

IMPORTANT TOPICS FOR IIT JEE

1. Detection of peroxy linkages / No. of peroxy bonds
2. Hybridization of N-metal atoms
3. Geometry of Molecules
4. Special oxidation states $[Fe(H_2O)_5NO]SO_4$, $CaOCl_2$
5. Shapes of complexes
6. μ of complexes
7. Hybridization of Transition metals
8. No of lone pairs and bond pairs
9. Role of dehydrating agents like P_2O_5 , $POCl_3$ anhydrous substances
10. Reason for color
11. Coloured and colorless species
12. Magnetic properties – which is para and which is dia
13. Bond orders
14. Thermal decomposition reactions (Less stable \rightarrow more stable)
15. Acidity and Basicity of compounds (inorganic)
16. Structures of Molecules – special reference to oxyacids
17. Molecules existing as dimers, trimers.
18. EAN
19. Inert pair effects Tl , Pb , Bi , PO
20. Dipole moment – H – bond
21. Basicity of oxyacids
22. No. of ions in solutions of complexes
23. Lanthanide contraction
24. Diborane-Bridging – Methylation
25. Hydration No. – Mobility of ions
26. (A) Be, B, Al Electro Deficiency
More oxygen – More acidic (Except oxyacids of P)
27. Sizes of ions ($x^- > x > x^+$)
28. M.P and B.P of Hydrides of non-metals
29. Stability of hydrides – reducing nature – basicity
30. Isostructurality (having same geometry)

31. Allotropes of carbon – Diamond & Graphite – Entropy
32. Carbonate – Calcinations – Thermal decompositions (IIA Only)
33. $H_2O_2, O_3, CaOCl_2$ extra oxygen (nascent oxygen)
34. Electrolysis of fused salts only – extraction of lighter metals
35. Role of substances like cryolite, flourspar in fusion
36. Borax-hydrolysis – Boric Acid - structure – B-O-B bonds
37. Alumina – colored stones – due to impurities- polymorphism – Quartz
38. $AlCl_3$ - Lewis acid, fumes in moist air, ionic in solution exists as a dimer
39. Alum – type of hydrolysis – cationic – no of H_2O attached
40. CO and CO_2 ; neutral – Acidic; Liganding Nature – carbonyl
41. Silicone – ketone Analogy
42. Silicates – pyro, meta, ortho
43. Oxides of nitrogen – several – diff o .s of N – magnetic acidic –color-dimeric
44. P_4, P_4O_6, P_4O_{10}
45. $PH_3 \longrightarrow PH_4^+$ - Basicity of Hydrides
46. Ozone – structure – resonance – depletion of ozone layer
47. H_2O_2 - uses – bleaching action - PbS
48. Bleaching by H_2O_2, O_3, SO_2, Cl_2
49. Oxides of S – max O . S Non metals \longrightarrow Max O.S
50. Hypo – Antichlor – Photography – complexing with Cu, Fe, Ag, Au
- Iodometric calculations (or) reactions
-Unexpected solubility due to complex formation
51. Halogens – Bond Energy, E.A. oxidizing ability, hydrations
(Reactivity with H_2O]
52. $Hx \longrightarrow H - bond, M.P., Reducability, acidity$
53. $XeF_2, XeF_4, XeF_6 \longrightarrow (B.P, L.P)$ shape, Hydrolysis
54. Hydrolysis – procedure
55. Isomerism in complexes resulting in different ions in solution
56. SnO, SnO_2 $SnCl_2, SnCl_4$ Inert pair effect
 PbO, PbO_2 $PbCl_2, PbCl_4$
57. $FeO_3, FeSO_4, FeCl_2$ - Reducing ability to reach Fe^{+3}
58. $CuO, CuSO_4, CuCl_2$ – act as a result of disproportionation of Cu^+ ($2Cu^+ \longrightarrow Cu + Cu^{+2}$)

59. $KMnO_4$ - Preparation (MnO_2 fusion with dry KOH)
- Maximum o . S \longrightarrow Hence oxidizing agent only
 - Color due to charge transfer
- $$-MnO_2 + KOH(dry) \xrightarrow{\text{fusion}} \text{manganate green} \xrightarrow{\text{Electrolysis}} \text{Permanganete purple}$$
60. $K_2Cr_2O_7$ - SO_2 turns dichromate paper green
- chromyl chloride test
 - chromates ore yellow – only Na & K chromate
- Chromate $\begin{matrix} \square & \square & \square & \square \\ \square & \square & \square & \square \\ \square & \square & \square & \square \\ \square & \square & \square & \square \end{matrix}$ dichromate $\begin{matrix} \square & \square & \square & \square \\ \square & \square & \square & \square \\ \square & \square & \square & \square \\ \square & \square & \square & \square \end{matrix}$
61. Learn ores of $Cu, Sn, Pb, Mg, Al, Zn, Ag$
62. ore dressing – Magnetic separation – Sn
- Froth floatatn – sulfide ores only
 - Calcinations – carbonates
 - Leaching – Al, Ag, Au
63. Al – Bayer, ser peck, Hall’s, Hall – Heroult
64. Calcinations – Roasting – Smelting
65. Reduction Techniques – Self (Cu, Pb)
- Chemical (carbon) - (Fe, Sn)
 - Electrolytic (in fused state) – Mg, Al
 - Cynide - [Ag, Au]
66. Vapor phase retiring – Mond’s, Van Arkel
- Zone Refining – Highest Purity
- Poling – Hydrocarbons in bamboo poles
- Cupallation – Bone ash cupil absorbs PbO or Pb from Ag
- Chromatography – absorbent – Eluent
67. Color of substances – smell of gases – colored gases- color of ppt – Brown ring (for nitrate)
68. Solubility effects in Qualitative Analysis
69. Special Tests – Chromyl chloride, nessler’s Reagent
- Starch Iodide paper
 - Lead acetate Paper
 - Litmus turning white
 - Dichromate paper

70. Role of organic Reactns in inorganic
 $NaHCO_3$ - effervescence $RCOOH$
 Na – Violent reaction with ROH
 Ozonolysis – break two bonds only

PHYSICAL CHEMISTRY

1. Max. No of atoms – 4g H_2 , 1 mole Na.....
2. C; O; N- Equivalence
3. Mole concept (1mole = M.W.t = 22.42=)
4. Molarity, Molality, Normality

Volume strength of H_2O_2
 Degree of Hardness
5. Molality from Mole fraction (Mole fraction = x

$$\text{Molality} = \frac{1000x}{18(1-x)}$$
6. Molarity – density – Molality
7. $N = M \times V \cdot F$
8. Equivalenic in redox reaction
9. Balancing redox reactions – missing (O) Technique
10. Graham's Law – Table
11. Velocities, CP, \bar{C} , C
12. K.E, Avg, KE of gases, - Temperature effect
13. Dalton's Law
14. Vanderwaals equation T_c and T_b
15. Bohr's Energy - Ratio – $E_1 : E_2, \lambda_1 : \lambda_2 : \bar{v}_1 : \bar{v}_2 ; r_1 : r_2$
16. Hydrogen spectrum – Rydberg Equation
 $(2 \rightarrow 1)$ hydrogen = $(4 \rightarrow 2)$ He^+
17. Correct set of Q.Nos → different angular momentum
 Orbital angular momentum,.....
18. KE, PE, T.E of Electron

$$KE = \frac{1}{2} \frac{zke^2}{r} \quad P.E = \frac{-zke^2}{r}$$

$$TE = -\frac{1}{2} \frac{zke^2}{r}$$

19. Velocity of e^- – No. Of revolution in 1 sec

$$\frac{2.188 \times 10^6 \times 2}{n} m/s \quad \frac{V}{2\pi rn} = \frac{z^2}{n^3} \times 1.326 \times 10^{16}$$

20. Debroglie $\lambda = \frac{h}{mv}$; $\lambda = \frac{h}{p}$. $\lambda = \frac{h}{\sqrt{2m(K.E)}} = \frac{h}{\sqrt{2meV}}$

21. Frequency of matter wave = $\frac{V}{\lambda} = \frac{mv^2}{h} = \frac{2KE}{h}$

22. Heisenburg $(\Delta x)m(\Delta v) \geq \frac{h}{4\pi}$

23. $KE = hv - hv_0$ v_0 - Threshold frequency

24. Schrodinger $\Psi_{3s} = \frac{1}{81\sqrt{3\pi}} \left(\frac{1}{a_0}\right)^{3/2} \left(27 - \frac{18r}{a_0} + \frac{2r^2}{a_0^2}\right) e^{-\frac{r}{3a_0}}$

Has node at $r = r_0$ Find $r_0 = f(a_0)$

-concept of Nodes, Nodal Planes

25. $\Delta H = \Delta H + \Delta n(RT)$ at const P

$\Delta H = \Delta E$ at const vol.

Its' always products – reactants except when HL & BDE are used

$$\Delta H_f = \sum \Delta H_c(\text{react}) - \sum \Delta H_c(\text{prod})$$

$$\Delta H_c = \sum \Delta H_f(\text{products}) - \sum \Delta H_f(\text{Reactants})$$

$$\Delta G = \Delta H - T\Delta S$$

$$\Delta G = \Delta G^0 + 2.303 RT \log Q$$

Criterion for spontaneity

26. Relation between K_p and K_c

$$K_p = K_c$$

$$K_p < K_c \quad \text{for which reaction}$$

$$K_p > K_c$$

27. Units of K_p & K_c

28. Calculation of K_p and K_c in altered reaction

29. Characteristics of equilibrium

30. K_{sp} in cells - $A_x B_y$

31. PH – PH of buffer – PH of weak electrolytes – very dil (10^{-8})

6. Keto –enol Tautomerism – more when EWG present
7. Effect + I, -I, +M, -M
8. Orientation in Benzene
9. Acidity of R-COOH – conjugate stability If necessary
10. Basicity of Amine – conjugate stability If necessary
11. Stability of carbocation
12. Wurtz, decarboxylation – free radical
13. Addition to C = C – Markownikov – kharasch
 - Stability of intermediate
 - carbocation
 - rearrangement
14. Pinacol – Pinacolone (with ring expansion)
15. Elimination – Zaisev, - more substituted
 - Hoffmann – Less substituted
16. Ozonolysis
17.
$$C_2H_2 \xrightarrow[Hg^{+2}]{water} \begin{array}{cc} Cu & \& Ag \\ \downarrow & & \downarrow \\ Red & & White \\ PPT & & PPT \end{array}$$
18. Aromaticity
19. Orientation in subst. Benzenes (disubstitute)
20. SN^1 and SN^2
21. Aldol & cannizaro, HVZ Esterification
22. Nitrobenzene $\xrightarrow{Reduction}$
23. Diazotisation – coupling
24. Glucoses, fructose \rightarrow Reduction ($HNO_3, Br_2 + H_2O$)
25. Hydrolysis of sugar
26. Mutarotation
27. Zwitter ion
28. Polymers
29. Lassaigne's Test – Results
30. Hoffmann Bromamide
31. Carbyl amine Test
32. Chloroform
33. Beck Man Rearrangement