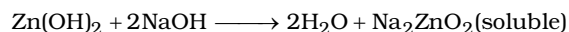
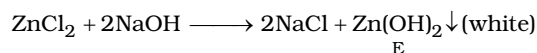
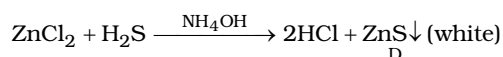
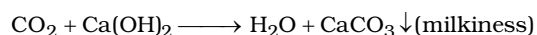
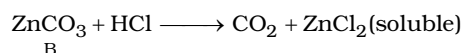
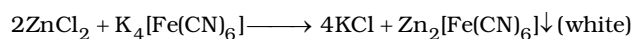
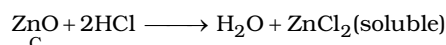
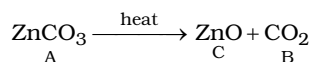


Daily Tutorial Sheet 1

JEE Advanced (Archive)

1. (A) – ZnCO_3 (Zinc carbonate)
 (B) – CO_2 (Carbon dioxide)
 (C) – ZnO (Zinc oxide)
 (D) – ZnS (Zinc sulphide)
 (E) – Zn(OH)_2 (Zinc hydroxide)

Reaction :



- 2.(D) Zn(OH)_2 is the weakest base.
- 3.(B) German silver : Cu – 56%, Zn – 24% and Ni – 20%
- 4.(B) $\text{Zn} + 2\text{NaOH} \longrightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2$

5. Reactions involved



Milliequivalent of FeSO_4 in 30 mL of 0.1 N $\text{FeSO}_4 = 30 \times 0.1 = 3$

25 mL of KMnO_4 reacts with = 3 meq of FeSO_4

$$\therefore 50 \text{ mL of } \text{KMnO}_4 \text{ reacts with } \frac{3 \times 50}{25} = \text{meq of } \text{FeSO}_4 = 6 \text{ meq of } \text{FeSO}_4$$

Milliequivalent of 100 mL of 0.1 N $\text{FeSO}_4 = 100 \times 0.1 = 10 \text{ meq}$

Ferrous sulphate reacted with $\text{Mn}_3\text{O}_4 = 10 - 6 \text{ meq} = 4 \text{ meq}$

Since millieq. of oxidising agent = millieq. reducing agent

$\therefore$ milliequivalent of Mn_3O_4 formed = 4 meq

Since $\text{Mn}_3\text{O}_4 \equiv 3\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$

1 meq = 3 meq

$$\therefore 4 \text{ meq} = 12 \text{ meq}$$

Equivalent weight of $\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$

$$= \frac{55 + 32 + (4 \times 16) + (4 \times 18)}{2} = \frac{223}{2}$$

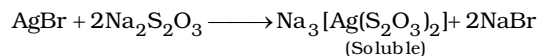
$$\text{Weight of } \text{MnSO}_4 \cdot 4\text{H}_2\text{O} \text{ in the sample} = \frac{12 \times 223}{2} \text{ mg} = 1.338 \text{ g}$$

6. A – ferrous sulphate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$)
B – sulphur dioxide (SO_2)
C – sulphur trioxide (SO_3)
D – ferric oxide (Fe_2O_3)
E – iron (Fe)

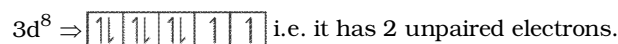
Ferrous sulphate has a light green colour. It dissolved in water containing sulphuric acid. In the absence of acid, ferrous being a salt of weak base and strong acid gets hydrolysed to ferrous hydroxide which is insoluble in water therefore, the solution will not be clear.

Ferrous sulphate is a reducing agent therefore, it decolourises the KMnO_4 solution. On strongly heating ferrous sulphate, both SO_2 (B) and SO_3 (C) are evolved. Sulphur dioxide being a sulphuric acid in the solution. Moreover, the SO_3 dissolves in water to give sulphuric acid. That is why the solution gives a white precipitate (BaSO_4) with a solution of $\text{Ba}(\text{NO}_3)_2$. On heating in a charcoal cavity in a residue flame reduces ferric oxide (D) reduces to iron (Fe) which is a magnetic substance.

- 7.(C) Hypo ($\text{Na}_2\text{S}_2\text{O}_3$) is used in photography to remove the unaffected AgBr in the form of a soluble complex.



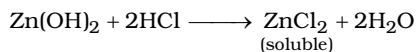
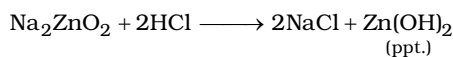
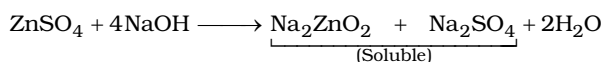
- 8.(B) The electronic configuration of Ni^{2+} is $1s^2 2s^2 2p^2 3s^2 3p^6 3d^8$.



9. Since the mixture is soluble in water to give strong alkaline solution so it must contain NaOH as one of the constituents. Since a precipitate appears when dil. HCl is added and the precipitate is soluble in excess of dil. HCl so the solution must contain zinc salt, i.e., ZnSO_4 .

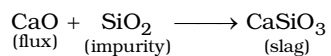
So NaOH and ZnSO_4 are present in mixture solution.

Reactions :

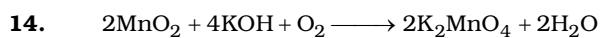
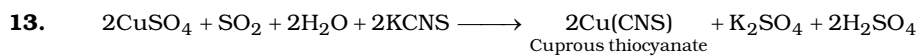


10. $\text{SO}_2 + \text{MnO}_4^- + \text{H}^+ \longrightarrow \text{SO}_4^{2-} + \text{Mn}^{2+} + \text{H}_2\text{O}$

- 11.(A) $\text{CaCO}_3 \xrightarrow{\text{heat}} \text{CaO} + \text{CO}_2 \uparrow$



12.(D) Because of formation of a thick protective film of Fe_3O_4 on its surface iron is rendered passive on action with concentrated HNO_3 .



15. Silver bromide is used in photography because of its sensitivity to sunlight. In light AgBr reduces to metallic silver.