

Daily Tutorial Sheet 3

JEE Main (Archive)

31.(B) $E^\circ_{\text{Mn}^{2+}/\text{Mn}} = -1.18 \text{ V}$

$E^\circ_{\text{Cr}^{2+}/\text{Cr}} = -0.91 \text{ V}$

$E^\circ_{\text{Fe}^{2+}/\text{Fe}} = -0.44 \text{ V}$

$E^\circ_{\text{Co}^{2+}/\text{Co}} = -0.28 \text{ V}$

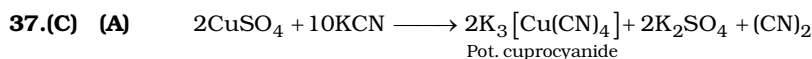
32.(D) The electronic configuration of ${}_{64}\text{Gd} = [\text{Xe}]^{54} 4f^7 5d^1 6s^2$.

33.(D) Availability of 4f-electrons does not result in the formation of compound in +4 state for all the members of the series.

34.(C) Ferrous oxide is more basic, more ionic, less volatile and less easily hydrolysed than ferric oxide.

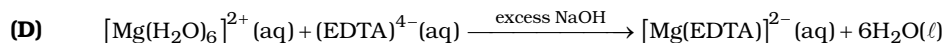
35.(B) Number of unpaired electrons in Fe^{2+} is less than Mn^{2+} , so Fe^{2+} is less paramagnetic than Mn^{2+} .

36.(A) Learn as fact



(B) Reaction is unfavourable in the forward direction, as K_2O is unstable while Li_2O is stable.

(C) Complex $[\text{CoCl}(\text{NH}_3)_5]^+$ decomposes to NH_4^+ salt under acidic medium.



Reaction is unbalanced w.r.t. charge.

38.(D) $\text{TiCl}_4 \rightarrow$ Ziegler-Natta polymerization

$\text{PdCl}_2 \rightarrow$ Wacker process

$\text{CuCl}_2 \rightarrow$ Deacon's process

$\text{V}_2\text{O}_5 \rightarrow$ Contact process

39.(A) The deep purple colour of KMnO_4 is not due to d-d transitions but due to charge transfer from O to Mn (i.e. $\text{L} \rightarrow \text{M}$), which reduce the oxidation state of Mn from +7 to +6 momentarily.

40.(CD) $\text{Na}_2\text{Cr}_2\text{O}_7$ is not used as primary standard in volumetry as it is deliquescent. $\text{Na}_2\text{Cr}_2\text{O}_7$ is more soluble than $\text{K}_2\text{Cr}_2\text{O}_7$.

41.(D) In aqueous solution, Co^{2+} ion exists as $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ ion and has pink colour. When heated, it turns blue due to dehydration.

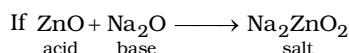
42.(B) $\text{Cr}^{2+}(\text{d}^4)$ is unstable and is oxidised to $\text{Cr}^{3+}(\text{d}^3 \text{ i.e., } t_{2g}^3)$ which is more stable.

Cu^+ is unstable and is oxidised to Cu^{2+} which has more negative enthalpy of hydration.

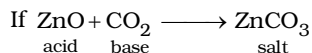
Similarly, $\text{Mn}^{5+}(\text{d}^2)$ in MnO_4^{3-} is unstable and is oxidised to $\text{Mn}^{7+}(\text{d}^0)$.

MnO_4^{2-} ion is far more likely to exist in a very high pH solution and is stable for a few hours in alkalies.

43.(B) ZnO is an amphoteric oxide. So, it can act either as an acid or as a base.



ZnO acts as an acidic oxide.



ZnO acts as an basic oxide.

44. (A) $[\text{Fe}(\text{CN})_6]^{3-} \Rightarrow x + (6 \times -1) = -3 \Rightarrow x = +3$

$$[\text{Cu}(\text{CN})_4]^{2-} \Rightarrow x + (4 \times -1) = -2 \Rightarrow x = +2$$

The possible highest oxidation state of Fe is +6 while that of Cu is +2.

(B) $[\text{FeCl}_4]^- \Rightarrow x + (4 \times -1) = -1 \Rightarrow x = +3$

$$\text{Co}_2\text{O}_3 \Rightarrow 2x + (3 \times -2) = 0 \Rightarrow x = +3$$

The possible highest oxidation state of Co is +4.

(C) $[\text{NiCl}_4]^{2-} = x + (4 \times -1) = -2 \Rightarrow x = +2$

$$[\text{CoCl}_4]^{2-} = x + (4 \times -1) = -2 \Rightarrow x = +2$$

The possible highest oxidation state of Ni is +4.

(D) $\text{MnO}_2 = x + (2 \times -2) = 0 \Rightarrow x = +4$

$$\text{CrO}_2\text{Cl}_2 = x + (2 \times -2) + (2 \times -1) = 0 \Rightarrow x = +6$$

The possible highest oxidation state of Mn is +7 while that of Cr is +6.

45.(A) The third ionisation energy of Mn is too high due to stable half filled 3d-orbital. Hence, it cannot further get oxidised to liberate hydrogen.