CHEMISTRY PAPER – I (SOLUTION)

21. (B)

Sol. For metal - metal insoluble salt electrode

$$\overset{o}{E}_{cl^-/Agcl/Ag} = \overset{o}{E}_{Ag^+/Ag} + \frac{0.059}{1}\log_{10} ksp$$

$$0.2 = 0.79 + 0.059\log_{10} ksp$$

So, $ksp = 10^{-10}$

Now, in presence of 0.1M $AgNo_3$,

Solubility of Agcl = $\frac{10^{-10}}{0.1} = 10^{-9}$ mole/lt

So, solubility in 10^6 lt will be = 10^{-3} moles or 1 milli mole

22. (C)

Sol. $-\frac{1}{3}\frac{d(A)}{dt} = k[A]^2$ …(1)

Here $K = 1\times10^{-3}$ *l*t/mol - min

$= \frac{1}{60} \times 10^{-3}$ *l*t/mol -sec

So $-\frac{d[A]}{dt} = 3 \times \frac{1}{60} \times 10^{-3} \times (2)^2 = 2 \times 10^{-4}$

23. (C)

Sol.

$$KHCO_3 \xrightarrow{\Delta} K_2CO_3 + H_2O + CO_2$$

$$\text{Further, } K_2CO_3 + HCl \rightarrow KCl + H_2O + CO_2$$

24. (B)

Sol. Order of Reducing Character is :

$$H_3PO_2 > H_3PO_3 > H_3PO_4$$

25. (B)

Sol. From

$$2\pi r = n\lambda$$

$$2\pi\left(0.5\frac{n^2}{z}\right) = n\lambda$$

or $\lambda \; \alpha \; \frac{n}{z}$

26. (A)

Sol. Zeff = $\left(4 - \frac{1}{100} \times 4\right) = 3.96$

So, density = $\frac{3.96 \times 40}{(6\times10^{23})(0.5\times10^{-7})^3} = 2.1$ g/cm^3

27. (D)

28. (C)

29. (B)

30. (C)

31. (A, D)

$H_3AsO_4 \rightleftharpoons H^+ + H_2AsO_4^-$

Sol. $H_2AsO_4^- \rightleftharpoons H^+ + HAsO_4^{2-}$

$HAsO_4^{2-} \rightleftharpoons H^+ + AsO_4^{3-}$

$\left\{\text{As it is basic buffer, so almost all the } H_3AsO_4 \text{ convert into } H_2AsO_4^-, \text{so} \left[H_2AsO_4^-\right] = 0.1\right\}$

$$2.5 \times 10^{-4} = \frac{0.1 \times 10^{-8}}{[H_3ASO_4]}$$

$$[H_3AsO_4] = \frac{1}{25} \times 10^{-4} = 4 \times 10^{-6}$$

$$5 \times 10^{-8} = \frac{10^{-8} \times [HAsO_4^{2-}]}{0.1}$$

$$[HASO_4^{2-}] = 5 \times 10^{-1} = 0.5$$

So, $[HASO_4^{2-}] = 5\,[H_3ASO_4]$

$$2 \times 10^{-13} = \frac{10^{-8} \times [ASO_4^{3-}]}{0.5}$$

$$\left[ASO_4^{3-}\right] = 1 \times 10^{-5}$$

32. (A, B, C, D)

33. (C, D)

34. (A, C)

35. (B, C, D)

36. **6**

Sol. The redox changes are for reduction of Fe_2O_3 by zinc dust

$Fe_2{}^{3+} + 2e^- \longrightarrow 2Fe^{2+}$

$Fe^{2+} \longrightarrow Fe^{3+} + e^-$

Oxidant + $ne^- \longrightarrow$ product

Meq. Of Fe_2O_3 in 25mL

= meq. of Fe^{3+} in Fe_2O_3

= meq. Of Fe^{2+} formed

= meq. Of oxidant used to oxidize Fe^{2+} again

$\therefore$ meq.of Fe_2O_3 in 25mL = meq of oxidant

$$= 5 \times \frac{1}{15} \times n$$

Where, n is the number of electron gained by 1 mole of oxidant

$\therefore$ meq. Of Fe_2O_3 in 100mL = $5 \times \frac{1}{15} \times n \times \frac{100}{25}$

$$\therefore \quad \frac{1 \times 64 \times 1000}{100 \times \frac{M}{2}} = 5 \times \frac{1}{15} \times n \times \frac{100}{25}$$

$\because$ molecular wt.of Fe_2O_3 = 160

$$\therefore \quad n = \frac{1 \times 64 \times 1000 \times 2}{100 \times 160 \times \frac{1}{15} \times 5 \times 4} = 6$$

Hence, number of moles of electrons gained by one mole of oxidant = 6.

37. 2

Sol. Only $[Ni(co)_4]$ and $Na_2[Zn(Cn)_4]$ are tetrahedral

38. 2

Sol. Let number of phenol molecules undergoing polymerization = n

$$\therefore \quad 1 = [1 + (y - 1)x] = \left[1 + \left(\frac{1}{n} - 1\right) \times \right]$$

$$= 1 + \left(\frac{1}{n} - 1\right) \text{ since, } x = 1$$

$$= i = \frac{1}{n}$$

$$= \Delta T_f = 1000 K_f \frac{w_1}{m_1 w_2} \text{ (i)}$$

$$0.93 = 1000 \times \frac{1.86 \times 9.4}{94 \times 100}$$

$$i = \frac{1}{2} = \frac{1}{2}$$

$$\therefore \quad n = 2$$

39. 5

40. 4