WORKSHEET 1

CHAPTER 8 – STUDY OF COMPOUNDS – HYDROGEN CHLORIDE

A. Select the correct words from the list given below to complete the following word equations:

Metallic oxide, Active metal, Metal carbonate, Metal bisulphite, Metal hydroxide, Metal bicarbonate, Metal sulphate, Metal sulphide

1. _____ + HCl (dil.) → Metal salt + water + carbon dioxide gas
2. _____ + HCl (dil.) → Metal salt + hydrogen sluphide gas
3. _____ + HCl (dil.) → Metal salt + hydrogen gas
4. _____ + HCl (dil.) → Metal salt + water + sulphur dioxide gas
5. _____ + HCl (dil.) → Metal salt + water

B. How will you obtain following from dil. HCl acid and write the corresponding reactions.

1. Hydrogen
2. Carbon dioxide
3. Sulphur dioxide
4. Hydrogen sulphide

C. A colourless gas G fumes strongly in the air. The gas gives dense white fumes when a glass rod dipped in ammonia solution is held near the gas. Now, answer the following questions:

1. Name the gas G.
2. Name two chemicals used in the preparation of the gas G.
3. Write the chemical equations for the reaction of the chemicals named in Q. 2 when:
   a. the reaction mixture is not heated.
   b. the reaction mixture is heated above 100 °C.
4. Why does the gas G fume strongly in air?
5. Why does the gas G form dense white fumes with ammonium hydroxide?

D. State the products formed and write chemical equations when the following substances are treated with hydrochloric acid.

1. Calcium carbonate
2. Magnesium hydrogen carbonate
3. Ferric hydroxide
4. Copper oxide
5. Sodium nitrite

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E. Choose the chemicals from the box, which match the descriptions below.

NH_4Cl	$AgCl$	$Ag(NH_3)_2Cl$	$PbCl_2$	$FeCl_2$

1. A salt which is soluble in hot water, but insoluble in cold water.
2. A salt which is insoluble in nitric acid, but soluble in ammonia solution.
3. A salt obtained when a basic gas reacts with HCl gas.
4. A salt obtained by the action of active metal with dil. HCl.
5. A salt obtained by dissolving insoluble metallic chloride in excess of ammonium hydroxide.

ANSWERS

WORKSHEET 1

A. Select the correct words from the list given below to complete the following word equations:

1. Metal carbonate or Metal bicarbonate
2. Metal sulphide
3. Active metal
4. Metal bisulphite
5. Metal oxide or Metal hydroxide

B. How will you obtain following from dil HCl acid?

1. When zinc metal is treated with dilute HCl, it liberates hydrogen gas.
   $Zn + 2HCl(dil.) \rightarrow ZnCl_2 + H_2$
2. When sodium carbonate is treated with dilute HCl, it liberates carbon dioxide gas.
   $Na_2CO_3 + 2HCl(dil.) \rightarrow 2NaCl + CO_2 + H_2O$
3. When sodium sulphite is treated with dilute HCl, it liberates sulphur dioxide gas.
   $Na_2SO_3 + 2HCl(dil.) \rightarrow 2NaCl + SO_2 + H_2O$
4. When iron(II) sulphide is treated with dilute HCl, it liberates hydrogen sulphide gas.
   $FeS + 2HCl(dil.) \rightarrow FeCl_2 + H_2S$

C. A colourless gas G fumes strongly in the air. The gas gives dense white fumes when a glass rod dipped in ammonia solution is held near the gas. Now, answer the following questions:

1. The gas G is hydrogen chloride gas.
2. The chemicals are (i) sodium chloride (ii) conc. sulphuric acid
3. a. $NaCl + H_2SO_4(conc.) \xrightarrow{\text{Without heating}} NaHSO_4 + HCl(g)$
   b. $NaCl + NaHSO_4 \xrightarrow{heat} Na_2SO_4 + HCl(g)$
4. It is because HCl gas is extremely soluble in water. Thus, the gas dissolves in water vapour present in the air to form tiny droplets of hydrochloric acid, which appear in the form of fumes.
5. HCl gas reacts with vapours of ammonium hydroxide to form very fine solid particles of ammonium hydroxide which are white in colour. These white particles of solid ammonium hydroxide appear in the form of white fumes.

D. State the products formed and write chemical equations when the following substances are treated with hydrochloric acid.

1. When calcium carbonate is treated with dilute hydrochloric acid, the products are
   i. calcium chloride,
   ii. carbon dioxide gas and
   iii. water

   $CaCO_3 + 2HCl(dil.) \rightarrow CaCl_2 + CO_2(g) + H_2O$

2. When magnesium hydrogen carbonate is treated with dilute hydrochloric acid, the products are:
   i. magnesium chloride,
   ii. carbon dioxide gas, and
   iii. water.

   $Mg(HCO_3)_2 + 2HCl(dil.) \rightarrow MgCl_2 + 2CO_2(g) + 2H_2O$
3. When ferric hydroxide is treated with dilute hydrochloric acid, the products are
   i. ferric chloride, and
   ii. water.

   $Fe(OH)_3 + 3HCl(dil.) \rightarrow FeCl_3 + 3H_2O$
4. When copper oxide is warmed with dilute hydrochloric acid, the products are
   i. copper chloride, and
   ii. water.

   $CuO + 2HCl(dil.) \xrightarrow{warm} CuCl_2 + H_2O$
5. When sodium nitrite is treated with dilute hydrochloric acid, the products are
   i. sodium chloride,
   ii. nitric oxide,
   iii. nitrogen dioxide gas, and
   iv. water.

   $2NaNO_2 + 2HCl(dil.) \rightarrow 2NaCl + NO(g) + NO_2(g) + H_2O$

E. Choose the chemicals from the box, which match the descriptions below.

1. $PbCl_2$
2. $AgCl$
3. NH_4Cl
4. $FeCl_2$
5. $Ag(NH_3)_2Cl$