CHAPTER - 03

CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES

1. 1 Atomic number of element placed just above 43rd element is 25

2. 1 B is smaller in size than Be

3. 2 Second electron gain enthalpy is positive for all elements

4. 3 The lower value of electron affinity of F is due to stronger electron-electron repulsion in 2-p orbitals of F-atom.

5. 2 Order of metallic character is B < Al < Mg < K

6. 1 Electronegativity of Cl = 3.0, S = 2.5, At = 2.2, Si = 1.8, P = 2.1

7. 4 Order of electronegativityis S > P > Si > Al

   Thus, acidic character of oxides follows the order $SO_2 > P_2O_3 > SiO_2 > Al_2O_3$

8. 16 Huge difference between sixth and seventh ionisation enthalpies signifies that number of valence electrons in the element is 6. Thus, group number of the element is 16

9. 11 Be, N, Mg, Noble gas, O^- and Cl^- have positive electron gain enthalpy

10. 4 SnO_2, As_2O_3, Al_2O_3 and PbO_2 are amphoteric oxides

11 C Element (C) has two valence electrons. Thus, it have maximum difference between $\Delta_i H_3$

12. D Electron gain enthalpy is most negative for Cl whereas positive for N

13. D Lanthanoid contaction is due to less effective shileding of one electron by the other in the antipenultimate f - subshell

14. C P can expand its covalency beyond 4 whereas N cannot. This is due to the absence of diorbitals in the valence shell of N

15. C Metallic character increases down the group

16. A Size of isoelectronic species is affected by the nuclear charge. Chemical properties are influenced by nuclear charge

17. A Long form of periodic table does not give complete inforamtion about the stability of oxidation states

$Z = 64 \Rightarrow Gd\ (4f^7 5d^1 6s^2)$

$Z = 96 \Rightarrow Cm\ (5f^7 6d^1 7s^2)$

18. A Ionisation enthalpy of Ca > K 'b' is exceptionally high due to the noble gas configuration of K+

19. AC Electronegativity is not a measurable property. It provides a mean to predict general nature of a chemical bond

20. A, B Be cannot form $[BeF_6]^{4-}$. Chlorides of Be and Al are soulbe in organic solvent due to significant covalent character.

21. A, B,C

(i) cannot show variable oxidation state as it is an s-block element

ii) is Lr, an actinoid

Bond formed between (i) and (iii) will be ionic

22. B,D Ionisation enthalpy of Na, and electron gain enthalpy of Ar will be positive (or) endothermic

23. ABD First ionisation enthalpy of M is 100eV.

Second ionisation enthalpy $M = 250 - 100 = 150eV$

24. 50.00 Order of filling of orbitals in the eighth period would be 8s < 5g < 6f < 7d < 8p

25. 9.00 Sudden jump between I_1 and I_2 for the third element (Z = n + 2) indicates that it is an alkalimetal. Thus $n + 2 = 11 \Rightarrow n = 9$

26. 68.95 - 69.01

1 mol of Mg absorbs 750kJ energy to produce 1mol of Mg^+. Now, reamaining 450kJ energy is used up to produce $\frac{1}{1450} \times 450$ mol of Mg^{2+} (ie. 0.31mol Mg^{2+})

Thus, amount of Mg^+ in the final mixture will be, 1–0.31 =0.69mol (or) 69%

27. 1.59 - 1.61 $376 \times 10^3 J$ energy can ionise 1 mol Cs atoms

$\therefore$ 1J energy can ionise $\frac{1}{376 \times 10^3}$ mol Cs atoms

i.e., $\frac{1}{376 \times 10^3} \times 6.022 \times 10^{23} = 1.60 \times 10^{18}$ Cs atom

28. 2.99 or 3.00

10^6 atoms release 4.8×10^{-13} J energy

$\therefore$ 1 atom release 4.8×10^{-19} J energy

Thus electron gain enthalpy of $I = 4.8\times10^{-19}$ J atm^{-1} (or) $-\left(4.8\times10^{-19}\right)\times\left(6.24\times10^{18}\right)$ eV atom^{-1}

i.e, approx –3eV atom^{-1}

29. B Cations have greater Z_{eff} and smaller size, whereas anions have lower Z_{eff} and larger size. Electron gain enthalpy of halogen follows the order, Cl>F>Br>I (magnitude only)

30. A MgO and Al_2O_3 are ionic; P_4O_{10} and SiO_2 are covalent and acidic; MgO is basic; Al_2O_3 is amphoteric.