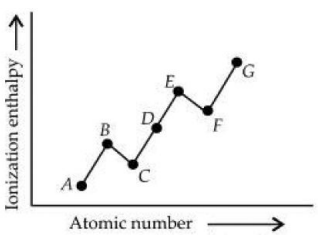
AVIRAL CLASSES
IIT-JEE | NEET | FOUNDATIONS

CHEMISTRY
CRASH COURSE

LECTURE-03

TOPICS : Periodicity

1. The incorrect statement among the following is
   (a) the first ionization enthalpy of Al is less than the first ionization enthalpy of Mg.
   (b) the second ionization enthalpy of Mg is greater than the second ionization enthalpy of Na
   (c) the first ionization enthalpy of Na is less than the first ionization enthalpy of Mg.
   (d) the third ionization enthalpy of Mg is greater than the third ionization enthalpy of Al
2. The decreasing order of the ionization potential of the following element is
   (a) Ne > Cl > P > S > Al > Mg
   (b) Ne > Cl > P > S > Mg > Al
   (c) Ne > Cl > S > P > Mg > Al
   (d) Ne > Cl > S > P > Al > Mg
3. In any period, the valency of an element with respect to oxygen
   (a) increases one by one from IA to VIIA
   (b) decreases one by from IA to VIIA
   (c) increases one by one from IA to IVA and then decreases from VA to VIIA one by one
   (d) decreases one by one from IA to IVA and then increases from VA to VIIA one by one
4. The electronic configuration and the group number in the periodic table in which the element with atomic number 107 lies are
   (a) [Rn] $5f^{14}\ 6d^1\ 7s^2\ p^4$, Group 3
   (b) [Rn] $5f^{14}\ 6d^5\ 7s^2$, Group 7
   (c) [Rn] $5f^{14}\ 7s^2\ 7p^5$, Group 7
   (d) [Rn] $5f^{14}\ 6d^2\ 7s^2\ 7p^3$, Group 15
5. The ionization enthalpy of second period elements vary with atomic number as



   The elements present at points B and E are
   (a) Be, C (b) B, N
   (c) Be, O (d) Be, N
6. As we move from left to right across a period, there is regular decrease in atomic radii of the representative elements. This is due to the reason that
   (a) the number of energy shells remains the same which nuclear charge decreases
   (b) the number of energy shells remains the same while nuclear charge increases
   (c) the nuclear charge remains the same while number of shells decrease
   (d) both number of shells and nuclear charge remain the same
7. Fluorine, has the highest electronegativity among the $ns^2\ np^5$ group on the Pauling scale, but the electron affinity of fluorine is less than that of chlorine because
   (a) the atomic number of fluorine is less than that of chlorine
   (b) fluorine being the first member of the family behaves in an unsual manner
   (c) chlorine can accommodate an electron better than fluorine by utilising its vacant 3-d orbital
   (d) small size, high electron density and an increased electron repulsion makes addition of an electron to fluorine less favourable than that in the case of chlorine
8. The element of 4^{th} period of the periodic table having maximum number of unpaired electrons in its ground state is
   (a) $_{20}Ca$ (b) $_{30}Zn$
   (c) $_{33}As$ (d) $_{24}Cr$
9. In which of the following arrangements, the order is not according to the property indicated against it ?
   (a) $Al^{3+} < Mg^{2+} < Na^{+} < F^{-}$ increasing ionic size
   (b) B < C < N < O increasing first ionisation energy
   (c) I < Br < F < Cl increasing electron gain enthalpy (without negative sign)
   (d) Li < Na < K < Rb increasing metallic radius
10. An element of atomic number 29 belongs to which of the following block of the periodic table ?
    (a) s-block (b) p-block
    (c) f-block (d) d-block

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1. **(b):** IE_2 of Mg is lower than that of Na because in case of Mg^+, 3*s*-electron has to be removed while in case of Na^+, an electron from the stable inert gas configuration (Neon) has to be removed.

2. **(b):** Closed shell configuration (Ne), half filled configuration (P) and completely filled configuration (Mg) are responsible for higher values of ionization enthalpies.

3. **(c):** As we move along the period, an electron is subsequently added in the outer most shell of the elements and valency increases. However when the number of valence electrons is more than 4, then the valency is given by

valency = group no. – 8.

4. **(b):** In accordance with, Aufbau principle, the most stable electronic configuration is (*b*) and its group number is 7.

5. **(d):** The electronic configuration of Be = $1s^2, 2s^2$ (Fully filled).
The electronic configuration of N = $1s^2, 2s^2, 2p^3$ (Half filled).
Due to stable electronic configuration of Be and N the *IE* of these elements is more than elements of the next group.

6. **(b):** Radius $\propto \frac{1}{\text{Nuclear charge}}$

7. D

8. **(d):** It is Cr and has configuration $3d^5 4s^1$ *i.e.*, 6 unpaired electrons.

9. **(b):** (a) All of these are isoelectronic ions with decreasing nuclear charge and increasing ionic size.
Al^{3+} (Z = 13) < Mg^{2+} (Z = 12) < Na^+ (Z = 11) < F^- (Z = 9)
(b) IE_1 of these elements are in the order
B < C < O < N.
IE_1 of N ($1s^2\ 2s^2\ 2p^3$) is more than O ($1s^2\ 2s^2\ 2p^4$) due to extra stable half filled 2*p*-subshell in the valence shell. Thus, the given order is not correct.

(c) Electron gain enthalpies of these elements are
I (– 295 kJ mol^{-1}) < Br (– 325 kJ mol^{-1})
< F (– 328 kJ mol^{-1}) < Cl (– 349 kJ mol^{-1})
(d) Metallic radius increases down the group in I^{st} group.

10. **(d):** Z = 29 → $[Ar]^{18}\ 3d^{10}\ 4s^1$. Since last electron enters *d*-orbital, the atom is *d*-block element.