}_{16}S$

Question 2:

When chlorine gas is analysed in a mass spectrometer $^{35}Cl^+$ ions are detected.

Which row is correct?

	number of neutrons in $^{35}Cl^+$	electronic configuration of $^{35}Cl^+$
A	17	$1s^2 2s^2 2p^6 3s^2 3p^4$
B	17	$1s^2 2s^2 2p^6 3s^2 3p^6$
C	18	$1s^2 2s^2 2p^6 3s^2 3p^4$
D	18	$1s^2 2s^2 2p^6 3s^2 3p^6$

Question 3:

What is the electronic configuration of Mg^{2+}?

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

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

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

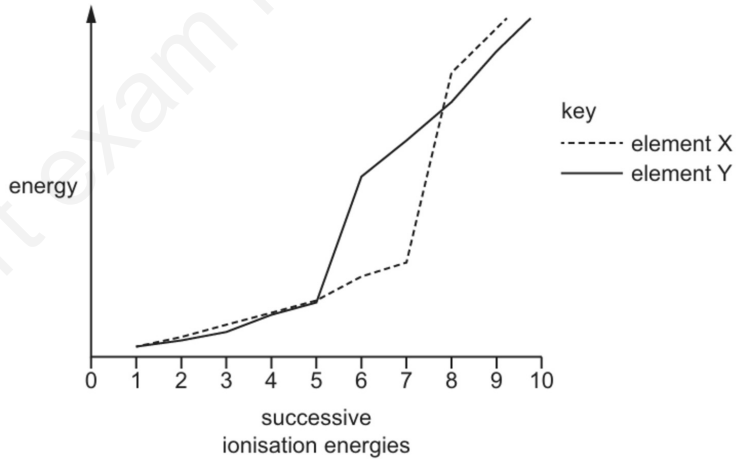
D $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^2\ 4s^2$

Questions (Continued)

Question 4:

The graph shows the successive ionisation energies of element X and element Y.

Both elements are in Period 3.



Which statement is correct?

A An atom of element X needs one extra electron for a full outer shell; an atom of element Y needs three extra electrons for a full outer shell.

B An atom of element Y has five electrons in the 3p subshell.

C Element X has an oxidation number of +7 in most of its compounds.

D When element X combines with element Y, the bonding is ionic.

Question 5:

What is the electronic configuration of an element with a **second** ionisation energy higher than that of each of its neighbours in the Periodic Table?

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

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

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

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

Question 6:

Which atom has the same number of electrons as an ammonium ion?

A Mg **B** Na **C** Ne **D** O

Questions (Continued)

Question 7:

Gallium nitride, GaN, could revolutionise the design of electric light bulbs because only a small length used as a filament gives excellent light at low cost.

Gallium nitride is an ionic compound containing the Ga^{3+} ion.

What is the electron arrangement of the nitrogen ion in gallium nitride?

A $1s^2\ 2s^2$

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

C $1s^2\ 2s^2\ 2p^4$

D $1s^2\ 2s^2\ 2p^6$

Question 8:

The ion X^{2+} has the same electronic configuration as the atom Kr.

What is the electronic configuration of an atom of X?

A $[Ar]\,4s^2 3d^{10} 4p^6$

B $[Ar]\,4s^2 3d^{10} 4p^6 5s^2$

C $[Ar]\,4s^2 4d^{10} 4p^6$

D $[Ar]\,4s^2 4d^{10} 4p^6 5s^2$

Question 9:

Which row is correct?

	molecule	shape	total number of pairs of electrons in the valence shell of the central atom
A	CO_2	linear	two
B	BF_3	trigonal planar	three
C	NH_3	regular tetrahedral	four
D	PF_5	octahedral	six

Questions (Continued)

Question 10:

A stable ion N_5^+ has been produced by research chemists.

Which structure is most likely to show the electron arrangement of this ion?

A 

B 

C 

D 

Question 11:

What is the electronic configuration of an isolated Ni^{2+} ion?

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

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

C $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2$

D $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8$