



# CFE-KOTA

IIT-JEE | NEET | CA | CS | Foundation

**A Unit of PP SAVANI**

*Beginning For Successful Career*

CLASS: 12th (NEET)

SUBJECT: CHEMISTRY

DPP

## DPP: QUALITATIVE ANALYSIS

### Charcoal Cavity Test :

Observation		Inference
Incrustation or Residue	Metallic bead	
Yellow when hot, white when cold	None	Zn <sup>2+</sup>
Brown when hot, yellow when cold	Grey bead which marks the paper	Pb <sup>2+</sup>
No characteristic residue	Red beads or scales	Cu <sup>2+</sup>
White residue which glows on heating	None	Ba <sup>2+</sup> , Ca <sup>2+</sup> , Mg <sup>2+</sup>
Black	None	Nothing definite—generally coloured salt

### Cobalt Nitrate Test :

S.No.	Metal	Colour of the mass
1	Zinc	Green
2	Aluminium	Blue
3	Magnesium	Pink
4	Tin	Bluish-green

### Flame test :

Colour of Flame	Inference
Crimson Red / Carmine Red	Lithium
Golden yellow	Sodium
Violet/Lilac	Potassium
Brick red	Calcium
Crimson	Strontium
Apple Green/Yellowish Green	Barium
Green with a Blue centre/Greenish Blue	Copper

## Borax Bead test :

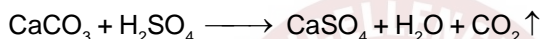
Metal	Colour in oxidising flame		Colour in reducing flame	
	When Hot	When Cold	When Hot	When Cold
Copper	Green	Blue	Colourless	Brown red
Iron	Brown yellow	Pale yellow/Yellow	Bottle green	Bottle green
Chromium	Yellow	Green	Green	Green
Cobalt	Blue	Blue	Blue	Blue
Manganese	Violet/Amethyst	Red/Amethyst	Grey/Colourless	Grey/Colourless
Nickel	Violet	Brown/Reddish brown	Grey	Grey

## Analysis of ANIONS (Acidic Radicals) :

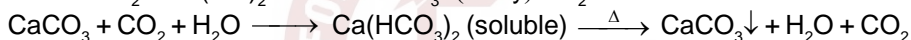
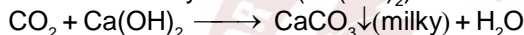
### (a) DILUTE SULPHURIC ACID/DILUTE HYDROCHLORIC ACID GROUP:

#### 1. CARBONATE ION ( $\text{CO}_3^{2-}$ ):

- Dilute  $\text{H}_2\text{SO}_4$  test : A colourless odourless gas is evolved with brisk effervescence.



- Lime water/Baryta water ( $\text{Ba}(\text{OH})_2$ ) test :



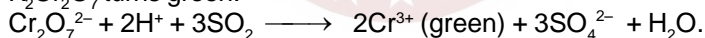
#### 2. SULPHITE ION ( $\text{SO}_3^{2-}$ ):

- Dilute  $\text{H}_2\text{SO}_4$  test :

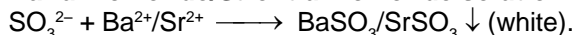


$\text{SO}_2$  has suffocating odour of burning sulphur.

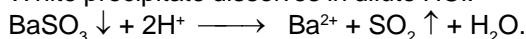
- Acidified potassium dichromate test : The filter paper dipped in acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  turns green.



- Barium chloride/Strontium chloride solution :

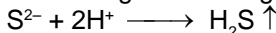


☞ White precipitate dissolves in dilute HCl.



#### 3. SULPHIDE ION ( $\text{S}^{2-}$ ):

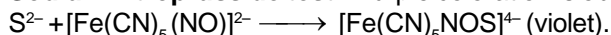
- Dilute  $\text{H}_2\text{SO}_4$  test : Pungent smelling gas like that of rotten egg is obtained.



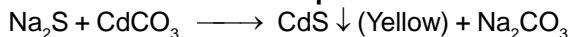
- Lead acetate test :



- Sodium nitroprusside test : Purple coloration is obtained.

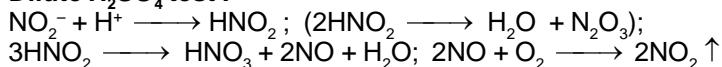


- Cadmium carbonate suspension/ Cadmium acetate solution:

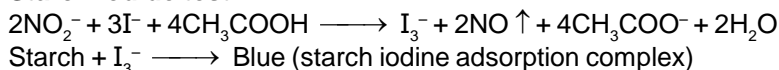


#### 4. NITRITE ION ( $\text{NO}_2^-$ ):

- **Dilute  $\text{H}_2\text{SO}_4$  test :**

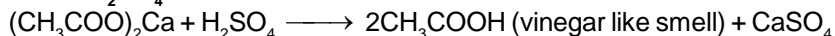


- **Starch iodide test :**

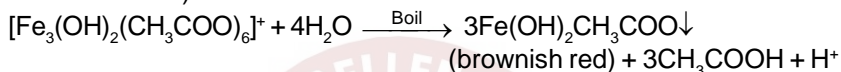
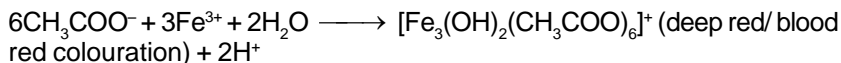


#### 5. ACETATE ION ( $\text{CH}_3\text{COO}^-$ )

- **Dilute  $\text{H}_2\text{SO}_4$  test :**



- **Neutral ferric chloride test :**



#### (b) CONC. $\text{H}_2\text{SO}_4$ GROUP :

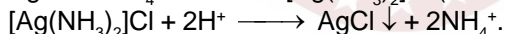
##### 1. CHLORIDE ION ( $\text{Cl}^-$ ):

- **Concentrated  $\text{H}_2\text{SO}_4$  test :**  $\text{Cl}^- + \text{H}_2\text{SO}_4 \longrightarrow \text{HCl}$  (colourless pungent smelling gas) +  $\text{HSO}_4^-$

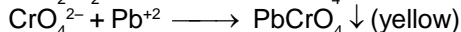
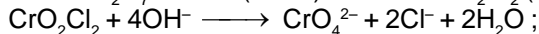
- $\text{NH}_4\text{OH} + \text{HCl} \longrightarrow \text{NH}_4\text{Cl} \uparrow$  (white fumes) +  $\text{H}_2\text{O}$ .

- **Silver nitrate test :**  $\text{Cl}^- + \text{Ag}^+ \longrightarrow \text{AgCl} \downarrow$  (white)

☞ White precipitate is soluble in aqueous ammonia and precipitate reappears with  $\text{HNO}_3$ .

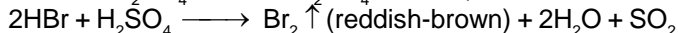
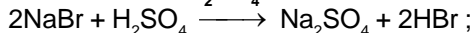


- **Chromyl chloride test :**



##### 2. BROMIDE ION ( $\text{Br}^-$ ):

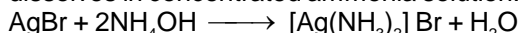
- **Concentrated  $\text{H}_2\text{SO}_4$  test :**



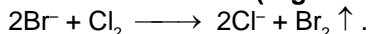
- **Silver nitrate test :**



☞ Yellow precipitate is partially soluble in dilute aqueous ammonia but readily dissolves in concentrated ammonia solution.



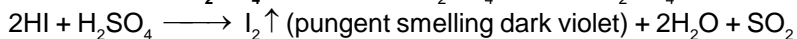
- **Chlorine water test (organic layer test) :**



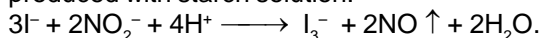
$\text{Br}_2 + \text{CHCl}_3 / \text{CCl}_4 \longrightarrow \text{Br}_2$  dissolve to give reddish brown colour in organic layer.

### 3. IODIDE ION ( $\text{I}^-$ ) :

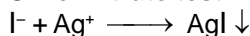
- **Concentrated  $\text{H}_2\text{SO}_4$  test :**  $2\text{NaI} + \text{H}_2\text{SO}_4 \longrightarrow \text{Na}_2\text{SO}_4 + 2\text{HI}$



- **Starch paper test :** Iodides are readily oxidised in acid solution to free iodine; the free iodine may then be identified by deep blue colouration produced with starch solution.

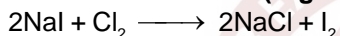


- **Silver nitrate test :** Bright yellow precipitate is formed.



☞ Bright yellow precipitate is insoluble in dilute aqueous ammonia but is partially soluble in concentrated ammonia solution.

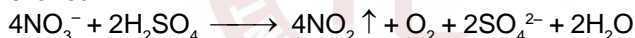
- **Chlorine water test (organic layer test) :**



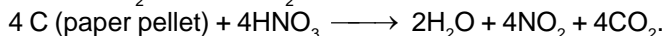
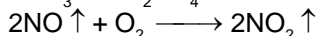
$\text{I}_2 + \text{CHCl}_3 \longrightarrow \text{I}_2$  dissolves to give violet colour in organic layer.

### 4. NITRATE ION ( $\text{NO}_3^-$ ) :

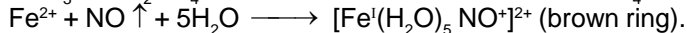
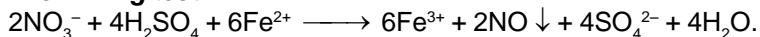
- **Concentrated  $\text{H}_2\text{SO}_4$  test :** Pungent smelling reddish brown vapours are evolved.



☞ Addition of bright copper turnings or paper pellets intensifies the evolution of reddish brown gas.



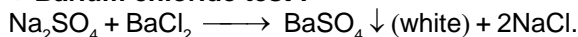
- **Brown ring test :**



### 3. Miscellaneous Group :

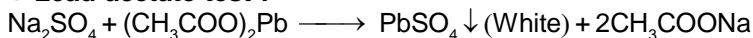
#### 1. SULPHATE ION ( $\text{SO}_4^{2-}$ ) :

- **Barium chloride test :**

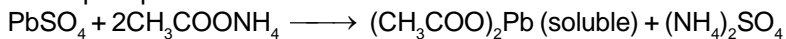


☞ White precipitate is insoluble in warm dil.  $\text{HNO}_3$  as well as  $\text{HCl}$  but moderately soluble in boiling concentrated hydrochloric acid.

● **Lead acetate test :**

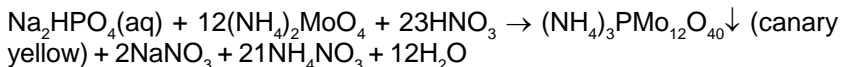


White precipitate soluble in excess of hot ammonium acetate.



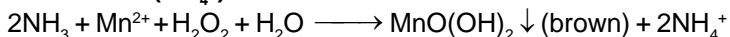
**2. PHOSPHATE ION ( $\text{PO}_4^{3-}$ ) :**

● **Ammonium molybdate test :**

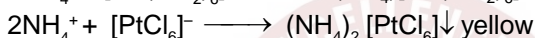
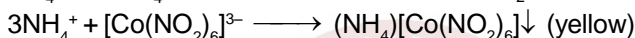


**ANALYSIS OF CATIONS**

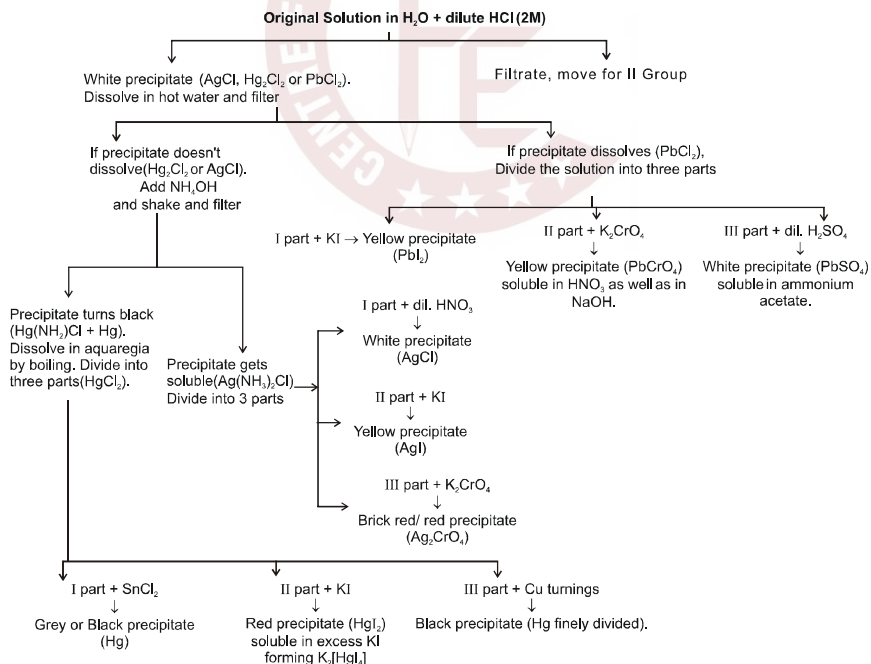
**1. AMMONIUM ION ( $\text{NH}_4^+$ ) :**



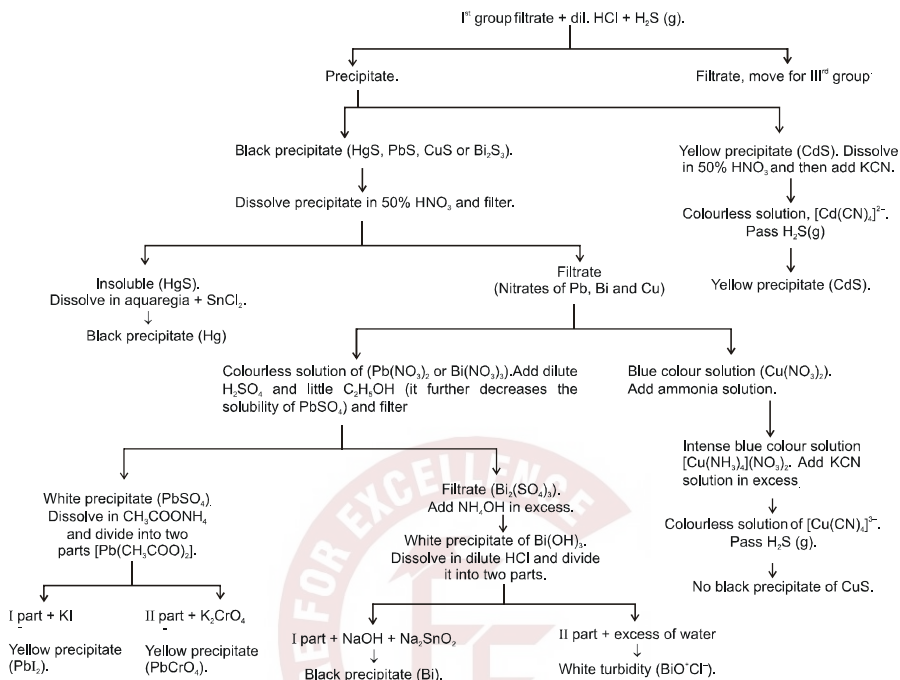
**Nessler's reagent (Alkaline solution of potassium tetraiodomercurate(II)) :**



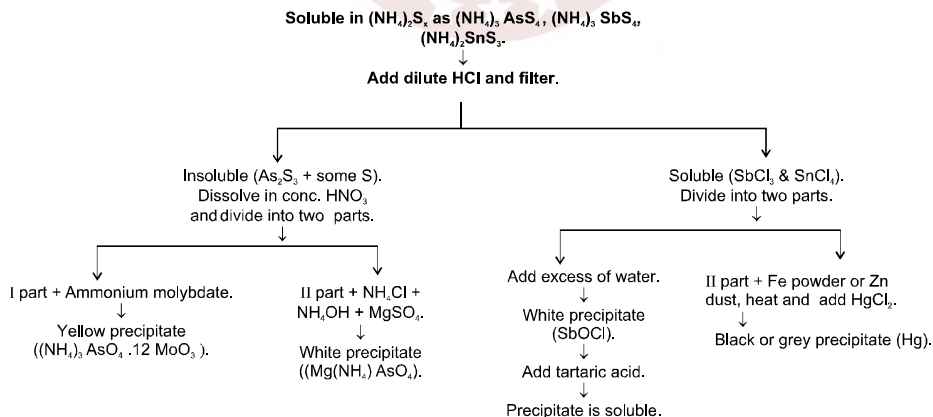
**1<sup>st</sup> GROUP ( $\text{Pb}^{2+}$ ,  $\text{Hg}_2^{2+}$ ,  $\text{Ag}^+$ ) :**



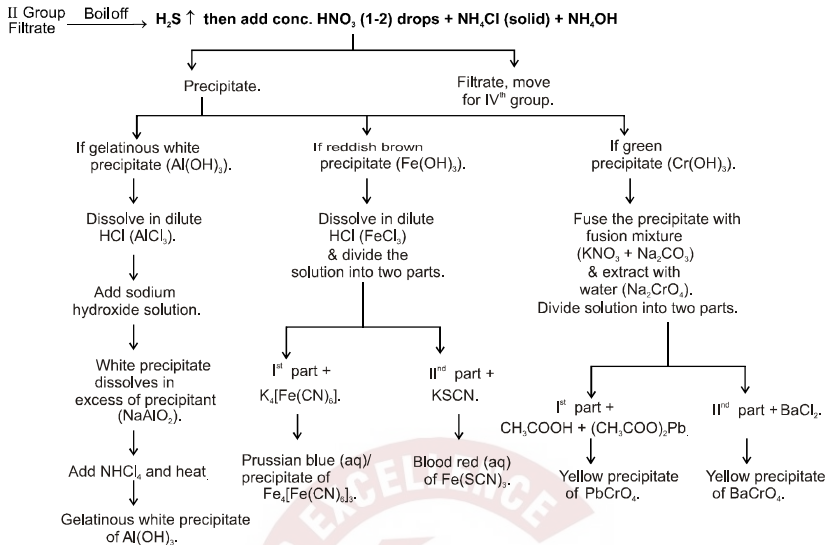
## IIA Group ( $\text{Hg}^{2+}$ , $\text{Pb}^{2+}$ , $\text{Bi}^{3+}$ , $\text{Cu}^{2+}$ , $\text{Cd}^{2+}$ )



## IIB Group ( $\text{As}^{3+}$ , $\text{Sb}^{3+}$ , $\text{Sn}^{2+}$ , $\text{Sn}^{4+}$ )



### III<sup>rd</sup> Group (Al<sup>3+</sup>, Cr<sup>3+</sup>, Fe<sup>3+</sup>)



### IV<sup>th</sup> GROUP (Zn<sup>2+</sup>, Mn<sup>2+</sup>, Ni<sup>2+</sup>, Co<sup>2+</sup>) :

III Group filtrate + NH<sub>4</sub>OH (excess) & NH<sub>4</sub>Cl, then pass H<sub>2</sub>S

