Inorganic Mechanism

Chapter 1

Theory / Your Secrets / Questions

Lecture-1

Compound Representation

In the compound representation electronegative is placed on the right hand side of the compound and the name of the compound is according to the electronegative.

F O N Cl Br I ····· C ····· H ····· metal

Example : NaCl chloride HCl chloride $\left.\begin{matrix}Na\\H\end{matrix}\right\rangle$ NaH Hydride

(Because 'it' is more electronegative and the name is according to it.

BYK Boost Your Knowledge

Q. 1. Which is wrong represented.

(a) ClBr (b) IBr (c) FBr (d) Cl_2O

Ans. a, c because in 'a' more electronegative is Cl so it is BrCl and in 'c' more electronegative is 'F' so it is BrF.

Q. 2. Which is correct represented

(a) $KNaSO_4$ (b) $NaKSO_4$

Ans. (a) For detail see the video lecture.

Q. 3. Which is not oxide.

(a) F_2O (b) Cl_2O (c) CO_2 (d) Na_2O

Ans. (a) For detail see the video lecture.

Note :

- Name of Anion

SO_4^{--}	Sulphate
HSO_4^-	Bisulphate
SO_3^{--}	Sulphite
HSO_3^-	Bisulphite
S^{--}	Sulphide
HS^-	Bisulphide
NO_3^-	Nitrate
NO_2^-	Nitrite
N^{3-}	Nitride

- Name of the Compound.

$NaHSO_3$	—	Sodium bisulphite
Na_3N	—	Sodium Nitride
$NaHS$	—	Sodium bisulphide
$Ca(NO_2)_2$	—	Calcium Nitrite

Ide with water

- Nitride gives NH_3 with water.

$$AlN + H_2O \longrightarrow Al(OH)_3 + NH_3$$

$$Na_3N + H_2O \longrightarrow NaOH + NH_3$$

- Sulphide gives H_2S with water

$$CaS + H_2O \longrightarrow Ca(OH)_2 + H_2S$$

$$Na_2S + H_2O \longrightarrow NaOH + H_2S$$

- Phosphide gives PH_3 with water

$$Mg_3P_2 + H_2O \longrightarrow Mg(OH)_2 + PH_3$$

- Carbides gives different products with water.

$$Be_2C + H_2O \longrightarrow Be(OH)_2 + CH_4$$
$$Al_4C_3 + H_2O \longrightarrow Al(OH)_3 + CH_4$$
$$CaC_2 + H_2O \longrightarrow Ca(OH)_2 + CH \equiv CH$$
$$Mg_2C_3 + H_2O \longrightarrow Mg(OH)_2 + CH \equiv C-CH_3$$

In Be_2C Carbide is C^{----}

In Al_4C_3 Carbide is C^{----}

In CaC_2 Carbide is $^{-}C \equiv C^{-}$ 2π and 16.

In Mg_2C_3 Carbide is $^{-}C \equiv C - C^{---}$ 2π and 26.

BYK Boost Your Knowledge

Q. 1. Which is correct represented

(a) CaClBr (b) CaBrCl (c) IBr (d) a and b

Ans. (b)

Q. 2. Which is not possible ?

(a) $HClO_4$ (b) HFO_4 (c) HF (d) HI

Ans. (b)

Q. 3. Correct representation

(a) $CaCO_3.MgCO_3$ (b) $MgCO_3.CaCO_3$

(c) Both (d) None

Ans. (a)

Q. 4. Total number of σ and π bonds in carbide in Mg_2C_3 and in the product after the reaction with H_2O

	Carbide		Product	
	Sigma	**Pi**	**Sigma**	**Pi**
(a)	2	2	4	2
(b)	2	2	6	2
(c)	4	2	6	2
(d)	6	2	4	2

Ans. (b)

Famous Heatings

☑ Heating of Metal

Na	⟶	Golden yellow
K, Cs, Rb	⟶	Violet
Ca	⟶	Brick red
Ba	⟶	Apple green
Sr	⟶	Crimson red

☑ Substance Melts on Heating

- Salts of alkali metal
- Chlorides of Hg, Pb, Ag

☑ Substance If Cracks

$KI,\ NaCl,\ Pb(NO_3)_2,\ Ba(NO_3)_2$

☑ Substance Swells Up

Alums, Borates and phosphates

Note :

$$H_3PO_3 \xrightarrow{\Delta} PH_3 + H_3PO_4$$

$$HCOO^- \longrightarrow \begin{matrix} COO^- \\ | \\ COO^- \end{matrix}$$

Compound of Zn on heating give yellow colour and on cooling become white.

Salts of Pb, Bi, Sn on heating become brown and on cooling become yellow.

All cupric salts on heating become white and on cooling becomes blue.

Salts of Cd become red or black on heating and on cooling become brown.

Compounds		Hot	Cold
$COCl_2$	→	Blue	Red blue
$COBr_2$	→	Green	Dark Red
COI_2	→	Violet	Red
Ni salt	→	Yellow	Green
Cr Salt	→	Violet	Green
HgO	→	Dark Orange Red	Light Orange Red
Fe_2O_3	→	Dark Red Brown	Light Brown
CuO, MnO_2 NiO	→	Black	Black

(A) Heating of Salts (Any Salt Heating)

☞ **Note :** Salts of HAPA (Hg, Ag, Pt, Au) on heating gives metal

$$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$$

$$Ag_2CO_3 \longrightarrow Ag_2O + CO_2$$

$$Ag_2O \xrightarrow{\Delta} Ag + O_2$$

If in the heating of salt, $\frac{q}{r}$ is more, stability of the salt will be less.

In case of $CaCO_3$ and $MgCO_3$, $CaCO_3$ is more stable because $\frac{q}{r}$ of Mg is more so less stable.

Boost Your Knowledge

Q. 1. Find out stability order of

(a) Na_2CO_3, (b) $Al_2(CO)_3$, (c) MgCO3.

Ans. Order = $a > c > b$ because $\frac{q}{r}$ is $b > c > a$.

Final Shoot—1

1. If a salt cracks on heating then salt is
   (*a*) AgCl (*b*) NaCl (*c*) $PbCl_2$ (*d*) All
2. If a compound swells up on heating
   (*a*) $BaSO_4$ (*b*) $MnSO_4$ (*c*) $Ca_3(PO_4)_2$ (*d*) $CaCl_2$
3. If a salt on heating melts then salt is
   (*a*) $PbCl_2$ (*b*) $HgCl_2$ (*c*) AgCl (*d*) All
4. If a compound gives metal as residue. Then, the compound is
   (*a*) $CaCO_3$ (*b*) Ag_2CO_3 (*c*) $PbCO_3$ (*d*) Na_2CO_3
5. If a compound on heating become Brick red then it is
   (*a*) $CaCO_3$ (*b*) $BaCO_3$ (*c*) Na_2CO_3 (*d*) $(NH_4)_2CO_3$
6. Find out stability order of (A) $CaCO_3$, (B) $BaCO_3$, (C) $MgCO_3$ to words heat
   (*a*) A > B > C (*b*) A > C > B (*c*) B > A > C (*d*) C > B > A
7. Which one is dissociated first in the alum on heating
   (*a*) K_2SO_4 (*b*) $Al_2(SO_4)_3$ (*c*) Both same (*d*) Any
8. Which one on heating gives auto reaction
   (*a*) H_3PO_4 (*b*) H_3PO_3 (*c*) $HCOO^-$ (*d*) Na_2CO_3

Answer Key

1. (b)	2. (c)	3. (d)	4. (b)	5. (b)
6. (c)	7. (b)	8. (b,c)		

Some Famous Gases

(a) If a gas is absorbed by lime water—CO_2 or SO_2.

- SO_2 turns orange, $K_2Cr_2O_7$ into green $Cr_2(SO_4)_3$ but not CO_2.

(b) If a gas is absorbed by pyragallole → O_2.

(c) If a gas turns blue litmus paper red, with NH_3 it gives white fumes → HCl

$$NH_3 + HCl \longrightarrow NH_4Cl \text{ (white fumes)}$$

(d) If a gas turns red litmus paper blue and gives white fumes with HCl → NH_3

NH_3 is Tested by K_2HgI_4 (Nesler's reagent) [K_2HgI_4 + KOH]

Ammonia salt when reacts with a base it gives NH_3.

(i) Ammonical salt + Base → NH_3

$$NH_4X + NaOH \longrightarrow NH_4OH + NaX$$
$$\downarrow$$
$$NH_3 + H_2O$$

(ii) Nitride always gives ammonia with water.

$$\text{Nitride} \xrightarrow{H_2O} NH_3$$

$$AlN \xrightarrow{H_2O} Al(OH)_3 + NH_3$$

(e) If a gas condensed at room temperature to become liquid → H_2O (vapour)

- If a gas on reaction with anhydrous $CuSO_4$ becomes blue → H_2O (vapour)

$$CuSO_4 + 5H_2O \longrightarrow CuSO_4.5H_2O$$
$$\uparrow$$

Anhydrous — Hydrated

White

$FeSO_4.7H_2O$ → green

(f) If a gas is absorbed by terpantine Oil → O_3

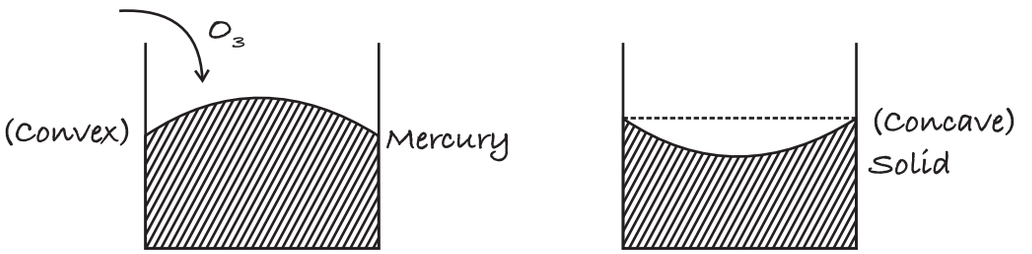
(i) This gas on liquification becomes blue liquid.

(ii) This gas on reaction with KOH gives orange yellow colour

$$KOH + O_3 \longrightarrow KO_3 \text{ (Potassium ozonide)}$$

(orange-yellow)

(iii)



(Tailing of mercury)

When O_3 passes through mercury then its miniscus is changed.

This is known as tailing of mercury (To remove fluidity)

(g) If a brown colour gas is there → NO_2, Br_2

[Br_2 - (Some time dark brown)]

- NO_2 gives brown ring test with $FeSO_4$

$$FeSO_4 \xrightarrow{NO_2} [Fe(H_2O)_5NO]SO_4$$

$$[Fe(H_2O)_5NO]^{++}$$

$FeSO_4.NO$ (Brown ring)

- NO also gives brown ring test. But it is colourless.

N_2O_3 ⟶ Blue

$NO_2 \longrightarrow$ Brown

$N_2O_3 \longrightarrow NO + NO_2$

So, we can say that only two gases of nitrogen are coloured

N_2O_3 ($NO+NO_2$) (Blue) on liquification, NO_2 (Brown).

(h) If a red brown colour gas is there which gives yellow solution with KOH or NaOH, this yellow solution gives yellow ppt., then the gas will be → CrO_2Cl_2

$$\underset{\text{(chromyl chloride)}}{CrO_2Cl_2} \xrightarrow{KOH} \underset{\text{(yellow solution)}}{K_2CrO_4} \xrightarrow{Pb^{++}} \underset{\text{(Yellow ppt.)}}{PbCrO_4}$$

(i) KOH absorbs CO_2 and SO_2.

(j) Ammonia is absorbed in water.

(k) CO burns with blue flames.

Try Yourself

Q. 1. Find out A, B, C, D and E.

$$A \xrightarrow{\Delta} B + C + D$$
$$\downarrow \Delta$$
$$E + C$$

If B, C and D are mixed then 'A' is formed C gives lime water milky temporary. 'E' on heating give crimson red color. (**Hint :** A = $[Sr(HCO_3)_2]$

True (✓) or False (✗)

1. N_2O, CO and NO are inert gases.
2. NO, N_2O_3 and N_2O Give Brown Ring text.
3. CO_2, SO_2 and Cl_2 are absorbed in KOH solution.
4. CrO_2Cl_2 gives yellow solution with NaOH not with KOH.
5. In brown Ring oxidation state of NO is '+1'.

(B) Heating of Salt

(a) Metal Carbonate : Carbonate on heating gives metal oxide and CO_2.

$$\text{Carbonate} \xrightarrow{\Delta} \text{metal oxide} + CO_2$$

Example : $CaCO_3 \xrightarrow{\Delta} CaO + CO_2$

Note : These metal carbonates do not have any dissociation products.

$$Na, K, Cs, Rb \xrightarrow{\Delta} X$$

$$Na_2CO_3 \xrightarrow{\Delta} X \quad \text{(No Product)}$$

Note : HAPA (Hg, Au, Pt, Au) give metal on heating.

$$Ag_2CO_3 \xrightarrow{\Delta} Ag_2O + CO_2$$

$$Ag_2O \xrightarrow{\Delta} Ag + O_2$$

(b) Metal Bicarbonate : Metal bicarbonate on heating gives metal carbonate, CO_2 and H_2O and mixing of metal carbonate, CO_2 and H_2O gives bicarbonate.

$$\text{Bicarbonate} \xrightarrow{\Delta} \text{Carbonate} + CO_2 + H_2O$$

Example : $NaHCO_3 \xrightarrow{\Delta} Na_2CO_3 + H_2O + CO_2$

(Mixed)

(c) Metal Nitrate : Metal nitrate on heating gives metal oxide NO_2 and O_2. But Na, K, Cs, Rb nitrates on heating give nitrite and O_2 only.

$$\text{Nitrate} \xrightarrow{\Delta} \text{Metal oxide} + NO_2 + O_2$$

Note : These metal nitrates give nitrite on heating

$$Na, K, Cs, Rb \xrightarrow{\Delta} \text{Nitrite}$$

$$NaNO_3 \xrightarrow{\Delta} \underset{\text{Sodium Nitrate}}{NaNO_2} + O_2$$

Example :

$$Ca(NO_3)_2 \xrightarrow{\Delta} CaO + NO_2 + O_2$$

Give brown ring test gas i.e., NO_2.

(d) Metal sulphate : Metal sulphate gives metal oxide, SO_2 and O_2.

$$\text{Sulphate} \xrightarrow{\Delta} \text{Metal oxide} + SO_2 + O_2$$

Example : $CaSO_4 \xrightarrow{\Delta} CaO + SO_2 + O_2$

Note : But in case of $FeSO_4$, SO_2 and SO_3 are formed.

$$2FeSO_4 \xrightarrow{\Delta} Fe_2O_3 + 2SO_2 + \frac{1}{2}O_2 \quad \text{(wrong)}$$

$$Fe_2O_3 + SO_2 + SO_3 \quad \text{(right)}$$

$$SO_2 + \frac{1}{2}O_2 \xrightarrow{Fe_2O_3} SO_3$$

Here, Fe_2O_3 is working as an catalyst.

(e) Ammonia Compounds : Only Ammonia salts have No residue on heating (most of the time).

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

$$NH_4NO_2 \xrightarrow{\Delta} \underset{\text{(inert gas)}}{N_2} + H_2O$$

$$\underset{\text{(orange)}}{(NH_4)_2Cr_2O_7} \longrightarrow N_2 + \underset{\text{(green)}}{Cr_2O_3} + H_2O$$

Colours of Ions :

$Cr_2O_7^{--}$ ⟶ Orange
CrO_4^{--} ⟶ Yellow
I^- ⟶ Yellow
Br^- ⟶ Yellow
Cr^{3+} ⟶ Green
Mn^{2+} ⟶ Pink
Fe^{2+} ⟶ Green
Fe^{3+} ⟶ Yellow but $Fe(OH)_3$ Brown
Cu^{++} ⟶ Blue ⇒ Except (CO_3^{--}, Cl^-)

Always Remember

Example : Find out all the products in the given reaction.

$$X \xrightarrow{\Delta} B + \underset{(Gas)}{C} \xrightarrow[water]{lime} \text{Milky (color not permanent)}$$

$B \xrightarrow{\Delta}$ Apple green

Ans. $X \longrightarrow BaCO_3$
$B \longrightarrow BaO$
$C \longrightarrow CO_2$

Example : Find out all the products in the given reaction.

Dark brown

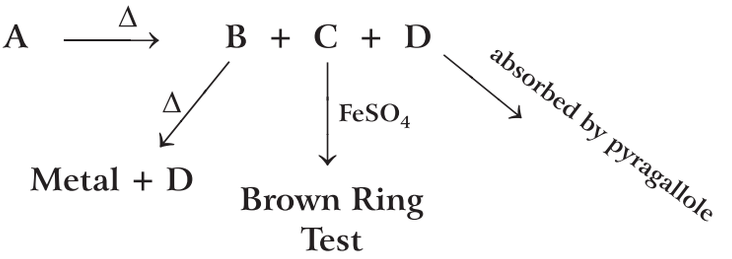
$$A \xrightarrow{\Delta} B + \underset{(Gas)}{C} + \underset{(Gas)}{D}$$

$$\underset{(Gas)}{C} \xrightarrow{[O]} D$$

$C \xrightarrow{K_2Cr_2O_7}$ Green

Ans. $A \longrightarrow FeSO_4$ $B \longrightarrow Fe_2O_3$
$C \longrightarrow SO_2$ $D \longrightarrow SO_3$

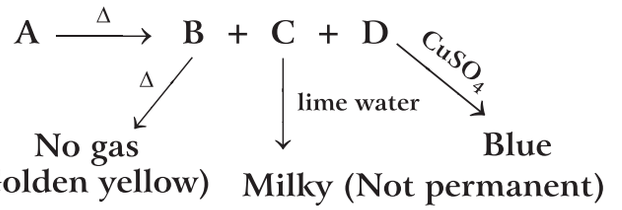
Example : Find out all the products in the given :



Metal is Used in Barometer.

Ans. $Hg(NO_3)_2$

Example : Find out all the products and reactants in the given :



Ans.

A ⇒ $NaHCO_3$

B ⇒ Na_2CO_3

C ⇒ CO_2

D ⇒ H_2O

(Mix)

Your Secrets

Not to be Copied by Others

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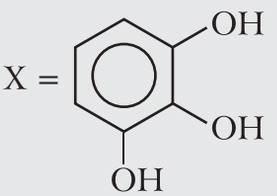
Final Shoot—2

☞ Single Correct Answer Type Questions

1. Which is Brown colore gas ?
   (*a*) NO_2 (*b*) N_2O_3 (*c*) Br_2 (*d*) (a) and (c)
2. If a gas turns lime water milky, it is
   (*a*) SO_2 (*b*) CO_2 (*c*) NO_2 (*d*) (a) and (b)
3. Which turns $K_2Cr_2O_7$ green
   (*a*) SO_2 (*b*) CO_2 (*c*) O_3 (*d*) All
4. Gas which is absorbed in compound 'X' ?



   (*a*) O_3 (*b*) O_2 (*c*) Cl_2 (*d*) CO_2
5. $X \xrightarrow{KOH} Y$ (yellow solution) $\xrightarrow{PbSO_4} Z$ (yellow ppt) then find out 'X' ?
   (*a*) $Cr_2O_2Cl_2$ (*b*) CrO_2Cl_2 (*c*) N_2O_5 (*d*) NO_2
6. Find out stability order towards heat
   (I) $MgCO_3$ (II) Na_2CO_3 (III) $Al_2(CO_3)_3$
   (*a*) I > II > III (*b*) II > I > III (*c*) III > II > I (*d*) III > I > II
7. $X \xrightarrow{\Delta} B + C \xrightarrow{\text{lime water}}$ Milky (temporary)

   $B \xrightarrow{\Delta}$ Apple green

   Then find out 'X'
   (*a*) $CaCO_3$ (*b*) $BaCO_3$ (*c*) $CaSO_4$ (*d*) $BaSO_4$
8. $A \xrightarrow{\Delta} B + C + D$ $\underset{\text{Gas}}{C} \xrightarrow{[O]} \underset{\text{Gas}}{D}$ $\underset{\text{Gas}}{C} \xrightarrow{K_2Cr_2O_7}$ Green

   Then correct about 'A' is
   (*a*) $FeSO_4$ (*b*) $CuSO_4$ (*c*) $CaSO_4$ (*d*) Na_2SO_4
9. $X \xrightarrow{\Delta} A + C$

   A—Metal used in barometer
   B—Gas gives brown ring test
   C—Absorb by Pyragallol
   Then X is
   (*a*) Ag_2CO_3 (*b*) $HgCO_3$ (*c*) $AgNO_3$ (*d*) $NaNO_3$

10. A $\xrightarrow{\Delta}$ B + C + D

B $\xrightarrow{\Delta}$ No gas only golden yellow color

C $\longrightarrow$ Lime water milky (temporary)

D $\xrightarrow{CuSO_4}$ Blue

Then 'A' is

(*a*) $NaHCO_3$ (*b*) Na_2CO_3 (*c*) $(NH_4)_2CO_3$ (*d*) K_2CO_3

11. A salt on heating gives no residue then salt is

(*a*) NH_4NO_3 (*b*) $(NH_4)_2Cr_2O_7$ (*c*) $CaCO_3$ (*d*) Ag_2CO_3

12. 'X' on reaction with a base gives a gas and this gas gives white fumes with HCl then the 'X' may be

(*a*) NH_4NO_2 (*b*) $NaNO_2$ (*c*) $Ca(NO_3)_2$ (*d*) Na_2SO_4

13. On thermal heating which will not give a gas that is having brown ring test

(*a*) $AgNO_3$ (*b*) $NaNO_3$ (*c*) $Ca(NO_3)_2$ (*d*) $LiNO_3$

☞ Matrix Type Question

Q. 1. Match the given :

Gas (X)	Color (Y)
(A) NO_2	(P) Colorless
(B) H_2	(Q) Greenish yellow
(C) Cl_2	(R) Blue liquid
(D) N_2O_3	(S) Brown
(E) I_2	(T) Violet

Q. 2. Match the given :

Gas (X)	Absorber (Y)
(a) O_3	(P) KOH
(b) NH_3	(Q) Water
(c) O_2	(R) Lime water
(d) SO_2	(S) Pyragallol
(e) CO_2	(T) Turpentine oil

Q. 3. Match the given :

Gas (X)	Test (Y)
(a) O_3	(P) Brown ring test
(b) NO_2	(Q) Mustard oil test
(c) NO	(R) White fumes with HCl
(d) NH_3	(S) Yellow solution with KOH
(e) CrO_2Cl_2	(T) Yellow orange with KOH

Q. 4. Match the given :

Salt Heating	Gas Release
(A) $NaNO_3$	(P) SO_2
(B) $AgNO_3$	(Q) SO_3
(C) $Ca(NO_3)_2$	(R) NO_2
(D) $FeSO_4$	(S) O_2
(E) $BaSO_4$	(T) NO

Answer Key

Single Correct Answer Type Questions

1. (d)	**2.** (d)	**3.** (a)	**4.** (b)	**5.** (b)
6. (b)	**7.** (b)	**8.** (a)	**9.** (b)	**10.** (a)
11. (a)	**12.** (a)	**13.** (b)		

Matrix Type Questions

1.	(A)—(S), (B)—(P), (C)—(Q), (D)—(R), (E)—(T)
2.	(A)—(T), (B)—(Q), (C)—(S), (D)—(P), (E)—(R)
3.	(A)—(T), (B)—(P), (C)—(P), (D)—(R), (E)—(S)
4.	(A)—(S), (B)—(R,S), (C)—(R,S), (D)—(P,Q), (E)—(P,S)

Quick Revision Calander (Stick on your Wall)

Gas	Color	Test
NO_2	Brown	Brown Ring
Br_2	Brown	—
N_2O_3	Blue	—
I_2	Violet	Hypo
Cl_2	Greenish Yellow	—
O_3	Blue liquid	Absorb by Pyragallol
CrO_2Cl_2	Brown Red	Yellow solution with KOH

Colours of Ions

CrO_4^{--}	Yellow
$Cr_2O_7^{--}$	Orange
Cu^{++}	Blue (Except CO_3^{--}, Cl^-)
Fe^{++}	Green
Cr^{+++}	Green
CO^{++}	Pink
Mn^{++}	Pink

Gas	Identification
H_2	Burns with blue flame
CO	Burns with blue flame
SO_2	Absorb by lime water and turns $K_2Cr_2O_7$ green
H_2S	Turns lead acetate paper black
NH_3	White fumes with HCl (absorb by water)
O_2	Absorb by Pyrogallol solution
PH_3	Evolved with white rings
N_2	Inert gas
NO	Gives Brown Ring test

Heating of Metal

Na	Golden
K, Cs, Rb	Violet
Ca	Brick red
Ba	Apple green
Sr	Crimson Red

Lecture-2

Amphoteric Metals and Oxide

They have reactions with acid as well as base. They are of two types :

(i) Amphoteric oxide from amphoteric metals

(ii) Amphoteric oxide from general metals

A metal which reacts with acid as well as base to evolve hydrogen is known as an amphoteric metal.

Zn, Pb, Al, Sn, Sb, As

$$Zn + HCl \longrightarrow ZnCl_2 + H_2$$

$$Zn + NaOH \longrightarrow Na_2ZnO_2 + H_2$$

Their oxides also have same property as the base, they have place in anionic part and are given as :

Zn	ZnO_2^{--}	Zincate
Pb	PbO_2^{--}	Plumbate
Al	AlO_2^{---}	Meta Aluminate
Sn	SnO_2^{--}	Stannate
Sb	SbO_3^{---}	Antimenate
As	AsO_3^{---}	Arsenate

Note : (AsH_3) = Poisonous gas

$CuO \Rightarrow$ Basic nature

BeO, GaO } are also amphoteric but they do not remove H_2.

In case Amphoteric metal and their compounds, they are soluble in excess of base

$$ZnCl_2 + NaOH \longrightarrow Zn(OH)_2 + NaCl$$

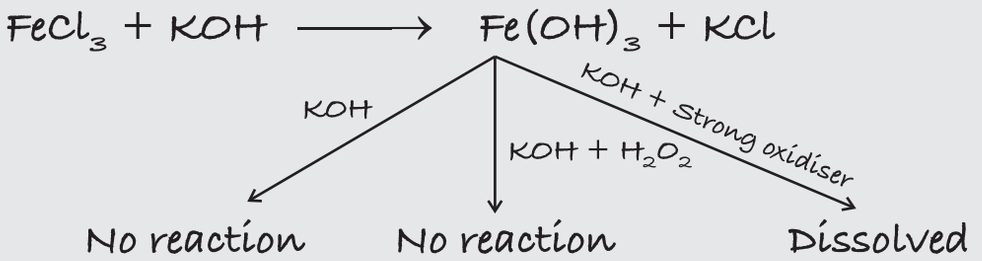
$$Zn(OH)_2 \xrightarrow{NaOH} Na_2ZnO_2 \text{ (Dissolved)}$$

$$CrCl_3 + KOH \longrightarrow Cr(OH)_3 \xrightarrow[\text{excess}]{NaOH} \text{Not dissolved}$$

If a weak or strong oxidiser is used then it is soluble.

$$Cr(OH)_3 \xrightarrow[H_2O_2]{NaOH} Na_2CrO_4 \text{ (soluble) [Yellow color]}$$

If $FeCl_3$ is a salt then strong oxidiser is used. For dissolution



For More Questions Watch the Video.

Find out X

$$Zn + X \longrightarrow B + H_2$$
$$\downarrow \Delta$$
Golden Yellow

$X = NaOH$

- From left to right in periodic table as the metallic character decreases, so basic nature decreases.
- From top to bottom metallic character increases so basic strength increases.
- Transition metal are having weaker base as compared to alkali metals.

BYK Boost Your Knowledge

Q. 1. Which is dissolved in excess of NaOH

(*a*) $FeCl_3$ (*b*) $FeCl_2$ (*c*) $CrCl_3$ (*d*) None

Ans. (d)

Q. 2. Which is dissolved in excess of NaOH

(*a*) $FeCl_2$ (*b*) $ZnCl_2$ (*c*) $AlCl_3$ (*d*) (b) and (c)

Ans. (d)

Q. 3. Which is dissolved in NaOH + H_2O_2

(*a*) $FeCl_3$ (*b*) $ZnCl_2$ (*c*) $CrCl_3$ (*d*) (b) and (c)

Ans. (d)

Q. 4. Which one will give H_2 with acid as well as base

(*a*) Na (*b*) Zn (*c*) Fe (*d*) Hg

Ans. (b)

Q. 5. Which is amphoteric oxide

(*a*) ZnO (*b*) BaO (*c*) BeO (*d*) (a) and (c)

Ans. (d)

Oxidation Number and It's Use

Some Important Points

Oxidation number can not be more than its group number

IA	+1
IIA	+2
IIIA	+3, +1
IVA	−4 to +4
VA	−3 to +5
VIA	−2 to +6
VIIA	−1 to +7

If you are a 11th class student or if your oxidation-reduction is topic is weak then you can go through oxidation-reduction topic first which is next lectures.

Noble gases :

Example : Xe : +2, +4, +6

Cr	+2 to +6
Fe	+2 or +3
Cu	+1 or +2
Mn	+2 to +7

F = –1 (always)

O = –2	Oxide	Ex. CO_2, Na_2O
O = –1	Peroxide	Ex. Na_2O_2, H_2O_2, K, Cs, Rb
O = –1/2	Superoxide	Ex. K, Cs, Rb
O = +2	if OF_2	

☞ Peroxides and superoxides are good oxidiser and they give H_2O_2 on reaction with water.

$$K_2O_2 + H_2O \longrightarrow H_2O_2 + KOH$$
$$KO_2 + H_2O \longrightarrow H_2O_2 + KOH + O_2$$

☞ They generate of oxygen in contact with CO_2.

$$\underset{\text{Oxzone}}{Na_2O_2} + CO_2 \longrightarrow Na_2CO_3 + \frac{1}{2}O_2$$

BYK Boost Your Knowledge

1. Find out correct representation of formula
   (*a*) $KNaSO_4$ (*b*) $NaKSO_4$ (*c*) PbClBr (*d*) HN_3
   Ans. (a)
2. Which is not correct represented
   (*a*) ClBr (*b*) BrCl (*c*) Cl_2O (*d*) (b) and (c)
   Ans. (a)
3. Which is odd one
   (*a*) Na_2O (*b*) Cl_2O (*c*) F_2O (*d*) H_2O
   Ans. (c)
4. Which is not possible as an oxy acid
   (*a*) HOCl (*b*) HOF (*c*) HOBr (*d*) HOI
   Ans. (b)

☑ Use of Oxidation State

In case of oxidiser and reducer :

Expamle : Fe^{+3} → Oxidiser

MnO_2 Mn^{+4} Both

H_2O_2 Both

Expample : Find out oxidiser, reducer and both.

$H_2\overset{+6}{S}O_4$ Oxidiser

$\overset{+5}{H}NO_3$ Oxidiser

$\overset{+3}{H}NO_2$ Both

$H_2\overset{-2}{S}$ Reducer

$\overset{+4}{S}O_2$ Both

$\overset{+6}{S}O_3$ Oxidiser

$\overset{+3}{Fe}Cl_3$ Oxidiser

If higher oxidation state is there, then compound has word 'ic' and if lower oxidation state is there, then compound has word "ous or o" as suffix.

$H_2\overset{+6}{S}O_4$ sulphuric acid

$H_3\overset{+4}{S}O_3$ sulphurous acid

$K_4[\overset{+2}{Fe}(CN)_6]$ Ferro

$K_3[Fe(CN)_6]$ Ferri

$\overset{+3}{}$(Potassium Ferro cyanide)

(Potassium Feric cyanide)

$Fe_4[Fe(CN)_6]_3$

↓ ↓

Ferri Ferro cyanide

Note : $KMnO_4 \xrightarrow{H^+} Mn^{2+}$ acts as an oxidiser.

$K_2Cr_2O_7 \xrightarrow{H^+} Cr^{+3}$ acts as an oxidiser.

Because Mn is changing from +7 to +2 in 1st and Cr is changing from +6 to +3 in second.

☞ If variable oxidations are there, then higher oxidation compound is covalent and lower oxidation compound is ionic.

$PbCl_2$	Ionic
$PbCl_4$	Covalent

☞ From top to bottom ionic character increases because metallic character increases.

stability	Ge		Sn		PB
	Ge^{+4}	>	Sn^{+4}	>	Pb^{+4}
	Ge^{+2}	<	Sn^{+2}	<	Pb^{+2}

☞ Lower one is contains lower oxidation state and is more stable.

Example : Which is more stable :

(a) $PbCl_4$ (b) $PbCl_2$ Ans. (b)

Example : Best oxidiser is

(a) $PbCl_4$ (b) $SnCl_4$

$PbCl_4$ because it wants to be in Pb^{2+} state.

☑ Use in Oxides

Exp. Most ionic

	A		B	
(a)	$\overset{+6}{CrO_3}$		CrO_3	
(b)	$\overset{+4}{MnO_2}$	(✓)	MnO	(✓)
(c)	$\overset{+6}{MnO_3}$		Mn_2O_7	
(d)	$\overset{+6}{CrO_5}$		CrO_5	

☞ In case of non-metallic oxide for same atom if oxidation number increases, acidic strength increases.

Exp.

(a) CO_2 (✓)

(b) CO

Exp.

(a) N_2O_5

(b) NO_2

(c) N_2O

(d) NO

$a > b > d > c$

☞ In a group from top to bottom with same oxidation state acidic strength decreases because metallic character increases.

(a) Cl_2O_3 (b) Br_2O_3 (c) I_2O_3

$a > b > c$

☞ From left to right in a period, acidic strength increases due to non-metallic character.

(a) CO_2 (b) NO_2 (c) SO_3 (d) Cl_2O_7

$d > c > b > a$

Example : Find out acidic order

CuO, ZnO, CO_2, SO_3, Na_2O

Ans. $SO_3 > CO_2 > ZnO > CuO > Na_2O$

☞ Same case with oxy-acids : (more acidic)

(a) $\overset{+5}{HNO_3}$

(b) $\underset{+3}{HNO_2}$

(a) $\overset{+6}{H_2SO_4}$

(b) $\underset{+4}{H_2SO_4}$

Note : In case of H_3PO_4, H_3PO_3 and H_3PO_2 acidic nature is $H_3PO_2 > H_3PO_3 > H_3PO_4$. It is not based on oxidation number. It is calculated by dissociation constant (Ka) of acids.

Note : In case of complex formation O.N. remains same.

Exp. $FeCl_3 + KCN \longrightarrow Fe(CN)_3 + KCl$

$Fe(CN)_3 \xrightarrow{KCN} K_3[Fe(CN)_6]$

In this Fe^{+3} in $FeCl_3$ and Fe^{+3} in $K_3[Fe(CN)_6]$. Here KCN as complexing agent. But in case of

$$CuCl_2 + KCN \longrightarrow Cu(CN)_2 + KCl$$

$$\downarrow$$

$$Cu_2(CN)_2 + (CN)_2 \text{ or } \begin{matrix} CN \\ | \\ CN \end{matrix}$$

$$\xrightarrow{KCN} K_3[Cu(CN)_4]$$

Here O.N. of Cu in $CuCl_2$ is Cu^{+2} and changing into Cu^{+1} in $K_3[Cu(CN)_4]$ means KCN acts as complexing as well as reducing.

Your Secrets

Not to be Copied by Others

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Final Shoot—3

☞ Single Correct Answer Type Questions

1. Find out the best oxidiser
   (*a*) $KMnO_4$ (pH = 4) (*b*) $KMnO_4$ (pH = 8)
   (*c*) $KMnO_4$ (pH = 7) (*d*) $KMnO_4$ (pH = 0)

2. Which is oxidiser as well as reducer,
   (A) HNO_2 (B) HNO_3 (C) H_2SO_4 (D) H_2S (E) MnO_2
   (*a*) A, E (*b*) A, B, C (*c*) D, E (*d*) A, D

3. KCN reacts with $CuSO_4$ then KCN acts as
   (*a*) Reducer (*b*) Complexing agent
   (*c*) Both (*d*) None

4. Find out, the most acidic oxide
   (*a*) I_2O_7 (*b*) Cl_2O_3 (*c*) Br_2O_7 (*d*) Cl_2O_7

5. KCN reacts with $FeCl_3$ then it's behaviour is as
   (*a*) Reducer (*b*) Complexing agent
   (*c*) Oxidiser (*d*) Neutral

6. Correct acidic order is :
   (*a*) $HClO_4 > HClO_3 > HClO_2$ (*b*) $HClO > HClO_2 > HClO_3$
   (*c*) $HIO_4 > HBrCl_4 > HClO_4$ (*d*) $H_3PO_4 > H_3PO_3 > H_3PO_2$

Answer Key

Single Correct Answer Type Questions

1. (d)	2. (a)	3. (c)	4. (d)	5. (b)
6. (a)				

Lecture-3

Hybridisation

☑ Structure, Reaction and Products

In case of Inorganic chemistry, these four concepts should be very clear. In this section all the four concepts are explained in detail.

In case of Hybridization following rules are important before that involment of d-orbital are as

sp^3d	d_{z^2}
sp^3d^2	$d_{z^2}, d_{x^2-y^2}$
sp^3d^3	d_{xy}, d_{yz}, d_{zx}

For hybridization. Rules are as.

1. First find out total number of valence electron in the central atom and the surrounding atoms and sum of them.

Example: NH_3 In this total number of valence electrons are.

$5 + 1 \times 3 = 8$

N(7) = 2, 5 — 5 valence electrons in 'N'.

H (1) = 1 — 1 valence electrons in 'H'.

In PCl_5 total number of valence electrons are calculated as.

P(15) = 2,8,5 — 5 valence electrons in 'P'.

Cl(17) = 2,8,7 — 7 valence electrons in 'Cl'.

Sum = 5 + 7 × 5 = 5+35 = 40

If sum of valance electrons is as.

>2 < 8÷2 (divide by 2) .....(i)

>8 < 56÷8 (divide by 8) .....(ii)

>56 ÷18 (divide by 18) .....(iii)

Afetr this find out final result.

Example: In case of NH_3

5 + 3 × 1 = 8 (This is divided by 2)

2) 8 (4, This '4' is total number of orbitals.
8
×

'4 orbitals' means one S three P

So Sp^3

Finding number of lone pair/pairs.

Lone pair = No. of orbitals – No. of surrounding atoms.

In NH_3 = 4 — 3 (Here No. of surrounding atoms are 3H).

means lone pair =1

Note: In NH_3

Orbitals = 4, surrounding atoms are = 3 (hydrogen)

Ex- For PCl_5

P(15) = 2,8,5 Cl(17) = 2,8,7

So electrons PCl_5 = 5 + 7 × 5 = 5 + 35 = 40

8) 40 (5 5 orbitals So $5+3P+1d = sp^3d$
40
X

lp = 5 − 5 = 0

Ex- I_3^-

In 'I' No. of valence electrons = 7

So $7 \times 3 + 1 = 22$

8) 22 (2 Total sum = 2 + 3 = 5
16
2) 6 (3 Hence orbitals are $5\left(\underset{1}{S} + \underset{3}{3P} + \underset{1}{d}\right) = sp^3d$
6
X

lp = 5 − 2 = 3

$I I_2^-$

Ex- For H_2O

Total valence electrons = 2 + 6 = 8

2 From hydrogen H = 1

6 From oxygen O = 2, 6

8 is divided by 2

SO 2) 8 (4 '4' orbitals.
8
X So S + 3P = $\underline{SP}^3$ Totals orbitals are '4'

lp = 4 − 2 = 2 (2H are arround the 'O')

XeO_3:

For 'Xe' valence electrons = 8

(For noble gases outer most electrons = 8)

For 'O' valence electrons = 6 So for XeO_3

$8 + 3 \times 6 =$

$8 + 18 = 26$

26 is in the range of '8 to 56' So divided By 8, Now

$$\begin{array}{r} 8\overline{)26}(3 \\ \underline{24} \\ 2\overline{)2}(1 \\ \underline{2} \end{array}$$ orbitals = 4

So $S + 3P = SP^3$

Lone pair lp = 4 — 3 = 1

If remainder is '1' then no consideration.

$$\begin{array}{r} 2\overline{)7}(3 \\ \underline{6} \\ 1 \end{array}$$ one is not Considered. only '3' orbitals.

Q.1 Find out Hybridization of

(a) $XeOF_2$ (b) XeF_4 (c) Sf_6 (d) ICl_2^-

(e) NH_4^+ (f) SO_3 (g) So_2 (h) IF_7

Ans. (a) Sp^3d (b) sp^3d^2 (c) sp^3d^2 (d) sp^3d

(e) sp^3 (f) sp^2 (g) sp^2 (h) sp^3d^3

* For more detail read 'Chemical Bonding'

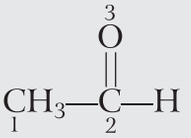
Boost Your Knowledge

1. Find out Hybridisation of C in CH_3^-

   (a) sp^2 (b) sp^3

   (c) dsp^2 (d) sp

2. What is the Hybridisation of oxygen and carbons in CH_3CHO.



   (a) $sp^3 sp^2 sp$ (b) $sp^3 sp^2 sp^2$

   (c) $sp^2 sp^2 sp^2$ (d) $sp^3 sp^2 sp^3$

3. Find out number of lone pairs in XeO_3.

   (a) 1 (b) 2

   (c) 3 (d) zero

4. If NH_3 reacts with HCl then find out change in Hybridisation of Nitrogen from NH_3 to NH_4Cl.

   (a) sp^3 *to* sp^2 (b) sp^2 *to* sp^3

   (c) sp^3 *to* sp (d) No change only sp^3

5. Hybridisation of Xe in $XeOF_2$ is

   (a) sp^3d (b) sp^3d^2

   (c) sp^3 (d) sp^2

6. Find out '*d*' orbital used in Hybridisation of SF_6

   (a) d_{z^2} (b) $d_{x^2-y^2}$

   (c) d_{xy} (d) a and b

Answer

1. (b) 2. (b) 3. (a) 4. (d) 5. (a) 6. (d)

Problems related with Reactions

For chemical reaction we should know

1. Types of reactions
2. Oxidisers and reducers

☑ *Types of Reaction.*

Reaction are of four types

1. Ion exchange
2. Water additions
3. Oxidiser-reducer based reaction
4. Complexing reactions

Ion Exchange: In Ion exchange two Ionic compounds are having reaction In which Ions are Exchanged.

$$NaOH \longrightarrow Na^{+} + OH^{-}$$

$$HCl \longrightarrow H^{+} + Cl^{-}$$

For reaction.

$$NaOH + HCl \longrightarrow$$

$$Na^{+}OH^{-} + H^{+}Cl^{-} \longrightarrow NaCl + HOH \text{ or } H_2O$$

In this Na^{+} is exchanged by H^{+} and OH^{-} is exchanged by Cl^{-}.

Note: NH_4OH means $NH_3 + H_2O$

H_2CO_3 means $H_2O + CO_2$

Famous reaction for ion exchange

$$NH_4Cl + KOH \longrightarrow NH_4OH + KCl$$
$$\downarrow$$
$$NH_3 + H_2O$$

$$NaOH + H_2SO_4 \longrightarrow NaHSO_4 + H_2O$$
$$H^+ \; HSO_4^- \qquad \downarrow Na\,OH$$
$$Na_2SO_4 + H_2O$$

$$NaOH + HNO_3 \longrightarrow NaNO_3 + H_2O$$

$$FeCl_3 + KOH \longrightarrow Fe(OH)_3 + KCl$$

☑ Reactions related with Addition of Water

In case of water addition if oxide is given then first of all add water on oxide it will give corresponding acid or base.

Example: $NaOH + SO_3 \longrightarrow ?$

First of all add water with SO_3

$$SO_3 + H_2O \longrightarrow H_2SO_4$$

Means action of SO_3 is likes H_2SO_4

So $NaOH + SO_3 \longrightarrow$

as $NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + H_2O$

Example: $NaOH + SO_2 \longrightarrow ?$

SO_2 Means, $SO_2 + H_2O \longrightarrow H_2SO_3$

as $NaOH + H_2SO_3 \longrightarrow Na_2SO_3 + H_2O$

Example: $NaOH + N_2O_5 \longrightarrow ?$

Means $N_2O_5 + H_2O \longrightarrow H_2N_2O_6$ or $2\,HNO_3$ (2 common)

Means $N_2O_5 \xrightarrow{is} HNO_3$

$NaOH + HNO_3 \longrightarrow NaNO_3 + H_2O$

Example: $NaOH + Cl_2O_7 \longrightarrow ?$

Means $Cl_2O_7 + H_2O \longrightarrow H_2Cl_2O_8$ or $HClO_4$

'2' Comman

$NaOH + HClO_4 \longrightarrow NaClO_4 + H_2O$

Note: Common number should be separated out.

Example: H_2Cl_2 means $2HCl$

$Cl_2O_3 \longrightarrow Cl_2O_3 + H_2O \longrightarrow H_2Cl_2O_4$ means $HClO_2$

$NO_2 \longrightarrow HNO_3 + HNO_2$ (NO_2 gives two acids)

$Cl_2 \longrightarrow Cl_2 + H_2O \longrightarrow H_2Cl_2O \begin{cases} \nearrow HCl \\ \searrow HClO \end{cases}$ (Cl_2 gives two acid)

Means $NaOH + Cl_2 \xrightarrow[(HCl+HClO)]{} NaCl + NaClO + H_2O$

CO_2 means $CO_2 + H_2O \longrightarrow H_2CO_3$

Example: $NaOH + CO_2 \longrightarrow ?$

Means $NaOH + H_2CO_3 \longrightarrow Na_2CO_3 + H_2O$

☑ Complexing reactions

In case of complexing reaction final product is a complex compound and it is generally given by d-Block compounds.

$$KCN + FeCl_2 \longrightarrow Fe(CN)_2 + KCl$$

$$Fe(CN)_2 + KCN \longrightarrow K_4[Fe(CN)_6]$$

$$KCN + FeCl_3 \longrightarrow Fe(CN)_3 + KCl$$

$$Fe(CN)_6 + KCN \longrightarrow K_3[Fe(CN)_6]$$

In both the products are having same oxidation number of Fe as in reactant.

Note: $CuCl_2 + KCN \longrightarrow Cu(CN)_2 + KCl$

$$Cu(CN)_2 \longrightarrow Cu_2(CN)_2 + \begin{vmatrix} CN \\ \\ CN \end{vmatrix}$$

$$Cu_2(CN)_2 + KCN \longrightarrow K_3[Cu(CN)_4]$$

In the given reaction oxidation number of Cu changes from Cu^{++} to Cu^{+} means KCN acts as complexing agent and reducer.

☑ Important Oxidisers

$KMnO_4$ with H_2SO_4 or $KMnO_4$ in acidic medium.

$$KMnO_4 + H_2SO_4 \longrightarrow \underbrace{K_2SO_4 + MnSO_4 + H_2O}_{\text{always fixed}} + [O]$$

(Oxidising nature)

$$K_2Cr_2O_7 + H_2SO_4 \longrightarrow \underbrace{K_2SO_4 + Cr_2(SO_4)_3 + H_2O}_{\text{always fixed}} + [O]$$

(Oxidising nature)

If we remove K From $K_2Cr_2O_7$

$K_2Cr_2O_7 \longrightarrow Cr_2O_7^{--}$, and SO_4^{--} from H_2SO_4 then.

$$K_2Cr_2O_7 + H_2SO_4 \longrightarrow K_2SO_4 + Cr_2(SO_4)_3 + H_2O + (O)$$

$$Cr_2O_7^{--} + H^+ \longrightarrow Cr^{+3} + H_2O + [O]$$

$$KMnO_4 + H_2SO_4 \longrightarrow K_2SO_4 + MnSO_4 + H_2O + (^-O)$$

This is the reaction after remove of K^+ and SO_4^{--}.

$$MnO_4^- + H^+ \longrightarrow Mn^{+2} + H_2O + [O]$$

☑ Some famous oxidation Processes

$CO \xrightarrow{[O]} CO_2$ $\quad I_2 \xrightarrow{[O]} HIO_3$ (In aqueous medium)

$SO_2 \xrightarrow{[O]} SO_3$ $\quad H_2S \xrightarrow{[O]} S + H_2O$

Metals sulphide $\xrightarrow[\text{Oxidation}]{[O]}$ metals sulphate, $\underset{\underset{\text{Oxalate}}{COO^-}}{\overset{COO^-}{|}} \xrightarrow[\text{Oxidation}]{[O]} CO_2$

$I^- \xrightarrow{[O]} I_2 \quad (I^- + \text{Base} + \text{Oxidiser} \longrightarrow IO_3^-)$

$CaS \xrightarrow{[O]} CaSO_4$. (But H_2S gives 'S')

$Fe^{+2} \xrightarrow{[O]} Fe^{+3}$

Example:

$$KMnO_4 + H_2SO_4 + \underline{H_2S} \longrightarrow \underbrace{\underline{K_2SO_4 + MnSO_4 + H_2O}}_{\text{Fixed values}} + \underline{S}$$

Oxidation of H_2S is into 'S'

Example :

$$K_2Cr_2O_7 + H_2SO_4 + \underline{CuS} \rightarrow \underbrace{K_2SO_4 + Cr_2(SO_4)_3 + H_2O}_{\text{Fixed values}} + \underline{CuSO_4}$$

Oxidation of CuS into $CuSO_4$.

Example: $MnO_4^- + Fe^{+2} + H^+ \longrightarrow$

$MnO_4^- + H^+$: will give Mn^{+2} and H_2O which is fixed and on oxidation Fe^{+2} will give Fe^{+3}

$$\text{So, } MnO_4^- + H^+ + Fe^{+2} \longrightarrow Mn^{+2} + H_2O + Fe^{+3}$$

C gives CO_2:

$$MnO_4^- + C + H^+ \longrightarrow \underbrace{Mn^{+2} + H_2O}_{\text{Fixed}} + CO_2$$

If it is $KMnO_4 + H_2SO_4$ then

$$KMnO_4 + H_2SO_4 + C \longrightarrow K_2\underline{SO_4 + MnSO_4 + H_2O} + CO_2$$
(Fixed)

☑ H_2SO_4 as an oxidiser:

$$\underset{\text{conc.}}{H_2SO_4} \longrightarrow \underline{H_2O + SO_2} + (O) \text{ oxidation process}$$
(Fixed)

Example: $H_2S + H_2SO_4 \longrightarrow \underline{H_2O + SO_2} + S$
(Fixed)

Because 'H_2S' gives 'S' on oxidation.

$$I^- + H_2SO_4 \longrightarrow \underline{H_2O + SO_2} + I_2$$
(Fixed)

Because I^-. Oxidised into I_2.

☑ HNO_3 (*as an oxidiser*)

1. $HNO_3 \longrightarrow NO_2 + H_2O + (O)$
   Hot + Conctrated

2. $HNO_3 \longrightarrow NO + H_2O + (O)$
   Hot + Dilute

3. $HNO_3 \longrightarrow N_2O + H_2O + (O)$
   Cold + Dilute

4. $HNO_3 \longrightarrow NH_4NO_3 + H_2O + (\underline{O})$
   very Dilute

Example: $C + \underset{\text{Hot+conc.}}{HNO_3} \longrightarrow \underset{\text{Fixed}}{NO_2} + H_2O + CO_2$

C converts into CO_2.

$$H_2S + \underset{\text{Dil+cold}}{HNO_3} \longrightarrow N_2O + H_2O + S$$

$H_2S \longrightarrow S$ (oxidation)

☑ Heating of the following:

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

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

$$(NH_4)Cr_2O_7 \xrightarrow{\Delta} N_2 + H_2O + Cr_2O_3$$

$$H_3PO_3 \xrightarrow{\Delta} H_3PO_4 + PH_3$$

**for more detail watch the video 'Types of reaction part-I and part-2'*

Your Secrets

Not to be Copied by Others

BYK Boost Your Knowledge

1. If 'A' on reaction with HNO_3 (Hot + Conc.) gives the following reactions then find out all

$$A + HNO_3 \longrightarrow B + NO_2 + H_2O$$

$$B \xrightarrow{\Delta} C + D + E$$

D on oxidation gives E both D and E are acidic gases then find out A and B.

(a) CaS, $CaSO_4$ (b) FeS, $FeSO_4$

(c) ZnS, $ZnSO_4$ (d) CuS, $CuSO_4$

2. If a reaction is as $H_2S + HNO_3$ (Hot + Conc.) $\longrightarrow A + B + H_2O$, then A and B are

(a) S, N_2O_3 (b) S, NO_2

(c) H_2SO_4, NO_2 (d) S, NO

3. $Fe^{+2} + MnO_4^- + H^+ \longrightarrow$

Find out main products of the reaction

(a) Fe^{+3}, Mn^{+2} (b) Fe^{+2}, MnO_2

(c) Fe^{+3}, Mn^{+4} (d) Fe_2O_3, MnO_2

4. $I_2 + H_2O$ when reacts with H_2SO_4 (Conc. + Hot) then the product is

(a) HIO_4 (b) HIO_3

(c) HIO_2 (d) I_2O_7

5. $CO + H_2SO_4$ (Hot + conc.) $\longrightarrow X + H_2O + SO_2$, 'X' is

(a) CO_2 (b) C_3O_2

(c) HCOOH (d) C

Answer

1. (b) 2. (b) 3. (a) 4. (b) 5. (a)