Year Questions on HCl, HNO_3 and H_2SO_4

2019

1. Name the drying agent used to dry HCl gas.
   Concentrated H_2SO_4

2. When NaCl is heated with concentrated H_2SO_4 below 200°C, one of the products formed is $NaHSO_4$. ($NaHSO_4$, Na_2SO_4, Cl_2)

3. Give balanced equation :-
   i) Action of dilute H_2SO_4 on NaOH
   $$H_2SO_4 \text{ (dil)} + 2NaOH \longrightarrow Na_2SO_4 + 2H_2O$$
   ii) Action of dilute H_2SO_4 on ZnS
   $$H_2SO_4 \text{ (dil)} + ZnS \longrightarrow ZnSO_4 + H_2S\uparrow$$

4. Give the observation for the following :-
   i) Concentrated HNO_3 is reacted with sulphur
   $$S + 6HNO_3 \text{ (conc)} \longrightarrow H_2SO_4 + 2H_2O + 6NO_2\uparrow$$
   Reddish brown fumes of NO_2 gas is observed.
   ii) A small piece of zinc is added to dilute hydrochloric acid.
   $$Zn + 2HCl \text{ (dil)} \longrightarrow ZnCl_2 + H_2\uparrow$$ (*)
   iii) Lead nitrate is heated strongly.
   $$2Pb(NO_3)_2 \xrightarrow{\Delta} 2PbO + 4NO_2\uparrow + O_2\uparrow$$
   The colourless, crystalline salt turns yellow in colour on heating and evolution of reddish brown fumes was observed.

(*) The metal zinc will get dissolved in the acid with evolution of a colourless and odourless gas which burns with a pale blue flame and get extinguished with a pop sound.

5. Distinguish by a chemical test :-

a) Manganese dioxide and copper(II) oxide

Reagent used	MnO_2	CuO
Concentrated HCl acid	Greenish yellow gas is evolved which turns starch iodide paper blue black.	No such observation

b) Dilute HCl and dilute HNO_3 acid

Reagent used	dil HCl	dil HNO_3
$Ba(NO_3)_2$ solution (OR) $AgNO_3$ solution	White ppt	No ppt

6. Complete and balance :-

a) $S + 6HNO_3 \text{ (conc)} \rightarrow H_2SO_4 + 2H_2O + 6NO_2 \uparrow$

b) $C + 2H_2SO_4 \text{ (conc)} \rightarrow CO_2 + 2H_2O + 2SO_2 \uparrow$

c) $3Cu + 8HNO_3 \text{ (dil)} \rightarrow 3Cu(NO_3)_2 + 4H_2O + 2NO \uparrow$

7. Name a dilute acid which is an oxidising agent

Dilute nitric acid.

8. Give the industrial preparation of H_2SO_4 — Process name and catalytic equation.

Contact Process

$$2SO_2 + O_2 \underset{400-450^\circ C}{\overset{V_2O_5/Pt}{\rightleftharpoons}} 2SO_3$$

Q1. What nature of hydrogen chloride gas is exhibited when liquified hydrogen chloride gas does not conduct electricity ? **1**

Q2. What is the purpose of concentrated hydrochloric acid in the preparation of aqua-regia ? **1**

Q3. How will you distinguish between Sodium sulphite and Sodium thiosulphate using dilute Hydrochloric acid ? **1**

Q4. Name the following :

(*i*) Two compounds of lead which react with concentrated Hydrochloric acid to liberate Chlorine.

(*ii*) A gas which gives dense white fumes with Hydrogen chloride gas.

(*iii*) A strong monobasic acid of Hydrogen chloride gas.

(*iv*) Method by which Hydrogen chloride gas is dissolved in Water. **4**

Q5. Write balanced chemical equations for the following reactions :

(*i*) Lead nitrate is added to dilute Hydrochloric acid.

(*ii*) dilute hydrochloric acid is added to Sodium thiosulphate solution.

(*iii*) Calcium carbonate is added to dilute Hydrochloric acid.

(*iv*) Gold is added to aqua-regia

(*v*) Ammonia mixes with Hydrogen chloride gas. **5**

Q6. What do you observe when

(*i*) Moist blue litmus paper is introduced in the jar of Chlorine ?

(*ii*) Moist starch iodide paper is introduced in the jar of Chlorine ?

(*iii*) Sulphur dioxide is passed through acidified Potassium dichromate solution ?

(*iv*) Hydrogen chloride gas is passed through Silver nitrate solution and the product thus formed is treated with excess of Ammonium hydroxide ?

(*v*) Moist blue litmus paper is introduced in the jar of Hydrogen chloride gas ? **5**

Q7. The following questions are related with the preparation and properties of hydrogen chloride gas in laboratory :

(*i*) Name two compounds which react in laboratory to produce Hydrogen chloride gas.

(*ii*) Write balanced chemical equation for the reaction taking place in (*i*) above.

(*iii*) How is Hydrogen chloride gas collected, tested and dried ?

(*iv*) What does the method of collection suggest about the density of the gas ?

(*v*) What can you say about the solubility of Hydrogen chloride gas ? Name the experiment which demonstrates such solubility.

(*vi*) Name the solution formed when Hydrogen chloride gas is dissolved in water. **8**

Q1. Name the acid which directly converts Sulphur to Sulphuric acid. Write balanced chemical equation in support of your answer. **2**

Q2. Why commercial sample of Nitric acid is pale yellow in colour ? **2**

Q3. What is the effect of adding dilute Nitric acid to

(*i*) Blue litmus solution

(*ii*) Phenolphthalein

(*iii*) Methyl orange **3**

Q4. Rain water contains traces of Nitric acid. Write three balanced chemical equations in support of your answer. **3**

Q5. Name the process by which Nitric acid is manufactured. Write balanced chemical equation in support of your answer. **4**

Q6. Write balanced chemical equations for the following.

(*i*) Nitric acid reacts with metal to produce Hydrogen

(*ii*) Nitric acid reacts with metal to produce Nitrogen dioxide

(*iii*) Nitric acid reacts with metal to produce Nitric oxide

(*iv*) Nitric acid reacts with carbon to form Carbon dioxide **4**

Q7. (*a*) Name the reactants used for the preparation of Nitric acid in laboratory

(*b*) Write balanced chemical equation for the above reaction taking place.

(*c*) Why the apparatus used for the preparation of Nitric acid made of glass ? **5**

(*d*) For the laboratory preparation of nitric acid why the reaction mixture should not be heated beyond 200°C ? (Give two reasons). **2**

Q1. Give two equations each to show that sulphur dioxide acts as
(*i*) Reducing agent.
(*ii*) Oxidizing agent. **1**

Q2. Differentiate between drying agent and dehydrating agent. **1**

Q3. What do you observe when
(*i*) concentrated Sulphuric acid is added to Sugar crystals ?
(*ii*) concentrated sulphuric acid is added to Copper sulphate crystals ? **2**

Q4. Give one equation each to show that sulphuric acid acts as
(*i*) Least volatile acid,
(*ii*) Dehydrating agent,
(*iii*) Oxidizing agent. **3**

Q5. Name two acids which can be prepared by using concentrated sulphuric acid. Write balanced chemical equation in support of your answer.

Q6. The following questions are related with the manufacture of sulphuric acid. **2+2**
(*i*) Name the process by which sulphuric acid is manufactured.
(*ii*) Give equation for the catalytic oxidation of sulphur dioxide.
(*iii*) During the process the direct combination between oxide of sulphur and water is prevented why ?
(*iv*) Name the compound in which oxide of sulphur is absorbed. Name the product formed.
(*v*) Give equation for the formation of final product. **7**

Q7. Write balanced chemical equations for the reaction of sulphuric acid with
(*i*) Iron
(*ii*) Potassium bicarbonate
(*iii*) Sodium carbonate
(*iv*) Sodium sulphate
(*v*) Iron (II) sulphide
(*vi*) Copper
(*vii*) Lead nitrate **7**