Classification of Elements and Periodicity in Properties Important Questions With Answers

NEET Chemistry 2023

1. Assertion: Atomic number of the element ununtrium is 113.
   Reason: According to IUPAC system of nomenclature, the numerical roots for 1, 1 and 3 are un, un and tri respectively
   a) If both assertion and reason are true and reason is the correct explanation of assertion.
   b) If both assertion and reason are true but reason is not the correct explanation of assertion.
   c) If assertion is true but reason is false. d) If both assertion and reason are false.

   Solution : -
   The atomic number of the elements above atomic number 100 were given a systematic nomenclature by IUPAC which can be derived directly from the atomic number of the element using the numerical roots for 0 and numbers 1-9. The names were ended with '-ium' suffix. They have three-letter abbreviation using the first letter of each number.
   According to IUPAC systematic nomenclature, the numerical roots for 1,1 and 3 are un, un and tri, respectively.
   Thus, an element with atomic number 113 has its name as Ununtrium (Uut)
   Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

2. The ionization enthalpies of Li and Na are 520 kJ mol^{-1} and 495 kJ mol^{-1} respectively. The energy required to convert all the atoms present in 7 mg of Li vapours and 23 mg of sodium vapours of their respective gaseous cations respectively are
   a) 52 J, 49.5 J **b) 520 J, 495 J** c) 49.5 J, 52 J d) 495 J, 520 J

   Solution : -
   No. of moles of Li = $\frac{7}{1000\times7} = 10^{-3}$
   No. of moles of Na = $\frac{23}{1000\times23} = 10^{-3}$
   ∴The amount of energies required for 10^{-3} mole each of Li and Na are 520 kJ x 10^{-3} and 495 kJ x 10^{-3} or 520 J and 495 J respectively.

3. Screening effect is not observed in:
   a) He^{+} b) Li^{2+} c) Be^{3+} **d) In all the above cases**

   Solution : -
   Normally, the screening effect takes place for the elements which have a high atomic number and have a large number of electrons in their inner orbits. These inner orbit electrons act as a screen and protect each other from the nuclear charges. Here all three elements have a small atomic number and have only 1 electron thus does not have enough electrons to perform screening effect.

4. The element with the atomic number 118, will be
   a) alkali **b) noble gas** c) lanthanide d) transition element

   Solution : -
   The outermost electronic configuration of element with atomic number 118 is $7s^2$ 7 p^6 , so it will be a noble gas.

5. The starting element of fifth period is:
   a) K **b) Rb** c) Kr d) Xe

   Solution : -
   K belongs to 4th period, Rb belongs to 5th period.

6. Which of the following oxide is amphoteric?

a) SnO_2 b) Cr_2O_3 c) CrO_3 d) CrO_5

Solution : -

In general, the electropositive character of the oxide's central atom will determine whether the oxide will be acidic or basic. The more electropositive the central atom the more basic the oxide. The more electronegative the central atom, the more acidic the oxide. Electropositive character increases from right to left across the periodic table and increases down the column.

SnO_2 is an amphoteric oxide because it reacts with acids as well as bases to form corresponding salts.

$SnO_2 + 2H^+ \rightarrow Sn^{4+} + 2H_2O$

$SnO_2 + 6OH^- \rightarrow [Sn(OH)_6]^{2-}$ or SnO_3^{2-} (stannate)

CaO is basic. SiO_2 and CO_2 are acidic in nature.

Silicon dioxide has no basic properties - it doesn't contain oxide ions and it doesn't react with acids. Instead, it is very weakly acidic, reacting with strong bases.

CaO is basic in nature and CO_2 is acidic in nature.

7. The atomic weights of Be were corrected by Mendeleef using the formula:

a) $\sqrt{v}$ =a(Z-b) b) $mvr = \frac{nh}{2\pi}$ **c) Atomic weight = Equivalent weight x valency**

d) Equivalent weight = Atomic weight x valency

Solution : -

Based on the position in the periodic table, Mendeleev corrected the atomic masses of some elements such as beryllium, indium, gold and platinum.

He corrected the atomic mass of beryllium from 13.5 to 9.

He used the formula atomic weight=equivalent weight $\times$ valency.

8. Match the columns I, II and III and mark the appropriate choice.

	Colum I		Colum II		Colum III
(A)	Bromine	(i)	Noble metal	(p)	Amalgam
(B)	Gold	(ii)	Crystalline non-metal	(q)	$4s^2\ 4p^5$
(C)	Mercury	(iii)	Liquid non-metal	(r)	Transition metal
(D)	Iodine	(iv)	Liquid metal	(s)	Violet

a) (A)→(iii, q); (B)→(i, r), (C)→(iv, p); (D)→(ii, s) b) (A)→(ii, p); (B)→(i, s), (C)→(iii, q); (D)→(iv, r)

c) (A)→(i, s), (B)→(ii, p); (C)→(iv, r), (D)→(iii, q) d) (A)→(iv, r), (B)→(iii, q): (C)→(ii, s): (D)→(i, p)

Solution : -

Col I	Col II	Col III
(A) Bromine	(iii) liquid non-metal	(q) $4s^24p^5$
(B) Gold	(i) Noble metal	(r) Transition metal
(C) Mercury	(iv) liquid metal	(p) Amalgam
(D) Iodine	(ii) crystalline non-metal	(s) violet

(A)→(iii, q); (B)→(i, r), (C)→(iv, p); (D)→(ii, s)

9. The species Ar, K^+ and Ca^{2+} contain the same number of electrons. In which order do their radii increase?

a) $Ca^{2+} < K^+ < Ar$ b) $K^+ < Ar < Ca^{2+}$ c) $Ar < K^+ < Ca^{2+}$ d) $Ca^{2+} < Ar < K^+$

Solution : -

The species Ar,K^+ and Ca^{2+} contain the same number of electrons.

The number of protons present in Ar, K^+ and Ca^{2+} are 18, 19 and 20 respectively.

The number of electrons is the same but the number of protons (and the effective nuclear charge) increases in the order $Ar < K^+ < Ca^{2+}$. Since argon has fully filled shells, it will have high electron-electron repulsions in its shell.

Thus, it has the largest radius. Among, K and Ca, K has a larger size and on moving from left to right, the atomic size decreases.

Thus, the radii increases in the order $Ca^{2+} < K^+ < Ar$.

10. Metallic radius of Ca is 200 pm. Covalent radius of Ca is:

a) 200 pm b) 230 pm c) 280 pm **d) 174 pm**

Solution : -

Covalent radius < metalic radius.

11. Which of the following is true about the element $_{33}As$?

a) It is the 5th period element **b) It is p-block element** c) It belongs to 16th group

d) It is the member of VIA group

Solution : -

Electron configuration is [Ar]18 $3d^{10}$ $4s^2$ $4p^3$. As last electron enters in p-subshell it is p-block element and thus its group number is equal to 10+5= 15. As principal quantum number of valence shell is 4. so it is 4th period element.

12. Two elements A and B have the following electronic configurations. The formula of the compound formed between them can be A = $1s^2$ $2s^2$ $2p^6$ $3s^2$ $3p^1$: B = $1s^2$ $2s^2$ $2p^4$

a) AB b) AB_2 **c) A_2B_3** d) A_3B_2

Solution : -

Valence of A = 3, Valence of B = 2. So the formula becomes A_2B_3

13. Gd (64) has_____ unpaired electrons with sum of spin_____

a) 7. 3.5 b) 8, 3 c) 6, 3 **d) 8, 4**

Solution : -

The element Gd(Z = 64) show electronic configuration = $[Xe]_{54}$. $4f^7$,$5d^1$,$6s^2$.

As it has 8 - unpaired electrons ($4f^7$ and $5d^1$) and its sum of spin = $8 \times \frac{1}{2} = 4$.

14. A sudden large jump between the values of second and third ionization energies of an element would be associated with which of the following electronic configuration?

a) $1s^2$ $2s^2$ $2p^6$ $3s^1$ $3p^2$ b) $1s^2$ $2s^2$ $2p^6$ $3s^1$ $3p^1$ c) $1s^2$ $2s^2$ $2p^6$ $3s^1$ **d) $1s^2$ $2s^2$ $2p^6$ $3s^2$**

Solution : -

A sudden large jump between the values of second and third ionization energies of an element would be associated with electronic configuration $1s^2$, $2s^2 2p^6 3s^2$.

$1s^2 2s^2 2p^6 3s^2$ looses two electorns to form $1s^2$, $2s^2 2p^6$ which is stable electronic configuration of noble gas Ne. Octet is completely filled. when third electron is to be removed, large anount of energy is required as this stable electronic configuration is to be broken.

15. Why is the electron gain enthalpy of O or F less than that of S or Cl?

a) O and F are more electronegative than Sand Cl.

b)

When an electron is added to O or F, it goes to a smaller (n = 2) level and suffers more repulsion than the electron in S or Cl in larger level (n = 3).

c) Adding an electron to 3p-orbital leads to more repulsion than 2p-orbital.

d) Electron gain enthalpy depends upon the electron affinity of the atom.

Solution : -

The electron gain enthalpy of O or F less than that of S or Cl and is due to smaller size of O/F the inter-electronic repulsion in compact 2p-orbitals is much more than the repulsion in 3p-orbitals of S/Cl hence, the incoming new electron feels less attraction in O/F and more attraction in S/Cl. Due to this the addition becomes difficult in O/F and electron gain enthalpy becomes less than S/Cl.

16. $N_0/2$ atoms of X(g) are converted into $X^+(g)$ by energy E_1.$N_0/2$ atoms of X(g) are converted into $X^-(g)$ by the energy E_2. Hence ionisation potential and electron affinity of X(g) are:

a) $\frac{2E_1}{N_0}, \frac{2(E_1 - E_2)}{N_0}$ b) $\frac{E_1}{N_0}, \frac{2E_2}{N_0}$ c) $\frac{2(E_1 - E_2)}{N_0}, \frac{2E_2}{N_0}$ **d)** $\frac{2E_1}{N_0}, \frac{2E_2}{N_0}$

Solution : -

Let, IP = I

EA = E

$X(g) \rightarrow X^+(g) + e^-$

$\frac{N_0}{2} I = E_1$

$I = \frac{2E_1}{N_0}$

$X(g) + e^- \rightarrow X^-(g)$

$\frac{N_0}{2} = E_2$

$E = \frac{2E_2}{N_o}$

17. An ion M^{3+} has electronic configuration $[Ar]3d^{10}4s^2$, Element M belongs to:

a) s-block **b) p-block** c) d-block d) f-block

Solution : -

M^{3+} has configuration $[Ar]3d^{10}4s^2$

M^{3+} has lose $3e^-$

M has configuration $[Ar]3d^{10}4s^24p^3$

Hence, the element M belongs to p - block.

18. Correct order of ionic radius is

a) $Ti^{4+} < Mn^{7+}$ b) $Cl^- < Cl$ c) $K^+ > Cl^-$ d) $P^{3+} > P^{5+}$

Solution : -

Size ↓ on increasing (+) ve charge

Size ↑ on decreasing (-) ve charge

19. Atomic radius is measured by

a) Mulliken oil drop method b) Rutherford's a-ray scattering experiment **c) X-ray diffraction technique**

d) Electric discharge tube experiment

Solution : -

Atomic size generally measured with X ray diffraction.

20. An element of 5f-series but has no electrons filled in 5f-sub shell:

a) Ac b) Ce c) Th **d) U**

Solution : -

Ac has configuration $ns^2(n-1)d^1$

21. Match the column I with column II and mark the appropriate choice.

Column I (Atomic number)		Column II (Period, Group)	
(A)	14	(i)	3, 14
(B)	53	(ii)	5, 2
(C)	38	(iii)	6, 10
(D)	78	(iv)	5, 17

a) (A) ⟶ (ii), (B) ⟶ (iv), (C) ⟶ (iii), (D) ⟶ (i) **b) (A)⟶ (i), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (iii)**

c) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶ (iv) d) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (iv)

Solution : -

Atomic number	Electronic configuration	Period, group
14	2,8,4	3, 14
38	2,8,8,18,2	5, 2
53	2,8,8,18,17	5,17
78	2,8,8,18,18,24	6, 10

22. There are two rows of inner transition elements in the periodic table each containing 14 elements. The reason for this may be

a) f-orbital has seven values for magnetic quantum number, hence total electrons are 14

b) in the periodic table there is space to accommodate 14 electrons only

c) only 28 inner transition elements have been discovered till date

d) 28 is the maximum number of elements that any block can accommodate.

Solution : -

For f-orbital, l= 3, $m_1 = 2l+ 1= 7$

There are 7 electrons with +1/2 spin and 7 electrons with -1/2 spin. Hence, total electrons are 14

23. Mercury is the only metal which is liquid at 0°c. This is due to its:
a) high ionisation energy and weak metallic bond b) Low ionisation potential and high electrogativity
c) High atomic mass and small size d) High electronegativity and low ionisation potential

Solution : -
The ionization energy of mercury is very high and the metallic bonds are very weak.
Hence, mercury is the only metal which is liquid at 0^0C.

24. Atomic numbers of actinides are
a) 57 to 71 b) 80 to 103 c) 58 to 71 **d) 90 to 103**

Solution : -
90 to 103 are Actinides

25. Electronic configurations of four elements A, B, C and D are given below
(A) $1s^2\ 2s^2\ 2p^6$
(B) $1s^2\ 2s^2\ 2p^4$
(C) $1s^2\ 2s^2\ 2p^6\ 3s^1$
(D) $1s^2\ 2s^2\ 2p^5$
Which of the following is the correct order of increasing tendency to gain electron?
a) A < C < B < D b) A < B < C < D c) D < B < C < A d) D < A < B < C

Solution : -
A is Ne(10) : $1s^2\ 2s^2\ 2p^6$
B is O(8) : $1s^2\ 2s^2\ 2p^4$
C is Na(11) : $1s^2\ 2s^2\ 2p^6\ 3s^1$
D is F(9) : $1s^2\ 2s^2\ 2p^5$
Noble gases (A) have completely filled orbitals hence, they have no tendency to gain electrons.
Element C prefers to lose electron ($3s^1$) to attain stable noble gas configuration.

26. The electronic configuration $1s^22s^22p^63s^23p^4$ represents
a) Oxygen b) Magnesium c) Calcium **d) Sulphur**

Solution : -
Z = 16 . i.e, Sulphur

27. The electronic configuration of an element is $1s^2$,$2s^2\ 2p^6$, $3s^2\ 3p^3$. What is the atomic number of the element, which is present just below the above element in the periodic table?
a) 33 b) 34 c) 36 d) 49

Solution : -
The element which is positioned just below the above element has same outermost electronic configuration with addition of one more shell. Thus, the outermost electronic configuration of the element just below the given element is $4s^24p^3$. Now, its complete electronic configuration is $1s^2$, $2s^2$, $2p^6$, $3s^2$, $3p^6$, $4s^2$, $3d^{10}$, $4p^3$. Thus, its atomic number is 33.

28. In the periodic table, the maximum chemical reactivity is at the extreme left (alkali metals) and extreme right (halogens). Which properties of these two groups are responsible for this?
a) Least ionisation enthalpy on the left and highest negative electron gain enthalpy on the right.
b) Non-metallic character on the left and metallic character on the right.
c) High atomic radii on the left and small atomic radii on the right.
d) Highest electronegativity on the left and least electronegativity on the right

Solution : -
Elements on the left side have lowest ionisation enthalpy due to which they can very easily lose electrons while the elements on the right can accept electrons easily as they show highest negative electron gain enthalpy.

29. Beryllium shows diagonal relationship with aluminium. Which of the following similarity is incorrect?
a) Be_2C like Al_4C_3 yields methane on hydrolysis b) Be, like Al is rendered passive by HNO_3
c) Be $(OH)_2$ like Al$(OH)_3$ is basic d) Be forms beryllates and Al forms aluminate

Solution : -

The two structures involve the only movement of electrons and not of atoms or groups, hence these are resonating structures. Both metals have the tendency to form covalent compounds Diagonal relationship of Be with Al Because of its small size. Be differs from other earth alkaline earth metals but resembles in many of its properties with Al on account of the diagonal relationship. The correct option is that $Be(OH)_2$ like $Al(OH)_3$ both are basic in nature.

30. In the long form of periodic table, the non-metals are placed in
a) s-block **b) p-block** c) d-block d) f-block

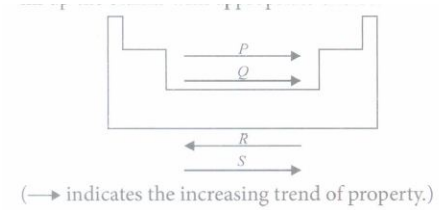
31. Arange Ce^{3+}, La^{3+}, Pm^{3+} and Yb^{3+} in increasing order of their size
a) $Yb^{3+} < Pm^{3+} < Ce^{3+} < La^{3+}$ b) $Ce^{3+} < Yb^{3+} < Pm^{3+} < La^{3+}$ c) $Yb^{3+} < Pm^{3+} < La^{3+} < Ce^{3+}$
d) $Pm^{3+} < La^{3+} < ce^{3+} < Yb^{3+}$

Solution : -
Lanthanide contraction is observed in these ions, i.e., ionic radius decreases as atomic number increases

32. Which of the following oxides is neutral in nature?
a) SrO b) Al_2O_3 c) CO_2 **d) CO**

Solution : -
CO is neutral in nature. It reacts neither with acid nor with base. SrO is basic, Al_2O_3 is amphoteric and CO_2 is acidic.

33. Study the given diagram of the periodic table and fill up the blanks with appropriate choice.



a)

P	Q	R	S
Ionisation enthalpy	**Electron gain enthalpy**	**Atomic radius**	**Electro-negativity**

b)

P	Q	R	S
Atomic radius	Ionisation enthalpy	Electro-negativity	Electron gain enthalpy

c)

P	Q	R	S
Ionisation enthalpy	Atomic radius	Electro-negativity	Electron gain enthalpy

d)

P	Q	R	S
Electro-negativity	Electron gain enthalpy	Ionisation enthalpy	Atomic radius

Solution : -
Ionisation enthalpy, electron gain enthalpy and electronegativity increases in a period from left to right while atomic radius decreases.

34. Which of the following statements is not correct about the electron gain enthalpy?
a) In general, the electron gain enthalpy becomes less negative in going from top to bottom in a group.
b) The electron gain enthalpy becomes less negative in a period from left to right.
c) The elements having stable configuration like noble gases have large positive electron gain enthalpies.
d) Noble gases have large positive electron gain enthalpies

Solution : -
The electron gain enthalpy becomes more negative in a period from left to right. With an increase in atomic number, the effective nuclear charge increases. The attraction between the nucleus and valence electron increases. Hence, electron gain enthalpy becomes more negative.

35. Which of the following is the wrong statement?
a) All the actinide element are radioactive b) Alkali and alkaline earth metals are s-block elements
c) Chalcogens and halogens are p-block elements
d) The first member of the lanthanide series is lanthanum

Solution : -

Lanthanum is a member of d-block.

36. Which of the following statement is incorrect?
    a) Oxide of aluminium (Al_2O_3) , and arsenic (AS_2O_3) are amphoteric.
    b) Oxide of chlorine (Cl_2O_7) is less acidic than oxide of nitrogen (N_2O_5).
    c) Oxide of carbon (CO_2) is more acidic than oxide of silica (SiO_2).
    d) The correct increasing order of basic character of various oxides is $H_2O < CuO < MgO < CaO$.

    Solution : -

    $^{+7}Cl_2O_7$ having higher oxidation state is more acidic than $\overset{+5}{N}_2\ O_5$ having lower oxidation state.

37. Generally the ionisation potential in it period increases, but there are some exceptions. The one which is not an exception is
    a) Be & B b) N & O c) Mg & Al **d) Na & Mg**

    Solution : -
    Be to B, I.P decreases, N to O, I.P decreases, Mg to Al I.P. decreases

38. The order of which of the following oxides is arranged according to decreasing basic nature?
    a) Na_2O, MgO, Al_2O_3, CuO b) CuO, Al_2O_3, MgO, Na_2O c) Na_2O_3, CuO, MgO, Na_2O
    d) CuO, MgO, Na_2O, Na_2O_3

    Solution : -
    Applying Fajans' rule, the lower the charge; the more is ionic and the more is basic and vice versa. Moreover, small cation, large anion, high charge and presence of d electrons mean more covalent and more acidic. Therefore, decreasing order of basic nature is

    $\overset{+1}{Na_2}O > \overset{+2}{M}gO > \overset{+3}{Al_2}O_3 > \overset{+2}{C}uO$

Group-1	1	2	13	11
Group-2	3rd	3rd	3rd	4th

    Size Al^{3+} > Cu^{2+} and presence of d electron in Cu^{2+} makes it less basic (or more acidic) than Al_2O_3.

39. Astatine is a radioactive halogen. It is a solid at room temperature because
    a) of greater van der Waal's force of attraction between large atoms of astatine
    b) of less van der Waal's force of attraction between large atoms of astatine
    c) of less van der Waal's force of attraction between small atoms of astatine
    d) it shows non-metallic characters

    Solution : -
    Because of its large size, the Van der Waal's force of attraction is strong, which makes it solid

40. The amount of energy released when 10^6 atoms of iodine in vapour state are converted to I^- ions is 4.9×10^{-13} J. What is the electron affinity of iodine in eV per atom?
    a) 2.0 b) 2.5 c) 2.75 **d) 3.0**

41. Assertion: Among isoelectronic species, the cation with the greater positive charge will have a smaller radius.
    Reason: Greater the attraction of the electrons to the nucleus, smaller is the size of atom/ion.
    a) If both assertion and reason are true and reason is the correct explanation of assertion.
    b) If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.

42. The order of screening effect of electrons of s, p, d and f orbitals of a given shell of an atom on its outer shell electrons is:
    a) s > p > d >f b) f > d > p > s c) p < d < s < f d) f > p > s > d

    Solution : -
    For the same shell, screening effect decreases in the order: s > p > d > f.

43. The correct order of the decreasing ionic radii among the following isoelectronic species are
    a) Ca^{2+}> K^+> S^{2-} > Cl^- b) Cl^-> S^{2-} >Ca^{2+}> K^+ **c) S^{2-} > Cl^-> K^+>Ca^{2+}** d) K^+>$Ca^{2+}Cl^-$> S^{2-}

    Solution : -

In iso-electronic species, if a positive charge is more then they will have a very less ionic radius. Because here protons are more than electrons and protons attract electrons to come close to the nucleus. But in anionic iso-electronic species, electrons are more than protons. Protons which are in less number can't attract all the electrons to come closer. So, ionic radius increases in the case of anionic species, if negative charge increases. Therefore the correct order is $S^{-2} > Cl^{-} > K^{+} > Ca^{+2}$

44. Assertion : Na_2O is basic oxide whereas Cl_2O_7 is acidic oxide.
Reason: Elements on extreme left form basic oxides whereas elements on extreme right form acidic oxides.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

Solution : -

Na_2O reacts with water to form a strong base NaOH.
Cl_2O_7 reacts with water to form strong acid.
$Na_2O+H_2O \rightarrow 2NaOH$
$Cl_2O_7+H_2O \rightarrow 2HClO_4$
in aqueous solution, sodium hydroxide (NaOH) dissociates to provide hydroxide ions. In aqueous solution, perchloric acid ($HClO_4$) dissociates to provide hydrogen ions.

45. Which one of the following pairs of atomic numbers represents elements belonging to the same group?
a) 11,20 b) 12,30 **c) 13,31** d) 14,33

Solution : -

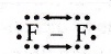
The elements with the same valence electrons belong to the same group. The pair of atomic numbers 13 and 31, represents elements belonging to the same group. They correspond to Al and Ga. They belong to group 13 or IIIA.

46. Which of the following statements is true?
a) Silicon exhibits 4 coordinates number in its compounds **b) Bond energy of F_2 is less than Cl_2**
c) Mn (III) oxidation state is more stable than Mn (II) in aqueous state
d) Elements of 15th group shows only +1 and +5 oxidation states

Solution : -

This is because of inter-electronic repulsions between lone pairs

Bond Energy $\left(kJmol^{-1}\right)$:	F-F 158.8	$Cl-Cl$ 242.6



47. The oxidation state of an element in a particular compound can be defined as
a)
the charge acquired by its atom on the basis of electronegative consideration from other atoms in the molecule
b) the residual charge acquired by its atom after removing all electronegative atoms from the molecule
c) the valency of the most electronegative atom present in the molecule
d) total number of electrons accepted by an atom to form a molecule.

Solution : -

The oxidation state of an element in a particular compound can be defined as the charge acquired by its atom on the basis of electronegative consideration from other atoms in the molecule.
In other words, it represents the number of electrons gained or lost by the element or ion in the reaction that formed the compound. It is expressed as a positive or negative number which represents the ionic charge . For example, in sodium chloride, the oxidation states of sodium and chlorine are +1 and -1 respectively.

48. Ionic radii are :
a) inversely proportional to effective nuclear charge
b) inversely proportional to square of effective nuclear charge.
c) directly proportional to effective nuclear charge.
d) directly proportional to square of effective nuclear charge.

Solution : -

Effective nuclear charge is the tendency of charge of nucleus to attract electrons towards itself. Thus, more the tendency more the electrons are nearer to nucleus and hence smaller is the ionic radius of the species. Therefore, the ionic radii are inversely proportional to effective nuclear charge.

49. The ions O^{2-}, F^{-}, Na^{+}, Mg^{2+} and Al^{3+} are isoelectronic. Their ionic radii show :

a) an increase from O^{2-} to F^{-} and then decrease from Na^{+} to Al^{3+}.

b) a decrease from O^{2-} to F^{-} and then increase from Na^{+} to Al^{3+} c) a significant increase from O^{2-} to Al^{3+}

d) a Significant decrease from O^{2-} to Al^{3+}

Solution : -

In isoelectronic species,

Ionic Radii $\propto$ negative charge on anion

$$\propto \frac{1}{Positive\ charge\ on\ cation}$$

Thus, from O^{2-} to Al^{3+}, the negative charge decreases and positive charge increases therefore, there is a significant decrease in ionic radii from O^{2-} to Al^{3+}.

50. Assertion: The atomic size generally increases across a period and decreases down the group.

Reason: Atomic size depends upon valence shell electronic configuration.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. **d) If both assertion and reason are false.**

Solution : -

Along a period, effective nuclear charge increases more than the shielding of inner electrons and thus the size of the atom decreases.

Along a group, as the size of the shell increases and so is the shielding of inner electrons, thus down the group the size of the atom increases downwards.

Both Assertion and Reason are incorrect.