**Girls' High School & College, Prayagraj**

**Session: 2020-21**

**Class: X A, B, C, D, E, F**

**Subject: Chemistry Practical**

**Instructions:** Students are advised to write the following chemistry practicals (Exp. No. 1 to 4) in chemistry practical file (D. M. publication). These experiments are to be written neatly. The same pattern of writing is to be followed as given. Write each experiment on a fresh page.

## EXPERIMENT NO. 1

(A)

Take a little amount of the substance in a clean dry hard glass test tube and add a small quantity of conc. $H_2SO_4$ in it and heat it gently. Make your observations, identify the gas evolved and give your deduction.

**(1) Observations:**

(i) A colourless, pungent and suffocating gas is evolved. (ii) The gas turns moist blue litmus paper red.

**(2) Confirmatory test for the gas**:

When a glass rod dipped in $NH_4OH$ solution is brought near the evolved gas, it gives dense white fumes. Thus, the gas evolved is HCl.

**(3) Name of an anion:** $Cl^-$ (chloride ion)

**(4) Deduction**: The given salt is chloride salt.

(B)

Add a small quantity of conc. $H_2SO_4$ and manganese dioxide ($MnO_2$) to the given substance and heat it gently. Make your observation, identity the gas evolved and give your deduction.

**(1) Observations:**

(i) A gas of choking odour is evolved.

(ii) A greenish yellow coloured gas is evolved.

(iii) The gas evolved turns moist blue litmus paper red and finally bleaches it. (iv) It turns starch iodide paper blue-black.

**(2) Confirmatory test for the gas:**

Add silver nitrate solution to the water extract of the given substance. White precipitate appears which dissolves in excess $NH_4OH$ solution. Thus, the gas evolved is chlorine.

**(3) Name of an anion**: $Cl^-$ (chloride ion)

**(4) Deduction**: the given salt is chloride salt.

**EXPERIMENT NO. 2**

(A)

Take a small amount of the substance in a clean hard glass test tube and add small amount of NaOH in it. Warm the mixture gently, record your observations, identify the gas evolved and give your deduction.

(1) **Observations**:

(i) The evolved gas is colourless.

(ii) The evolved gas has pungent smell.

(iii) The evolved gas turns moist red litmus paper blue, hence it is basic in nature.

(2) **Confirmatory test for the gas**:
When glass rod dipped in HCl solution is brought near the evolved gas, dense white fumes appear. Evolved gas turns Nessler's reagent brown. Thus, the gas evolved is ammonia ($NH_3$).

(3) **Name of the cation**: $NH_4^+$

(4) **Deduction:** The given salt is ammonium salt.

(B)

Take a small amount of the substance in a clean dry hard glass test tube. Heat it first gently and then strongly. Make your observations, identify the gas evolved and give your deduction.

**(1) Observations:**

(i) The gas evolved is colourless

(ii) It has a pungent smell (iii) It turns red litmus blue

**(2) Confirmatory test for the gas:**

It gives dense white fumes with a rod dipped in HCl solution. Thus, the gas evolved is ammonia ($NH_3$).

**(3) Name of the cation**: $NH_4^+$

**(4) Deduction**: the given salt is an ammonium salt.

## EXPERIMENT NO. 3

(A)

Take a small amount of the substance in a clean, dry, hard glass test tube and heat it strongly. Make your observations, identify the gas evolved and give your deduction.

**(1) Observations:**

(i) On strong heating, the light amorphous white solid, changes to pale yellow.

(ii) Gives off a colourless and odourless gas that turns lime water milky. The milkiness disappears on passing excess of gas.

(iii) The gas has no effect on acidified $K_2Cr_2O_7$ or acidified $KMnO_4$.

(iv) The residue, on cooling, changes to a white colour i.e. residue is yellow when hot and white when cold.

(2) **Identification of the gas evolved**:

Since the gas turns limewater milky, but has no effect on acidified $K_2Cr_2O_7$ or acidified $KMnO_4$, therefore the gas evolved is carbon dioxide ($CO_2$).

(3) **Name of the anion**: Carbonate ion ($CO_3^{2-}$)

(4) **Deduction**: The residue obtained is zinc oxide. The given substance is zinc carbonate.

(B)

Take a little portion of the substance in a clean hard glass test tube. Add dilute HCl in it. Make your observations, identify the gas evolved, name the anion and give your deduction.

**(1) Observations:**

(i) On adding dil. HCl to the given substance, a gas is evolved with brisk effervescence.

(ii) The gas turns blue litmus paper red.

(iii) The gas turns limewater milky, but has no effect on acidified $K_2Cr_2O_7$.

**(2) Identification of the gas evolved**:

Since the gas turns limewater milky, but has no effect on acidified $K_2Cr_2O_7$, therefore it is $CO_2$ gas and negative radical is $CO_3^{2-}$ **(3) Name of the anion**: carbonate ion ($CO_3^{2-}$)

**(4) Deduction:** the given substance is a carbonate salt.

(C)

You are given a solution. To the little portion of this solution, add NaOH solution drop by drop and then in excess. Make your observations, name the cation and give your deduction.

**(1) Observation:**

(i) On adding NaOH solution drop by drop, white gelatinous precipitate is formed. The white precipitate is dissolved in excess of NaOH giving a clear solution.

**(2) Name of the cation**: zinc ion ($Zn^{2+}$)

**(3) Deduction**: The white precipitate is of $Zn(OH)_2$. The white precipitate dissolves in excess of NaOH due to the formation of $Na_2ZnO_2$. $Zn(OH)_2$ dissolves in excess of NaOH because it is amphoteric in nature.

(D)

Take a small amount of the given solution and add $NH_4OH$ solution drop by drop and then in excess. Make your observations, name the cation and give your deduction.

(1) **Observation**: On adding $NH_4OH$ solution drop by drop, white gelatinous precipitate is formed which dissolves in excess of $NH_4OH$ solution.

(2) **Name of the cation**: zinc ion ($Zn^{2+}$)

(3) **Deduction**: The white precipitate is of zinc hydroxide. It dissolves in excess of $NH_4OH$ due to the formation of tetraamminezinc(II)sulphate.

**EXPERIMENT NO. 4**

(A)

Take a small amount of the substance in a clean dry glass test tube, heat it first gently and then strongly. Make your observations, identify the gas evolved and give your deduction.

(1) **Observations:**

(i) On heating the given substance, a hissing sound is produced and droplets of a colourless liquid condense on the upper cooler parts of the test tube.

(ii) On heating it strongly, a white residue is left behind.

(iii) On very strong heating, the white residue changes to a black residue and a colourless pungent smelling gas is evolved.

(iv) The gas turns moist blue litmus red.

(2) **Identification of the gas evolved:**

(i) The colourless liquid turns cobalt chloride paper pink. Hence there is water of crystallization.

(ii) The pungent smelling gas turns acidified $K_2Cr_2O_7$ paper green, hence it is $SO_2$

(3) **Deduction:**

(i) It is a hydrated salt and the gas evolved is sulphur dioxide.

(ii) The white residue formed on heating is of anhydrous copper sulphate.

(iii) On very strong heating the substance gives black residue which is of copper(II)oxide.

(B)

Prepare a solution of the given substance in water and perform the following experiments with different portions of the solution.

(B-1)

To the first portion of the solution, add NaOH solution drop by drop and then in excess. Record your observation, name the cation and give your deduction.

(1) **Observation:**

(i) On adding NaOH, a blue precipitate is obtained.

(ii) The blue precipitate is insoluble in excess of NaOH.

(2) **Name of the cation:** copper ($Cu^{2+}$)

(3) **Deduction:** The blue precipitate obtained is of copper hydroxide. On heating the blue precipitate a black precipitate is obtained which is of copper(II)oxide (CuO).

(B-2)

To the second portion of the solution add $NH_4OH$ solution drop by drop and then in excess. Record your observations and give your deduction.

(1) **Observations:**

(i) On adding $NH_4OH$ drop by drop, a bluish white precipitate is obtained which dissolves in excess $NH_4OH$ forming deep blue colour (Prussian blue).

(2) **Deduction:**

(i) The bluish white precipitate is of copper hydroxide.

(ii) Deep blue colour of the solution is obtained on adding excess $NH_4OH$ due to the formation of tetraamminecopper sulphate.

(B-3)

To the third portion of the solution, add a few drops of dilute HCl and then add barium chloride solution ($BaCl_2$). Make your observation, name the anion and give your deduction.

(1) **Observations:**

(i) On adding barium chloride, a thick white precipitate is obtained.

(ii) Precipitate is insoluble in dil. HCl.

(2) **Name of the anion: Sulphate ion** ($SO_4^{2-}$)

(3) **Deduction:** The given substance is hydrated copper sulphate salt.

END