WORKSHEET 2

CHAPTER 8 – STUDY OF COMPOUNDS – HYDROGEN CHLORIDE

A. The statements given below pertain to HCl gas or HCl acid. Complete the statements with appropriate words.

1. Hydrogen chloride gas is not dried by using _____ (conc. H_2SO_4/P_2O_5)
2. Hydrogen chloride gas on heating above 500 °C gives hydrogen and chlorine gas. This reaction is an example of _____ (thermal decomposition/thermal dissociation)
3. Addition of _____ (iron(III) sulphide/iron(II) sulphide/iron pyrities) to dilute hydrochloric acid results in the liberation of hydrogen sulphide gas.
4. An aqueous solution of HCl gas is named _____ (aqua fortis/oil of vitriol/muriatic acid)
5. In the preparation of HCl acid from HCl gas, a funnel arrangement provides _____ (more/less) surface area for the absorption of gas.

B. Choose the correct word/formula from the choices given within the brackets.

1. A substance which reacts with conc. HCl to liberate chlorine. ($PbO/PbO_2/PbCl_2$)
2. An acid which is not monobasic acid. ($HNO_3/HCl/HCOOH/H_2SO_4$)
3. A metal which reacts with dil. HCl to liberate hydrogen. (Zn/Cu/Ag/Pb)
4. An acid which is not an oxidising agent. ($H_2SO_4/HNO_3/HCl$)
5. A salt insoluble in cold water, but soluble in hot water. ($PbCl_2/PbSO_4/PbS$)

C. Write balanced equations for the reaction of dilute hydrochloric acid with each of the following.

1. Iron
2. Sodium hydrogen carbonate
3. Iron(II) sulphide
4. Sodium sulphite
5. Sodium thiosulphate solution

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D. A solution of hydrogen chloride in water is prepared. The following substances are added to separate portions of the solution.

Substances Added	Gas Evolved	Odour
Calcium carbonate	—	—
Magnesium ribbon	—	—
Manganese(IV) oxide with heating	—	—
Sodium sulphide	—	—

Complete the table by writing the gas evolved in each case and its odour.

E. Answer the following.

1. Give two tests for HCl gas.
2. Give two tests for hydrochloric acid.
3. State four uses of hydrochloric acid.
4. How can you distinguish between HCl gas and carbon dioxide gas by one test?
5. By giving a reason explain why dilute HCl cannot be concentrated by simple distillation?

ANSWERS

WORKSHEET 2

A. The statements given below pertain to HCl gas or HCl acid. Complete the statements with appropriate words.

1. P_2O_5
2. thermal dissociation
3. iron(II) sulphide
4. muriatic acid
5. more

B. Choose the correct word/formula from the choices given within the brackets.

1. PbO_2
2. H_2SO_4
3. Zn
4. HCl
5. $PbCl_2$

C. Write balanced equations for the reaction of dilute hydrochloric acid with each of the following.

1. $Fe + 2HCl \rightarrow FeCl_2 + H_2\uparrow$
2. $NaHCO_3 + HCl \rightarrow NaCl + H_2O + CO_2\uparrow$
3. $FeS + 2HCl \rightarrow FeCl_2 + H_2S\uparrow$
4. $Na_2SO_3 + 2HCl \rightarrow 2NaCl + H_2O + SO_2\uparrow$
5. $Na_2S_2O_3 + 2HCl \rightarrow 2NaCl + H_2O + SO_2\uparrow + S\downarrow$

D. A solution of hydrogen chloride in water is prepared. The following substances are added to separate portions of the solution

Substances Added	Gas Evolved	Odour
$CaCO_3$	Carbon dioxide	Odourless
Mg ribbon	Hydrogen	Odourless
MnO_2	Chlorine	Pungent and choking
Na_2S	Hydrogen sulphide	Rotten egg smelling

E. Answer the following.

1. i. It forms dense white fumes when a glass rod dipped in ammonia solution, is held near it.
   ii. It forms curdy-white precipitate when passed through a solution of silver nitrate.
2. i. When manganese dioxide is boiled with conc. hydrochloric acid, greenish-yellow gas, chlorine is evolved.
   ii. When treated with silver nitrate solution, it forms curdy white precipitate, which is soluble in excess of ammonium hydroxide solution.
3. Hydrochloric acid is used
   i. in the manufacture of drugs, dyes and paints.
   ii. in the manufacture of silver chloride for photography.
   iii. in the manufacture of glucose from starch.
   iv. in the cleaning of metal surfaces before galvanizing, painting, electroplating, soldering, etc. This process is called pickling.
4. Hold a glass rod moistened with ammonium hydroxide in either of the gases. In case of HCl gas, dense white fumes are formed but not in case of carbon dioxide gas.
5. When the concentration of hydrochloric acid is 22.2% by weight, it forms a constant boiling mixture. Now if it is distilled, the water and hydrochloric acid will distil in the same proportion as constant boiling mixture. Thus, the distillate cannot be more concentrated than the hydrochloric acid in the distillation flask.