

## Practical Chemistry

**2003**

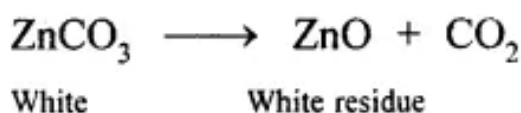
### Question 1.

State the colour of the residue obtained on cooling when the following carbonates are heated :

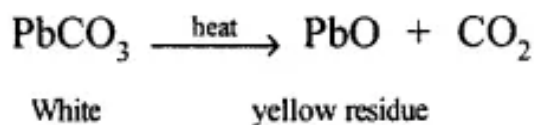
1. zinc carbonate
2. lead carbonate
3. copper carbonate.

### Answer:

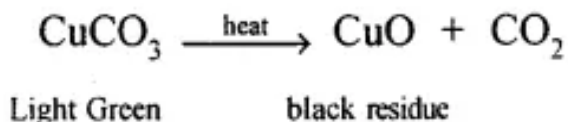
1. In case of zinc carbonate, residue is yellow when hot and White when cold



2. In case of lead carbonate, residue is reddish-brown when hot and yellow when cold



3. In case of Copper carbonate, residue is black when cold.



**2004**

### Question 1.

Sodium hydroxide solution is added first in a small quantity, then in excess to the aqueous salt solutions of copper (II) sulphate, zinc nitrate, lead nitrate, calcium chloride and iron (III) sulphate. For each of the aqueous salt solutions, state —

- (a) the colour of the precipitate when NaOH is added in a small quantity ;  
(b) the nature of precipitate (i.e. soluble or insoluble) when NaOH is added in excess.

**Answer:**

- (a) (i) blue (ii) white gelatinous  
(iii) white chalky (iv) curdy white  
(v) Reddish brown.
- (b) (i) Insoluble (ii) Soluble  
(iii) Soluble (iv) Insoluble  
(v) insoluble.

**2005****Question 1.**

The questions below refer to the following salt solutions listed A to F : A : Copper nitrate B : Iron (II) sulphate C : Iron (II) chloride D : Lead nitrate E : Magnesium sulphate F : Zinc chloride.

1. Which two solutions will give a white precipitate when treated with dilute hydrochloric acid followed by barium chloride solution, (i.e. white ppt. insoluble in dil. HCl)
2. Which two solutions will give a white ppt. when treated with dil.  $\text{HNO}_3$  and  $\text{AgNO}_3$  soln.
3. Which soln. will give a white ppt. when either dil. HCl or dil.  $\text{H}_2\text{SO}_4$  is added to it.
4. Which soln. becomes a deep/inky blue colour when excess of ammonium hydroxide is added to it.
5. Which solution gives a white precipitate with excess ammonium hydroxide solution.

**Answer:**

1. B and E [Iron(II) Sulphate and Magnesium sulphate]
2. C and F [Iron(II) chloride and Zinc chloride]
3. D [Lead nitrate]
4. A [Copper nitrate]
5. D [Lead nitrate]

**2006****Question 1.**

From the list of substances given—Ammonium sulphate, Lead carbonate, Chlorine, Copper nitrate, Ferrous sulphate — State : A substance that turns moist starch iodide paper blue.

**Answer:**

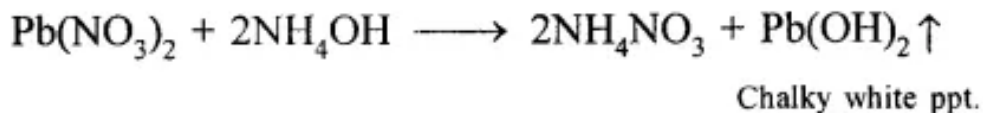
Chlorine

**Question 2.**

State what is observed when excess of ammonia passed through an aqueous solution of lead nitrate.

**Answer:**

When ammonia is passed through an aq. solution of lead nitrate, chalky white precipitate of lead hydroxide is formed which is insoluble in excess of ammonia.

**Question 3.**

Give one test each to distinguish between the following pairs of chemicals solutions

1.  $\text{Zn}(\text{NO}_3)_2$  and  $\text{Ca}(\text{NO}_3)_2$
2.  $\text{NaNO}_3$  and  $\text{NaCl}$
3. Iron [III] chloride and copper chloride.

**Answer:**

1. Add  $\text{NaOH}$  solution in excess to the two solutions. The one in which white ppt. initially formed dissolves in excess of  $\text{NaOH}$  solution is  $\text{Zn}(\text{NO}_3)_2$  solution and the other is  $\text{Ca}(\text{NO}_3)_2$  solution.
2. Add freshly prepared ferrous sulphate solution to the two solutions. Then by the side of the test tube, pour cone. sulphuric acid ( $\text{H}_2\text{SO}_4$ ) to each slowly. The one in which brown ring appears is sodium nitrate solution while the other is sodium chloride sol.
3. Add  $\text{NaOH}$  solution to both the solutions. The one which give a reddish brown ppt. is Iron(II) chloride solution and the one which gives blue ppt. is copper chloride solution.

**Question 4.**

Give a reason why carbon dioxide and sulphur dioxide cannot be distinguished by using lime water.

**Answer:**

Because both turns lime water milky.

**2007**

**Question 1.**

Salts A, B, C, D and E undergo reaction (i) to (v) respectively. Identify the anion present in these salts on the basis of these reactions.

1. When  $\text{AgNO}_3$  solution is added to a soln. of A, a white precipitate, insoluble in dilute nitric acid, is formed.
2. Addition of dil.  $\text{HCl}$  to B produces a gas which turns lead acetate paper black.

3. When a freshly prepared solution of  $\text{FeSO}_4$  is added to a soln. of C and cone.  $\text{H}_2\text{SO}_4$  is gently poured from the side of the test-tube, a brown ring is formed.
4. When dil.  $\text{H}_2\text{SO}_4$  is added to D a gas is produced which turns acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  soln. from orange to green.
5. Addition of dil.  $\text{HCl}$  to E produced an effervescence. The gas produced turns limewater milky but does not effect acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  soln.

**Answer:**

1. Chloride  $\text{Cl}^{1-}$
2. Sulphide  $\text{S}^{2-}$
3. Nitrate  $\text{NO}_3^{2-}$
4. Sulphite  $\text{SO}_3^{2-}$
5. Carbonate  $\text{CO}_3^{2-}$

**Question 2.**

How will the addition of barium chloride soln. help to distinguish between dil.  $\text{HCl}$  and dil.  $\text{H}_2\text{SO}_4$ .

**Answer:**

Barium chloride does not react with dil  $\text{HCl}$  but with dil  $\text{H}_2\text{SO}_4$  gives a white ppt. of barium sulphate.

**2008**

**Question 1.**

The salt which, in solution gives a pale green ppt. with sodium hydroxide solution and a white precipitate with barium chloride solution is :

- A :** Iron (III) sulphate  
**B :** Iron (II) sulphate  
**C :** Iron (II) chloride  
**D :** Iron (III) chloride

**Answer:**

**B :** Iron (II) sulphate

**2009**

**Question 1.**

Carbon dioxide and sulphur dioxide gas can be distinguished by using :

- (A)** Moist blue litmus paper  
**(B)** Lime water  
**(C)** Acidified potassium dichromate paper  
**(D)** None of the above.

**Answer:**

**(C)** Acidified potassium dichromate paper

**Question 2.**

Identify the substances 'R' based on the information given below :

The pale green solid 'R' turns reddish brown on heating. Its aqueous solution gives a white precipitate with barium chloride solution. The precipitate is insoluble in mineral acids.

**Answer:**

Ferrous sulphate ( $\text{Fe}_2\text{SO}_4$ ).

**Question 3.**

Give one chemical test to distinguish between the following pairs of compounds.

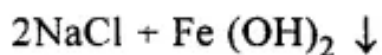
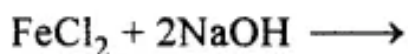
1.  $\text{ZnSO}_4$  and  $\text{ZnCl}_2$
2.  $\text{FeCl}_2$  and  $\text{FeCl}_3$
3. Calcium nitrate soln. and Calcium chloride soln.

**Answer:**

(i)

$\text{ZnSO}_4$ solution	$\text{ZnCl}_2$ solution
Add $\text{BaCl}_2$ solution to the above solution white precipitates of $\text{ZnSO}_4 + \text{BaCl}_2 \longrightarrow \text{BaSO}_4 \downarrow$ <p style="text-align: center;">(White ppt) + <math>\text{ZnCl}_2</math></p>	Add $\text{BaCl}_2$ solution to the above solution no effect is visualised $\text{ZnCl}_2 + \text{BaCl}_2 \longrightarrow \text{No visual effect}$

(ii) Iron (ii) chloride	Iron (ii) chloride
Add sodium hydroxide to the above solution. Dirty green ppts. are formed	Add sodium hydroxide to the above solution. Reddish brown ppts. are observed



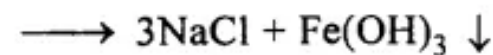
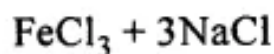
(iii) Calcium nitrate

To this solution add silver nitrate.

No reaction takes place

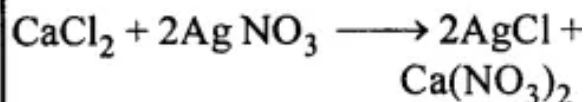


No reaction



Calcium chloride

To this solution add silver nitrate. White precipitates of silver chloride are formed.



(Curdy white  
precipitate)

**2010**

**Question 1.**

Select the correct answer from A, B, C, D and E –

- (A) Nitroso Iron (II) sulphate
- (B) Iron (III) chloride
- (C) Chromium sulphate
- (D) Lead (II) chloride
- (E) Sodium chloride.

The compound which is responsible for the green colour formed when  $\text{SO}_2$  is bubbled through acidified potassium dichromate solution.

**Answer:**

- (C) Chromium sulphate

**Question 2.**

State your observation –

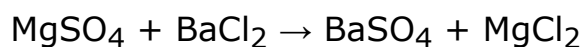
1. A piece of moist blue litmus paper
2. Paper soaked in potassium permanganate solution- is introduced into a gas jar of sulphur dioxide.

**Answer:**

1. Moist blue litmus turns red and finally colourless as  $\text{SO}_2$  act as an acidic gas and then a bleaching agent.
2. The pink colour of potassium permanganate paper turns colourless because of bleaching property of sulphur dioxide.

**Question 3.**

Write the equation for the reaction of magnesium sulphate solution with barium chloride solution.

**Answer:****2011****Question 1.**

Choose from the list of substances – Acetylene gas, aqua fortis, coke, brass, barium chloride, bronze, platinum.

An aqueous salt solution used for testing sulphate radical.

**Answer:**

Barium chloride.

**2012****Question 1.**

Name the gas which turns acidified potassium dichromate clear green.

**Answer:**

Sulphur dioxide gas ( $\text{SO}_2$ )

**Question 2.**

**Identify the anion present in the following compounds :**

1. Compound X on heating with copper turnings and concentrated sulphuric acid liberates a reddish brown gas.
2. When a solution of compound Y is treated with silver nitrate solution a white precipitate is obtained which is soluble in excess of ammonium hydroxide solution.
3. Compound Z which on reacting with dilute sulphuric acid liberates a gas which turns lime water milky, but the gas has no effect on acidified potassium dichromate solution.
4. Compound L on reacting with Barium chloride solution gives a white precipitate insoluble in dilute hydrochloric acid or dilute nitric acid.

**Answer:**

1. Nitrate ion,  $\text{NO}_3^-$
2. Chloride ion,  $\text{Cl}^-$
3. Carbonate ion,  $\text{CO}_3^{2-}$
4. Sulphate ion,  $\text{SO}_4^{2-}$

**Question 3.**

State one chemical test between each of the following pairs :

1. Sodium carbonate and Sodium sulphite
2. Ferrous nitrate and Lead nitrate
3. Manganese dioxide and Copper(II) oxide

**Answer:**

1. Treat each of the compound with dilute sulphuric acid. In case of sodium carbonate a colourless and odourless gas is evolved. In case of sodium sulphite a colourless gas evolved which has a choking smell and causes coughing.
2. To each of the aqueous solutions of compounds add aqueous sodium hydroxide solution. A dirty green precipitate is formed in case of ferrous nitrate, whereas a white chalky precipitate is formed in case of lead nitrate.
3. Heat each of the compound with cone, hydrochloric acid. In case of manganese dioxide a greenish yellow gas (chlorine) is evolved. In case of copper(II) oxide, no gas evolved and a bluish green solution is formed.

**Question 4.**

State one observation : A zinc granule is added to copper sulphate solution.

**Answer:**

The blue colour of copper sulphate solution fades to form a colourless solution.

**Question 5.**

Give balanced equation for the reaction :

Silver nitrate solution and Sodium chloride solution.

**Answer:**

**2013**

**Question 1.**

**Give a chemical test to distinguish between :**

1. NaCl soln. and NaNO<sub>3</sub> soln.
2. HCl gas and H<sub>2</sub>S gas.
3. Calcium nitrate soln. and zinc nitrate soln.
4. Carbon dioxide gas and sulphur dioxide gas.



**Answer:**

1. Add silver nitrate solution to sodium chloride solution and sodium nitrate solution. In case of sodium chloride, a curdy white ppt. is formed. In case of sodium nitrate solution the reaction mixture remains colourless.
2. Moist lead acetate paper turns black in case of hydrogen sulphide gas, but does not change its colour in case of hydrogen chloride gas.
3. To each of the solution add first sodium hydroxide solution in small amount and then in excess. In case of calcium nitrate a fine white precipitate is formed, which does not dissolve in excess of sodium hydroxide. In case of zinc nitrate a gelatin like white precipitate is formed which dissolves in excess of sodium hydroxide.
4. To each of the gas add few drops of acidified potassium dichromate solution. In case of carbon dioxide no change takes place. In case of sulphur dioxide, potassium dichromate solution turns blue.

**Question 2.**

From A : CO ; B : CO<sub>2</sub> ; C : NO<sub>2</sub> ; D : SO<sub>3</sub> – State which will not produce an acid on reaction with water.

**Answer:**

A : CO

**2014**

**Question 1.**

**Distinguish between :** Sodium nitrate and sodium sulphite (using dilute sulphuric acid)

**Answer:**

Sodium nitrate will not react with dilute sulphuric acid.

Sodium sulphite reacts with dil. sulphuric acid to liberate foul smelling hydrogen sulphide gas.

**Question 2.**

**State your observation :** When moist starch iodide paper is introduced into chlorine gas.

**Answer:**

The starch iodide paper turns blue due to the liberation of free iodine.

**Question 3.**

The flame test with a salt P gave a brick red flame. What is the cation in P?

**Answer:**

Cation in P is Ca<sup>2+</sup> (calcium ion).

**Question 4.**

Gas Q turns moist lead acetate paper silvery black. Identify the gas Q.  
pH of liquid R is 10. What kind of substance is R?

**Answer:**

The gas Q is  $\text{H}_2\text{S}$  (Hydrogen sulphide).

The substance R is an alkaline.

**2015****Question 1.**

Select the gas that has a characteristic rotten egg smell. [ammonia, ethane, hydrogen chloride, hydrogen sulphide, ethyne]

**Answer:**

Hydrogen sulphide

**Question 2.**

State one relevant observation : When hydrogen sulphide gas is passed through lead acetate solution.

**Answer:**

When hydrogen sulphide gas is passed through lead acetate solution, it forms a black precipitate of lead sulphide.

**Question 3.**

Identify the anion present in each of the following compounds: A, B, C :

1. Salt 'A' reacts with cone.  $\text{H}_2\text{SO}_4$  producing gas which fumes in moist air and gives dense fumes with ammonia.
2. Salt 'B' reacts with dil.  $\text{H}_2\text{SO}_4$  producing a gas which turns lime water milky but has no effect on acidified potassium dichromate solution.
3. When barium chloride solution is added to salt solution. 'C' a white precipitate insoluble in dilute hydrochloric acid is obtained.

**Answer:**

1. Chloride ion ( $\text{Cl}^-$ )
2. Carbonate ion ( $\text{CO}_3^{2-}$ ) or bicarbonate ion ( $\text{HCO}_3^{-1}$ )
3. Sulphate ion ( $\text{SO}_4^{2-}$ )

**Question 4.**

Identify the cation present in each of the following compounds — W, X, Y, Z :

1. To solution 'W', ammonium hydroxide is added in minimum quantity first and then in excess. A dirty white precipitate is formed which dissolves in excess to form a clear solution.
2. To solution 'X' ammonium hydroxide is added in minimum quantity first and then in excess. A pale blue precipitate is formed which dissolves in excess to form a clear inky blue solution.
3. To solution 'Y' a small amount of sodium hydroxide is added slowly and then in excess. A white insoluble precipitate is formed.
4. To a salt 'Z' calcium hydroxide solution is added and then the mixture is heated. A pungent smelling gas turning moist red litmus paper blue is obtained.

**Answer:**

1.  $\text{Zn}^{2+}$  (Zinc Ion)
2.  $\text{Cu}^{2+}$  (Copper (II) Ion)
3.  $\text{Ca}^{2+}$  (Calcium Ion)
4.  $\text{NH}_4^+$  (Ammonium Ion)

**2016**

**Question 1.**

Identify the cations in each of the following cases :

1. NaOH solution when added to the solution 'A' gives a reddish brown precipitate.
2.  $\text{NH}_4\text{OH}$  solution when added to the solution 'B' gives white ppt which does not dissolve in excess.
3. NaOH solution when added to the solution 'C' gives white ppt which is insoluble in excess.

**Answer:**

1. Ferric ( $\text{Fe}^{3+}$ ) ion
2. Plumbous ( $\text{Pb}^{2+}$ ) ion
3. Calcium ( $\text{Ca}^{2+}$ ) ion

**2017**

**Question 1.**

Choose the correct answer from the options – A chloride which forms a precipitate that is soluble in excess of ammonium hydroxide, is :

- A.** Calcium chloride
- B.** Ferrous chloride
- C.** Ferric chloride
- D.** Copper chloride.

**Answer:**

**D.** Copper chloride.

**Question 2.**

Identify the substance underlined – Cation that does not form a precipitate with ammonium hydroxide but forms one with sodium hydroxide.

**Answer:**

Magnesium ions.

**Question 3.**

Identify the salts P and Q from the observations given below :

1. On performing the flame test salt P produces a lilac coloured flame and its solution gives a white precipitate with silver nitrate solution, which is soluble in ammonium hydroxide solution.
2. When dilute HCl is added to a salt Q, a brisk effervescence is produced and the gas turns lime water milky. When  $\text{NH}_4\text{OH}$  solution is added to the above mixture [after adding dilute HCl], it produces a white precipitate which is soluble in excess  $\text{NH}_4\text{OH}$  solution.

**Answer:**

**(i)** The salt P is potassium chloride.

- **Reason :**  $\text{K}^+$  ions give lilac colour to flame and  $\text{Cl}^-$  ions react with silver nitrate to form silver chloride precipitate which is soluble in excess of ammonium hydroxide.

**(ii)** The salt Q is zinc carbonate.

- **Reason :**  $\text{CO}_3^{2-}$  ions are responsible for the liberation of carbon dioxide with HCl. The salt formed is zinc chloride which forms white precipitate with ammonium hydroxide. This precipitate is soluble in excess of ammonium hydroxide.

**Additional Questions**

**Question 1.**

The following materials are provided – solutions of cobalt chloride, ammonia, potassium permanganate, lime water, starch-iodide, sodium hydroxide, lead acetate, potassium iodide. Also provided are litmus and filter papers, glowing splinters and glass rods. Using the above how would you distinguish between :

- (a)** a neutral, acidic and a basic gas
- (b)** oxygen and hydrogen gas
- (c)** carbon dioxide and sulphur dioxide gas
- (d)** chlorine and hydrogen chloride gas
- (e)** hydrogen sulphide and nitrogen dioxide gas
- (f)** ammonia and carbon dioxide gas

- (g) zinc carbonate and potassium nitrate
- (h) hydrated copper sulphate and anhydrous copper sulphate
- (i) ammonium sulphate and sodium sulphate.

**Answer:**

- (a) Neutral gas does not effect litmus paper. Acidic gas turns blue litmus paper red and basic gas turns red litmus blue.
- (b) Oxygen is obtained by heating  $\text{KMnO}_4$  whereas hydrogen gas is obtained with the action of Zn and dil  $\text{H}_2\text{SO}_4$ .
- (c) No effect of  $\text{CO}_2$  on  $\text{KMnO}_4$  or  $\text{K}_2\text{Cr}_2\text{O}_7$  whereas  $\text{SO}_2$  turns  $\text{K}_2\text{Cr}_2\text{O}_7$  from orange to green.
- (d) Chlorine decolourises the colouring matter whereas HCl does not.
- (e)  $\text{H}_2\text{S}$  gas turns  $\text{KMnO}_4$  from pink to colourless and  $\text{NO}_2$  liberates violet vapours with KI.
- (f)  $\text{NH}_3$  turns red litmus blue and  $\text{SO}_2$  turns blue litmus red.
- (g) Lime water turns zinc carbonate milky and no effect on potassium nitrate.
- (h) Hydrated copper sulphate anhydrous copper sulphate. Take some dry  $\text{CuSO}_4$  on filter paper. It will be white in colour.  
anhydrous copper sulphate white in colour.  $\text{CuSO}_4$  (white powder)  
Now keep it in air for some time, it will absorb water vapour from atmosphere, its colour will change to blue.
- (i) Ammonium sulphate and sodium sulphate : When ammonium sulphate is heated with NaOH, gas ammonia is produced which turns red litmus blue. But sodium sulphate has no reaction with NaOH.

**Question 2.**

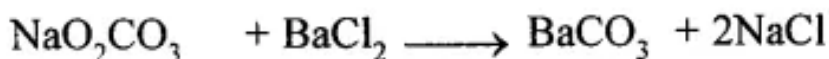
**Give a chemical test to distinguish between the following:**

1. Sodium carbonate and sodium sulphate
2. Potassium chloride and potassium nitrate
3. Copper carbonate and copper sulphite
4. Lead chloride and lead sulphide
5. Iron (II) sulphate and iron (III) sulphate
6. Calcium sulphate and zinc sulphate
7. Lead nitrate and zinc nitrate
8. Copper sulphate and calcium sulphate
9. Manganese dioxide and copper (II) oxide
10. dil. HCl, dil.  $\text{HNO}_3$ , dil.  $\text{H}_2\text{SO}_4$ .

[explain the procedure for the preparation of the solutions for the above tests wherever required]

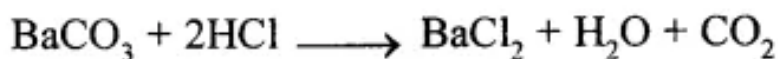
**Answer:**

- (i) Sodium carbonate and sodium sulphate : Add  $\text{BaCl}_2$  solution to  $\text{Na}_2\text{CO}_3$ , a white precipitate is produced which is soluble in dil. HCl.



sodium carbonate

white ppts.



Now add  $\text{BaCl}_2$  solution to sodium sulphate, white ppts. produced which are insoluble in dil.  $\text{HCl}$ .



sodium sulphate

white ppts.

$\text{BaSO}_4$  is insoluble in dil.  $\text{HCl}$ .



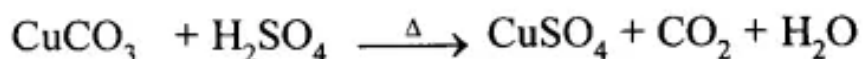
**(ii)** Add cone.  $\text{H}_2\text{SO}_4$  to potassium chloride and heat.

colourless gas produced which gives dense-white fumes when a glass rod dipped in ammonia is brought near it.

To the salt solution potassium nitrate, add cone.  $\text{H}_2\text{SO}_4$  and copper turnings and heat.

Reddish brown fumes evolved which gives violvet vapours and turns potassium iodide paper brown.

**(iii)** On adding dilute  $\text{H}_2\text{SO}_4$  to copper carbonate acid heating, a colorless odour less gas is evolved which turns lime water milky and has no effect on  $\text{KMnO}_4$  or  $\text{K}_2\text{Cr}_2\text{O}_7$  solution.



Copper carbonate

$\text{CO}_2$  gas turns lime water milky.

Now add dil.  $\text{H}_2\text{SO}_4$  to copper sulphite and heat.

A colourless gas with suffocating odour evolved which turns lime water milky and changes then pink colour of acidified  $\text{KMnO}_4$  to colourless and orange colour of acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  to clear green.

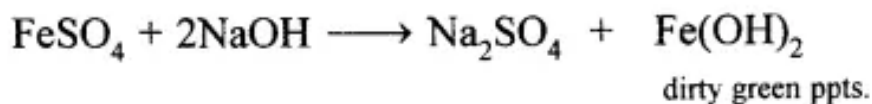
**(iv)** Added  $\text{MnO}_2$  and cone.  $\text{H}_2\text{SO}_4$  to the salt Lead Chloride and heat it.

A greenish coloured yellow coloured gas with punget odour is evolved which turns moist starch iodide paper blue black.

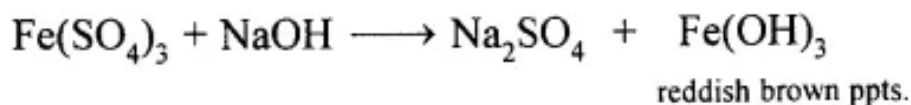
Now add dil.  $\text{H}_2\text{SO}_4$  to Lead sulphide and heat.

Colourless gas with rotten egg smell is evolved. The gas evolved turns moist lead acetate paper silvery black.

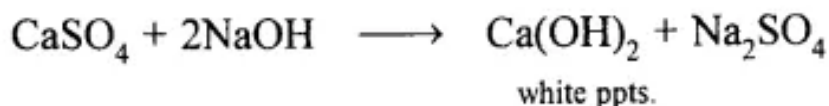
**(v)** Iron (II) sulphate is when reacted with small amount of  $\text{NaOH}$  solution, dirty green precipitates of Iron (II) hydroxide are produced which are insoluble in excess of  $\text{NaOH}$ .



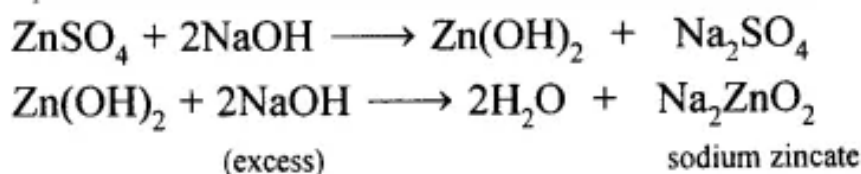
Iron (III) sulphate is when reacted with small amount of NaOH solution, reddish brown precipitates of  $\text{Fe(OH)}_3$  are formed which are insoluble in excess of NaOH.



**(vi)** Add sol. of NaOH to calcium sulphate solution, milky white ppts. of calcium hydroxide are formed which are soluble in excess of NaOH.

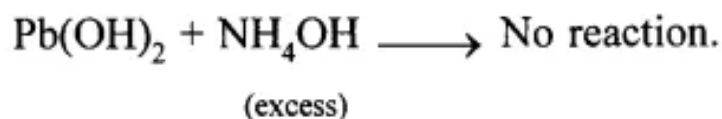
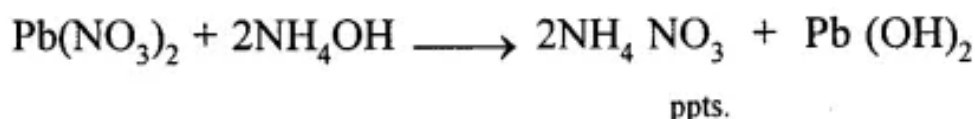


Now add NaOH to zinc sulphate a white ppts of  $\text{Zn(OH)}_2$  are produced which are soluble in excess of NaOH.



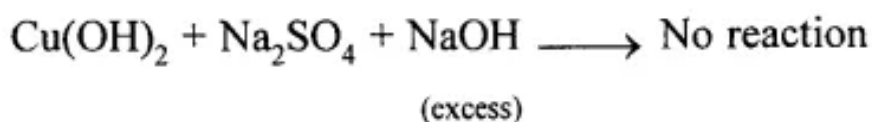
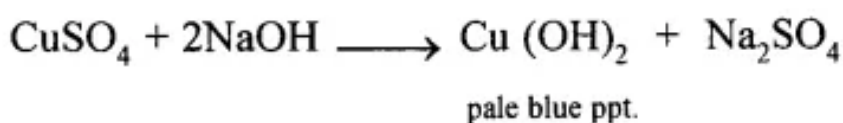
Also when sol. of  $\text{NH}_4\text{OH}$  is add to  $\text{CaSO}_4$ , no ppts. are formed i. e., no reaction whereas when a sol. of  $\text{NH}_4\text{OH}$  is add to  $\text{ZnSO}_4$ , gelatinous white ppts. are formed which are soluble in excess of  $\text{NH}_4\text{OH}$ .

**(vii)** When a sol. of  $\text{NH}_4\text{OH}$  in small amount is added to lead nitrate sol. a chalky white precipitates of lead hydroxide are produced. The precipitates so formed are insoluble in excess of  $\text{NH}_4\text{OH}$ .



Now add  $\text{NH}_4\text{OH}$  in small amount to zinc nitrate, a Gelatinous white precipitates of  $\text{Zn(OH)}_2$  are formed which are soluble in excess of  $\text{NH}_4\text{OH}$ .

**(viii)** When a sol. of NaOH in small amount is added to copper sulphate, pale blue precipitates of copper (II) hydroxide are formed which are insoluble in excess of NaOH.



Now add sol. of NaOH to calcium sulphate sol. milky white ppts. of  $\text{Ca(OH)}_2$  are

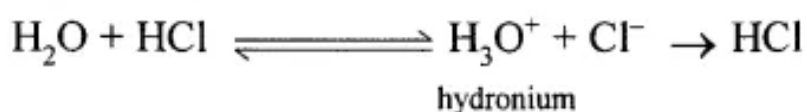
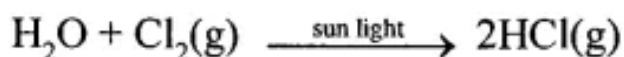
formed which are insoluble in excess of NaOH.

**(ix) Test :** **(i)** Add cone. HCl to the sol. and heat, **(ii)** Filter the sol. after reaction.

**Manganese dioxide (Black) :** Greenish coloured gas is evolved  $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$  Filtrate is brownish in colour.

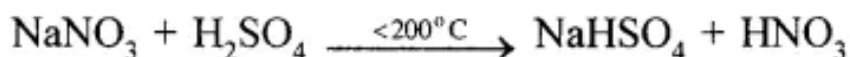
**Copper (II) oxide :** There is no evolution of chlorine gas.  $\text{CuO} \rightarrow 2\text{HCl} + \text{CuCl}_2 + \text{H}_2\text{O}$  Filtrate is blueish colour.

**(x)** Dil. HCl is prepared by dissolving HCl gas in water. It ionises to  $\text{H}_3\text{O}^+$  and  $\text{Cl}^-$  ions. HCl gas is prepared by explosive mixture of equal volumes of hydrogen gas and chlorine gas.



**dil.  $\text{HNO}_3$  :**

Nitric acid is prepared by distilling a mixture of sodium nitrate with conc.  $\text{H}_2\text{SO}_4$ .



**dil.  $\text{H}_2\text{SO}_4$  :**

dil.  $\text{H}_2\text{SO}_4$  is obtained by dissolving sulphure trioxide gas in water



### Question 3.

Identify the cation (positive ion) and anion (negative ion) in the following substances, A, B and C. Also identify P, Q, R, S, T, U, V, W.

**(a)** Substance 'A' is water soluble and gives a curdy white precipitate 'P' with silver nitrate solution. 'P' is soluble in ammonium hydroxide but insoluble in dil.  $\text{HNO}_3$ . Substance 'A' reacts with ammonium hydroxide solution to give a white precipitate 'Q' soluble in excess of  $\text{NH}_4\text{OH}$ .

**(b)** A solution of substance 'B' is added to barium chloride solution. A white ppt. 'R' is formed, insoluble in dil. HCl or  $\text{HNO}_3$ . A dirty green ppt. 'S' is formed on addition of ammonium hydroxide to a solution of 'B' and the precipitate is insoluble in excess of ammonium hydroxide.

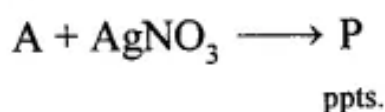
**(c)** Substance 'C' is a coloured, crystalline salt which on heating decomposes leaving a black residue 'T'. On addition of copper turnings and cone.  $\text{H}_2\text{SO}_4$  to 'C'



a coloured acidic gas 'U' is evolved on heating. A solution of 'C' is added to NaOH soln. until in excess. A pale blue ppt. 'P' is obtained insoluble in excess of NaOH. A solution of 'C' then added to  $\text{NH}_4$  soln. in excess to gives an inky blue solution 'V'. A solution of 'C' is warmed and hydrogen sulphide gas is passed through it. A black ppt. 'W' appears.

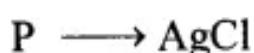
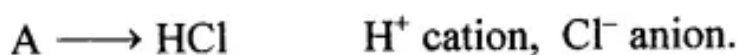
**Answer:**

- (a) Substance A to soluble in water and gives curdy white ppts. P with silver nitrate sol.

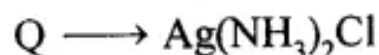
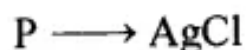
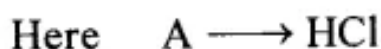
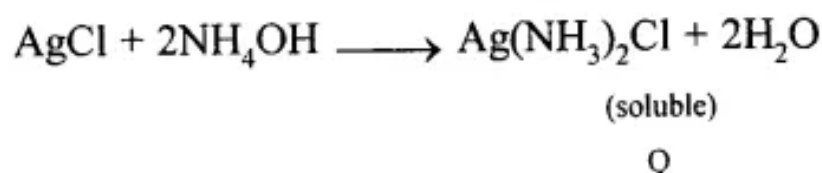
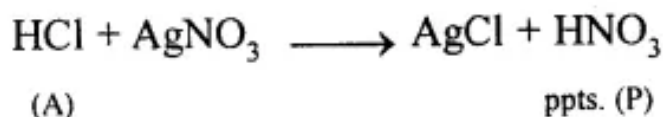


'P' ppts. are soluble in  $\text{NH}_4\text{OH}$  but insoluble in  $\text{HNO}_3$ .

Here



**Original reaction**



- (b) A solution of substance B is added to barium chloride solution White ppts. R are formed which are insoluble in dil. HCl or  $\text{HNO}_3$ .

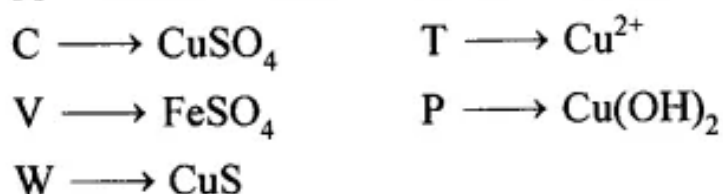
B stands for  $\text{FeSO}_3$ , R stands for  $\text{BaCl}_2$ ,

S stands for  $\text{Fe}(\text{OH})_2$

- (c) Substance 'C' which is coloured, crystalline which on heating decomposes and give black residue. 'T'

On heating 'C' gives black residue. This shows that 'C' is  $\text{CuSO}_4$  and black residue 'T' is  $\text{Cu}^{2+}$  : when  $\text{H}_2\text{SO}_4$  is added to 'C' and copper turnings, on heating it gives coloured gas 'V'. Brownish gas is escaped when 'C' is added to  $\text{NaOH}$ , pale blue ppts. are formed. Which are insoluble in excess of  $\text{NaOH}$ .

The reaction shows that 'V' is  $\text{FeSO}_4$  solution pale blue ppts. which are insoluble in excess  $\text{NaOH}$  solution 'P' is  $\text{Cu}(\text{OH})_2$ . When 'C' is passed through  $\text{H}_2\text{S}$  gas, black ppts. are formed. This shows W is  $\text{CuS}$ .



### Unit Test Paper — Chemistry Practicals

**Q.1. Match the 'cations' A to F and the solubility of ppt. G or H with the correct colours from 'X' and 'Y'.**

'X' On Addition of $\text{NaOH}$ in Excess	Cation	Solubility of ppt. In excess	'Y' On Addition of $\text{NH}_4\text{OH}$ in Excess	Cation	Solubility of ppt. in excess
1. Reddish brown ppt.	A : $\text{Ca}^{2+}$	G : Soluble	6. Dirty green ppt.	A : $\text{Ca}^{2+}$	G : Soluble
2. Pale blue ppt.	B : $\text{Zn}^{2+}$	H : Insoluble	7. No. Ppt. Formed	B : $\text{Zn}^{2+}$	H : Insoluble
3. Gelatinous white ppt.	C : $\text{Fe}^{2+}$		8. Gelatinous white ppt.	C : $\text{Fe}^{2+}$	
4. Chalky white ppt.	D : $\text{Cu}^{2+}$		9. Pale blue ppt.	D : $\text{Cu}^{2+}$	
5. Milky white ppt.	E : $\text{Pb}^{2+}$		10. Chalky white ppt.	E : $\text{Pb}^{2+}$	
	F : $\text{Fe}^{3+}$			F : $\text{Fe}^{2+}$	

**Answer:**

**‘X’ On addition of excess NaOH**

A : $\text{Ca}^{2+}$	Milky white ppt.	Insoluble
B : $\text{Zn}^{2+}$	Gelatinous white ppt.	Soluble
C : $\text{Fe}^{2+}$	Dirty green ppt.	Insoluble
D : $\text{Cu}^{2+}$	Pale blue ppt.	Insoluble
E : $\text{Pb}^{2+}$	Chalky white ppt.	Soluble
F : $\text{Fe}^{2+}$	Reddish brown ppt.	Soluble

**‘Y’ On addition of  $\text{NH}_4\text{OH}$  in Excess**

A : $\text{Ca}^{2+}$	No ppt. formed	Insoluble
B : $\text{Zn}^{2+}$	Gelatinous white ppt.	Soluble
C : $\text{Fe}^{2+}$	Dirty green ppt.	Soluble
D : $\text{Cu}^{2+}$	Pale blue ppt.	Soluble
E : $\text{Pb}^{2+}$	Chalky white ppt.	Insoluble

**Q.2. Select the correct ‘anion’ of a salt from the anions given, which matches with description 1 to 5.**

**A :  $\text{CO}_3^{2-}$ , B :  $\text{NO}_3^{1-}$ , C :  $\text{SO}_4^{2-}$ , D :  $\text{Cl}^-$ , E :  $\text{S}^{2-}$**

1. The salt soln. reacts with  $\text{AgNO}_3$  soln. to give a white ppt. insoluble in dil.  $\text{HNO}_3$ .
2. The salt soln. reacts with  $\text{Ba}(\text{NO}_3)_2$  soln. to give a white ppt. insoluble in dil.  $\text{HNO}_3$ .
3. The salt soln. reacts with  $\text{Ba}(\text{NO}_3)_2$  soln. to give a white ppt. soluble in dil.  $\text{HNO}_3$  but insoluble in dil.  $\text{H}_2\text{SO}_4$ .
4. The salt reacts with dil.  $\text{H}_2\text{SO}_4$  on heating evolving a gas which turns  $\text{KMnO}_4$  soln. pink to colourless.
5. The salt reacts with cone.  $\text{H}_2\text{SO}_4$  on heating evolving a coloured gas which turns potassium iodide paper brown.

**Answer:**

1.  $\text{Cl}^-$  ion(D)
2.  $\text{SO}_4^{2-}$  – ion(C)
3.  $\text{CO}_3^{2-}$  ion (A)
4.  $\text{S}^{2-}$  ion (E)
5.  $\text{NO}_3^{1-}$  ion(B)

**Q.3. Give balanced equations for the conversions A and B.**

1. Metallic carbonate A  $\xrightarrow{\text{Ba(NO}_3)_2}$  White precipitate  
 $\xrightarrow{\text{Dil. HCl}}$  precipitate dissolves

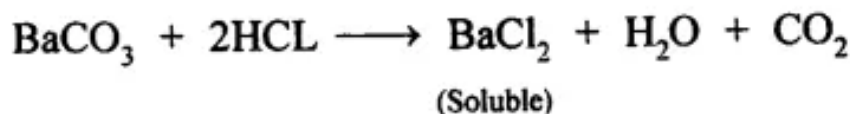
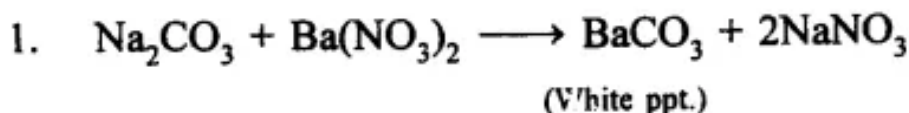
2. Metallic sulphide A  $\xrightarrow{\text{Pb(CH}_3\text{COO)}_2 \text{ soln.}}$  Black precipitate

3. Metallic salt A  $\xrightarrow{\text{BaCl}_2 \text{ soln.}}$  Barium sulphite B  $\xrightarrow{\text{dil. HCl}}$   
 Barium chloride

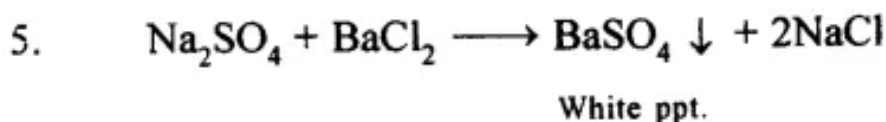
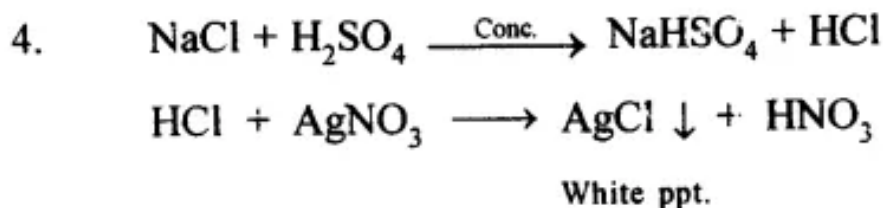
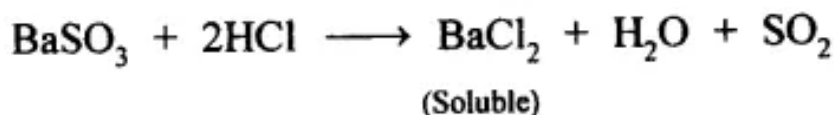
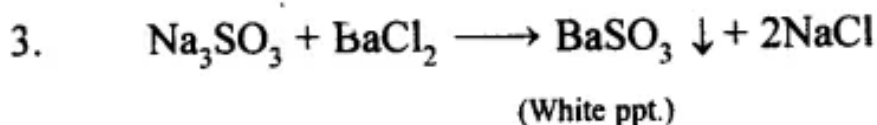
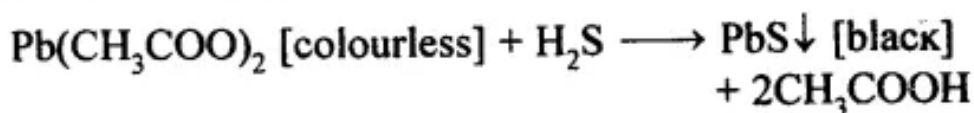
4. Metallic chloride A  $\xrightarrow{\text{conc. H}_2\text{SO}_4, \Delta}$  Gas evolved B  
 $\xrightarrow{\text{AgNO}_3, \Delta}$  White precipitate

5. Metallic salt A  $\xrightarrow{\text{BaCl}_2}$  White precipitate insoluble in  
 dil. HCl

**Answer:**



2. Turns moist lead acetate paper - silvery black.



**Q.4. Complete the table given below :**

Heat on	Gas evolved	Colour of gas	Odour of gas	Nature of gas	Solubility of gas in water	Colour of residue if any
1. $\text{KNO}_3$ 2. $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ 3. $\text{ZnCO}_3$ 4. $\text{Zn} + \text{dil. H}_2\text{SO}_4$ 5. $\text{Na}_2\text{S} + \text{dil. H}_2\text{SO}_4$ 6. $\text{Na}_2\text{SO}_3 + \text{dil. H}_2\text{SO}_4$ 7. $\text{NaCl} + \text{conc. H}_2\text{SO}_4$ 8. $\text{NaNO}_3 + \text{Cu} + \text{conc. H}_2\text{SO}_4$ 9. $\text{MnO}_2 + \text{conc. HCl}$ 10. $\text{NH}_4\text{Cl} + \text{NaOH}$						

**Answer:**

Heat on	Gas evolved	Colour of gas	Odour of gas	Nature of gas	Solubility of gas in water	Colour of residue if any
1. $\text{KNO}_3$	$\text{O}_2$	Colourless	Odourless	Neutral	Insoluble	White
2. $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$	$\text{N}_2$	Colourless	Irritating	Neutral	Insoluble	Greenish Grey
3. $\text{ZnCO}_3$	$\text{CO}_2$	Colourless	Odourless	Acidic	Soluble	White
4. $\text{Zn} + \text{dil. H}_2\text{SO}_4$	$\text{H}_2$	Colourless	Odourless	Neutral	Insoluble	—
5. $\text{Na}_2\text{S} + \text{dil. H}_2\text{SO}_4$	$\text{H}_2\text{S}$	Colourless	Suffocating	Acidic	Soluble	—
6. $\text{Na}_2\text{SO}_3 + \text{dil. H}_2\text{SO}_4$	$\text{SO}_2$	Colourless	Suffocating	Acidic	Soluble	—
7. $\text{NaCl} + \text{conc. H}_2\text{SO}_4$	$\text{HCl}$	Colourless	Pungent	Acidic	Soluble	—
8. $\text{NaNO}_3 + \text{Cu} + \text{conc. H}_2\text{SO}_4$	$\text{NO}_2$	Reddish brown	Irritating	Acidic	Soluble	—
9. $\text{MnO}_2 + \text{conc. HCl}$	$\text{Cl}_2$	Pale green	Pungent	Neutral	Soluble	—
10. $\text{NH}_4\text{Cl} + \text{NaOH}$	$\text{NH}_3$	Colourless	Pungent	Basic	Soluble	—

**Q.5. Select the correct word from the words in bracket.**

1. The solution which on heating with  $\text{CaCO}_3$  evolves  $\text{CO}_2$  gas. [cone.  $\text{H}_2\text{SO}_4$  / dil. $\text{H}_2\text{SO}_4$  / dil.  $\text{HCl}$ ]
2. The solution which can be used to distinguish an ammonium salt from a sodium salt. [ $\text{CuCl}_2$  soln. /  $\text{NH}_4\text{OH}$  / dil.  $\text{H}_2\text{SO}_4$  /  $\text{AgNO}_3$  soln.]
3. The pH of blood is around 7.4, of saliva is 6.5 and of acid rain is around 4.5. The solution which is slightly alkaline of the three, [saliva / acid rain / blood]
4. Decomposition of [ $\text{NaCl}$  /  $\text{NaHCO}_3$  /  $\text{NaNO}_3$ ] by dil.  $\text{H}_2\text{SO}_4$ , forms an unstable acid.
5. A metal which reacts with an alkali to liberate hydrogen, [iron / copper / aluminium]

**Answer:**

1. dil.  $\text{HCl}$
2.  $\text{CuCl}_2$  soln.
3. blood
4.  $\text{NaHCO}_3$
5. aluminium.