SALT ANALYSIS

Home assignment - 1

1. $FeSO_4$ forms $[Fe(H_2O)_5NO^+]SO_4$ as brown ring compound.

2. $AgNO_3 + PH_3 \rightarrow \underset{\text{Black}}{Ag_3P} + HNO_3$

3. $CaC_2O_4 \xrightarrow{\Delta} CaO + CO_{2(g)} + CO_{(g)}$

4. $Cl^- + K_2Cr_2O_7 + H_2SO_4 \xrightarrow[(conc)]{} CrO_2Cl_2$

$\downarrow + NaOH$

$Na_2CrO_4 \xrightarrow{(CH_3COO)_2Pb} PbCrO_4\downarrow$ (Yellow)

5. $2HCO_3^- \xrightarrow{\Delta} CO_3^{--} + CO_{2(g)} + H_2O_{(g)}$

6. $Ag_2SO_4 + Br^- \rightarrow AgBr\downarrow$ (ppt)

$+ NO_3^- \rightarrow$ no ppt ion

7. AgI does not dissolve in NH_3

9. $K_2Cr_2O_7 + HCl \rightarrow Cl_2\uparrow$

10. $SO_3^{--} + MnSO_4 \rightarrow SO_2$

$Ba(OH)_2 + SO_2 \rightarrow BaSO_3\downarrow$

$K_2Cr_2O_7 + MnSO_4 + SO_2 \rightarrow \underset{\text{(Green)}}{Cr_2(SO_4)_3}$

11. $C_2O_4^{2-} \xrightarrow{MnSO_4} CO_{2(g)} + CO_{(g)}$

$C_2O_4^{2-} + KMnO_4 \rightarrow CO_2 + Mn^{2+}$

12 $KNO_3 + H_2SO_4 \rightarrow NO_2\uparrow$

13 $Na_2S + Na_2[Fe(CN)_5NO] \rightarrow$

Sodium nitroprusside

$Na_2[Fe(CN)_5NOS]$

complex

Na_2SO_4 does not give this test.

14 $NaBr + AgNO_3 \Rightarrow AgBr$

$NaBr + H_2SO_4 \Rightarrow Br_2$ gas

15 $NaCl + AgNO_3 \rightarrow AgCl \xrightarrow{NH_4OH} Ag(NH_3)_2^+$

$\xrightarrow{HNO_3}$

16 $I^- + H_2SO_4 \rightarrow I_2\uparrow$

Violet

18 It is test of SO_4^{--} ion

21 $AgNO_3 \xrightarrow{\Delta} Ag + NO_2 + O_2$

22 $Cl^- + MnO_2 + H_2SO_4 \rightarrow Cl_2\uparrow$

23 It is test of Cl^- ion

24 I_2 is weaker oxidising agent than Br_2 & Cl_2.

25 $CO_2 + H_2O \rightarrow H_2CO_3$

$H_2CO_3 \rightarrow H^+ + HCO_3^-$

$\rightarrow H^+ + CO_3^{2-}$

27 $CrCl_3 \xrightarrow[NH_4OH]{NH_4Cl} Cr(OH)_3$ (A) $\xrightarrow[H_2O]{Na_2O_2} Na_2CrO_4$ (B)

$(CH_3COO)_2Pb$ ↓

$PbCrO_4$ (C)

28 It is chromyl chloride test

30 $NaBr + H_2SO_4 \longrightarrow Br_2$

31 $SO_2 + I_2 \rightarrow I^- + SO_4^{--}$

33 $SO_3^{--} + Ca(OH)_2 \rightarrow CaSO_3$ white

$K_2Cr_2O_7$ / acidic → $Cr_2(SO_4)_3$ green

34 $NO_2^- + AgNO_3 \rightarrow AgNO_2$ white ppt

$KMnO_4$ / Acidic → $NO_3^- + Mn^{+2}$

Home Assignment _2

(1) Bi^{3+} & Sn^{4+} belong to group II and can not be separated by same group reagent.

(2) HgS dissolves in aqua regia.

(3) Pb^{2+} is precipitated as PbS in gp II.

(4) Na_2S is soluble while Ksp of ZnS is more than CuS.

7. $CuSO_4 + NH_4OH \rightarrow [Cu(NH_3)_4]SO_4$

8. $PbCl_2 + KI \rightarrow PbI_2 + KCl$
(A)

$PbI_2 + KI \rightarrow K_2[PbI_4]$
(B)

9. $Fe^{2+} + NH_4SCN \rightarrow Fe(SCN)_2$

$Fe^{2+} + K_3[Fe(CN)_6] \rightarrow KFe[Fe(CN)_6]$
Blue

10. $CaSO_4$ is soluble.

11. $Cr(OH)_3 + Na_2O_2 + NaOH \rightarrow Na_2CrO_4$
(yellow)

12. Heavy metal chloride $HgCl_2$ does not give chromyl chloride test.

13. $FeSO_4 + K_4[Fe(CN)_6] \rightarrow Fe_4[Fe(CN)_6]_3$
Prussian Blue

14. $BiCl_3 + H_2O \rightarrow BiOCl$
white cloudiness

15. It is group reagent for Al^{3+}.

16. K_{sp} of NiS is high

17. $CuSO_4 + KCN \rightarrow K_3[Cu(CN)_4]$

18. $AgCl + NH_4OH \rightarrow Ag(NH_3)_2^+$
soluble

20. $BaCO_3 + HCl \rightarrow BaCl_2 + CO_2$
soluble

$ZnS + HCl \rightarrow ZnCl_2$ (soluble)

21. $Bi_2S_3 + HNO_3 \rightarrow Bi(NO_3)_3 \xrightarrow{NH_4OH} Bi(OH)_3 \xrightarrow{HCl} BiCl \xleftarrow{H_2O} BiO_3$

22. Cu^{+2} solubility is low as Ksp of CuS is low while Fe^{+2} Ksp is high for FeS.

23. $AgNO_3 \rightarrow Ag + NO_2 + O_2$
(W) (X)

$NO_2 + H_2O \rightarrow HNO_2 + HNO_3$
(X)

$Ag + HNO_3 \rightarrow AgNO_3 + NO + H_2O$
(W) (Y)

$AgNO_3 + Na_2S_2O_3 \text{ (Excess)} \rightarrow Na_3[Ag(S_2O_3)_2]$
(Y) (Z)

24. $NH_4Cl + K_2HgI_4 + KOH \rightarrow HgO\,Hg(NH_2)I$ Million's base

$NH_4Cl + AgNO_3 \rightarrow AgCl\downarrow$ White

26. Co^{2+} & Ni^{2+} both are same group ions.

27. $Hg_2Cl_2 + NH_3 \rightarrow Hg + Hg(OH)_2$

28. $Cu^{2+} + [Fe(CN)_6]^{4-} \rightarrow Cu_2[Fe(CN)_6]\downarrow$ Red-Brown

29. $Sb^{3+} + H_2S \rightarrow Sb_2S_3\downarrow$
orange

30. $PbCl_2 + H_2S \rightarrow PbS\downarrow \xrightarrow{HNO_3} Pb(NO_3)_2$
Black

$Pb(NO_3)_2 \xrightarrow{H_2SO_4} PbSO_4\downarrow$
white ppt

Home Assignment-3

1. $Pb(NO_3)_2 + NaCl \rightarrow PbCl_2$
(A) (B)

(A) $\xrightarrow{\Delta}$ $PbO + NO_2\uparrow + O_2$
(Brown)

(B) $\xrightarrow{KI}$ PbI_2
(D)

(B) $\xrightarrow{H_2S}$ PbS
(C)

2. $HgCl_2 + H_2S \rightarrow HgS\downarrow$
Black

$HgCl_2 + SnCl_2 \rightarrow Hg_2Cl_2 + SnCl_4$

$Hg_2Cl_2 \xrightarrow{SnCl_2} Hg + SnCl_4$
(grey)

$HgCl_2 + KI \rightarrow HgI_2$
red ppt

$HgI_2 \xrightarrow{KI} K_2[HgI_4]$

3. $NH_4NO_3 \xrightarrow{\Delta} N_2O + H_2O$

(X)

↓ KOH

$NH_3 \uparrow + KNO_3 \xrightarrow{Zn} NH_3$

(Y) (Y)

4. $K_2Cr_2O_7 + H_2SO_4 + NH_4Cl$

(A) (B)

↓ NaOH

$NH_4Cl \leftarrow$ fume $NH_3 + HCl$

(E)

$K_2Cr_2O_7 + H_2SO_4 + NH_4Cl \rightarrow CrO_2Cl_2$

(C)

↓ $(CH_3COO)_2Pb$

$PbCrO_4 \downarrow$

(D)

6. $ZnS + HCl \rightarrow H_2S + ZnCl_2$

(A) (B) (C)

↓ $+O_2$ ↓ NaOH

$ZnO + SO_2$ Na_2ZnO_2 ← Excess NaOH $Zn(OH)_2$

(F) (E) soluble (D)

↓ HCl → $ZnCl_2$

8. $SnCl_2 + H_2O \rightarrow Sn(O)Cl$

(A) (B)

↓ NaOH

$Sn(OH)_2 \downarrow$ → Excess NaOH → soluble

(C)

12. $FeS + H_2SO_4 \rightarrow \underset{(B)}{H_2S} \xrightarrow[(C)]{+HNO_3} \underset{(D)}{S}$

$\underset{(A)}{FeS}$

$H_2S \xrightarrow{CuSO_4\ (E)} \underset{(F)}{CuS}$

$CuS \xrightarrow{NH_4OH} \underset{(G)}{[Cu(NH_3)_4]SO_4}$

$[Cu(NH_3)_4]SO_4 \xrightarrow{K_4[Fe(CO)_6]} \underset{(H)}{Cu_2[Fe(CO)_6]}$

Chocolate

13.

$NaNO_3 \rightarrow \underset{(B)}{NaNO_2} + \underset{(C)}{O_2}$

$\underset{(A)}{NaNO_3}$

$NaNO_2 \xrightarrow[Acid]{dilute} NO_2$

$NaNO_2 + NH_4Cl \rightarrow NH_4NO_2 + NaCl$

$\underset{(E)}{NH_4NO_2} \rightarrow \underset{(D)}{N_2} + H_2O$

$NaNO_3 + (NH_4)_2SO_4 \rightarrow NH_4NO_3 + Na_2SO_4$

$\underset{(G)}{NH_4NO_3} \rightarrow \underset{(F)}{N_2O} + H_2O$

1. $Co(NO_3)_2 + NaOH \rightarrow Co(OH)_2$
coloured

2. $FeSO_4 \cdot Al_2(SO_4)_3 + K_2SO_4 \cdot Cr_2(SO_4)_3 \cdot 24H_2O$

$\downarrow Na_2O_2$

K_2CrO_4
yellow

4. It is chlorine water test of I^-

5 $Al(OH)_3 + NaOH \rightarrow Na(AlO_2)$
soluble

7. $FeSO_4 + NaOH \rightarrow Fe(OH)_2$
Green

$\downarrow K_3[Fe(CN)_6]$

$\Delta \rightarrow Fe_2O_3 + SO_2 + O_2$

$K Fe[Fe(CN)_6] \downarrow$
Blue

8. $Al^{3+} + NH_4OH \rightarrow Al(OH)_3 \downarrow$

$Zn^{2+} + NH_4OH \rightarrow Zn(OH)_2 \downarrow$

$\downarrow NH_4OH$

$[Zn(OH)_4]^{2+}$
soluble

9. $NO_2^- + Zn + NaOH \rightarrow NH_3$

10. $Mn(OH)_2 + HNO_3 + PbO_2$

$\longrightarrow KMnO_4$

Purple

11. $Fe^{3+} + KSCN \longrightarrow Fe(SCN)_3 \downarrow$

Red

12. $CuSO_4 \xrightarrow{\Delta} Cu_2O$

Black

13. $Na_2[Sn(OH)_6] + BiCl_3 \rightarrow Bi + Na_2SnO_3$

14. $\cdot 9+$ is test of Zn^{2+}

16. $PbO_2 \xrightarrow{\Delta} Pb_3O_4 + O_2$

(A) (B) (C)

17. $Bi^{3+} + KI \rightarrow BiI_3$

$BiI_3 + KI \rightarrow K[BiI_4]$

soluble complex

18. $Cu^{2+} + I^- \rightarrow CuI + I_2$

(X)

$I_2 + S_2O_3^{2-} \rightarrow I^- + S_4O_6^{2-}$

(Y)

21. $SnCl_2 + HgCl_2 \rightarrow Hg_2Cl_2 + SnCl_4$

$Hg + SnCl_4 \xleftarrow{SnCl_2}$

(Grey)

22. $CuSO_4 + I^- \rightarrow Cu_2I_2 + I_2 \uparrow$

(Brown)

23

$HgCl_2 + KI \rightarrow HgI_2$

$HgI_2 \xrightarrow{KI} K_2[HgI_4]$ soluble

Comprehension

Passage-1

$FeS + O_2 \rightarrow SO_2$

(A) (B)

$FeS \xrightarrow{H_2SO_4} H_2S + FeSO_4$

(C) (D)

Passage-2

$AgNO_3 + HCl \rightarrow AgCl$

(A) (B)

hot insoluble

$Pb(NO_3)_2 + HCl \rightarrow PbCl_2$

(A) (B)

soluble in hot water

Passage-3

$AgNO_3 \xrightarrow{KI} AgI$ (B)

$AgNO_3 \xrightarrow{BaCl_2} AgCl \xrightarrow{NH_4OH} (Ag(NH_3)_2)^{+}$

(A) (C) (D)

$AgNO_3 \xrightarrow{NaOH} Ag_2O$

(E)

Passage-4

$$CuCO_3 \xrightarrow{\Delta} CuO + CO_2$$
(A) (B) (C)

$$CuO + H_2 \longrightarrow Cu + H_2O$$
(B) (D)

$$CuO + HCl \longrightarrow CuCl_2$$

$CuCl_2 \xrightarrow{K_4[Fe(CN)_6]} Cu_2[Fe(CN)_6]$
(E) (Brown)

multiple correct!

1. Both H_2S & SO_2 are oxidised by $K_2Cr_2O_7$
2. $Al(OH)_3$, $Zn(OH)_2$, $Cr(OH)_3$ dissolves in excess NaOH as these are Amphoteric.
3. $Na_2CrO_4 + H^+ \longrightarrow Na_2Cr_2O_7$
   orange
5. All dissolves in NH_4OH as they form soluble complex.
6. NaOH can be used to separate Amphoteric ion with insoluble normal hydroxide ion.

9. $H^+ + K_2Cr_2O_7 + H_2S \rightarrow Cr^{3+} + S$

10. Na_2CO_3 does not break on heating & rest give CO_2 & SO_2 gas.

11. $BaCl_2 + Na_2SO_3 \rightarrow BaSO_3\downarrow$ White

$NaAlO_2 + NH_4Cl \rightarrow Al(OH)_3\downarrow$ White

$ZnSO_4 + H_2S \rightarrow ZnS\downarrow$ White

$Na_2CO_3 + ZnSO_4 \rightarrow ZnCO_3\downarrow$ White

12. It is test of SO_2 gas produced from sulphide & sulphite salt.

13. $Pb^{2+} + K_2CrO_4 \rightarrow PbCrO_4\downarrow$ Yellow

$AgNO_3 + KI \rightarrow AgI\downarrow$ Yellow

$CdSO_4 + H_2S \rightarrow CdS\downarrow$ Yellow

15. $CuSO_4 \cdot 5H_2O \xrightarrow{\Delta} CuO$ Black

$MnSO_4 \xrightarrow{\Delta} MnO$ Black

16. $BaCl_2 + S^{2-} \rightarrow BaS$ (Black)

1. NO is paramagnetic & NO^+ is diamagnetic so can be distinguished by magnetic moment.

2. $BaSO_4$ is insoluble while $MgSO_4$ is soluble.

4. $NaCl + K_2Cr_2O_7 + H_2SO_4 \xrightarrow{\text{conc}} CrO_2Cl_2$
↓ NaOH
Na_2CrO_4
yellow

5. $Pb^{2+} + HCl \rightarrow \downarrow PbCl_2$
$\xrightarrow{H_2S} PbS \downarrow$
Black

6. $Cl_2 + H_2O \rightarrow HCl + O$
$HCl + AgNO_3 \rightarrow AgCl \downarrow$

7. It is test of SO_3^{2-} as it liberate SO_2 gas.

8. $HCO_3^- \xrightarrow{\Delta} CO_3^{2-}$
↓ $MgCl_2$
$MgCO_3 \downarrow$
white ppt

9. $(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} N_2\uparrow + Cr_2O_3 + H_2O$

$NH_4NO_2 \xrightarrow{\Delta} N_2\uparrow + H_2O$

11. $Zn(OH)_2 + NH_4OH \rightarrow [Zn(NH_3)_4]^{2+}$

13. $K_2Cr_2O_7 + (NH_4)_2SO_4 \cdot FeSO_4 \cdot 6H_2O$

$n = 6$ $\quad$ $n = 1$

no 6 mole required

16. $Hg^{2+} + KI \rightarrow HgI_2\downarrow$ (Excess KI) $\rightarrow K_2[HgI_4]$ soluble

18. $NH_4NO_3 \xrightarrow{NaOH} NH_3\uparrow$ (Zn)

$NH_4NO_2 \xrightarrow{NaOH} NH_3\uparrow$ (Zn)

Passage

It is test of S^{2-} ion (X)

$FeCl_3 + K_4[Fe(CN)_6] \rightarrow Fe_4[Fe(CN)_6]_3$

Prussian Blue

23 MnO_2 + alkaline oxidant → K_2MnO_4

Mn is +6

24 It gives test of group II sulphide ion like CuS & HgS.

Passage

25 $Cu + AgNO_3 \rightarrow Cu(NO_3)_2 + Ag$

Blue

↓ NaCl

$CuCl_2 + AgCl$

$CuCl_2 \xrightarrow{NH_3} [Cu(NH_3)_4]^{2+}$

$AgCl \rightarrow [Ag(NH_3)_2]^{+}$

28 $AgNO_3 + HCl \rightarrow AgCl$

$+ HBr \rightarrow AgBr$

$+ HI \rightarrow AgI$

dissolves in $Na_2S_2O_3$

29 KI_3 (Brownish Yellow) ⟶ gives test with starch