shishuvan

CHEMISTRY (STD X)

SCIENCE Paper – 2

(Two hours)

Answers to this paper must be written on the paper provided separately.
You will not be allowed to write during the first 15 minutes.
This time is to be spent in reading the question paper.
The time given at the head of this paper is the time allowed for writing the answers.

Attempt all questions from Section I and any four questions from Section II.
The intended marks for questions or parts of questions are given in brackets [ ].

Section I (40 Marks)

Attempt all questions from this section

Question 1

a. **Four alternatives are given for each of the statements given below. Choose the most appropriate option. Write the letter of the option along with the statement.** [5]

i. The non-metallic character of the elements _____ across the period in the modern periodic table.
   A. Decreases
   B. Increases
   C. Remains the same
   D. Varies exponentially

ii. Black copper oxide is placed in a beaker containing concentrated hydrochloric acid. After one hour colour of the resultant mixture changes to _____
   A. Red
   B. Blue
   C. Green
   D. Yellow

iii. A compound is treated with a dilute acid and releases a gas which turns lime water milky. The compound can contain _____ ions.
   A. Carbonate
   B. Sulphite
   C. Sulphate
   D. Both A and B

iv. On heating strongly, pure nitric acid decomposes to
   A. Water and nitrogendioxide
   B. Water, nitrogendioxide and oxygen
   C. Water, nitrous oxide and oxygen
   D. Only nitrogen dioxide and oxygen

35

v. The number of atoms present in 12 g of carbon 12 is called _____.
A. Atomic number
B. Relative atomic mass
C. Avogadro's number
D. None of the above

b. **Write the balanced chemical equations for the following:** [5]

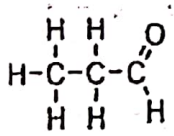
i. Solution of lead (II) sulphate is mixed with dilute sulphuric acid
ii. Magnesium nitride is mixed with warm water
iii. Iron metal and chlorine gas
iv. Sodium sulphite and hydrochloric acid
v. Copper and concentrated sulphuric acid.

c. **Give reasons** [5]

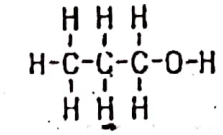
i. Graphite anodes are continuously replaced during the extraction of aluminium
ii. An inverted funnel arrangement is made for the preparation of dilute HCl from hydrogen chloride gas.
iii. Electrolysis of acidulated water is considered to be a catalytic reaction.
iv. Solid sodium chloride is an nonelectrolyte but molten sodium chloride conducts electricity.
v. A cation is always smaller than the parent atom from which it is formed.

d. **Write the IUPAC names of the following:** [3]

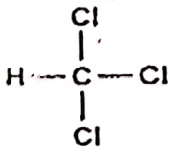
i.



ii.



iii.



e. **Write the structural formula of the following compounds** [5]

i. Propanoic acid
ii. 3-Methyl Butane
iii 2-bromo-4-chloro-hexane
iv 2-methyl-prop-1-ene
v. 2-methyl butan-2-ol

36

f. Write your observations for the following reactions [5]

i. Calcium hydroxide is heated with ammonium chloride crystals
ii. Lead (II) nitrate crystals are heated in a hard glass test tube
iii. Sodium hydroxide is added to a solution of iron (II) chloride first little and then in excess
iv. Ethyl alcohol is treated with sodium metal
v. Methyl orange is added to sodium hydroxide solution.

g. Phosphorous is oxidized to phosphoric acid by concentrated nitric acid in the following reaction [5]

$P + 5HNO_3 \rightarrow H_3PO_4 + H_2O + 5NO_2$

i. Calculate the mass of phosphoric acid which can be obtained from 12.4 g of phosphorous.
ii. Calculate the mass of nitric acid consumed in the reaction.
iii. Calculate the volume of nitrogen dioxide formed at STP

Given P=31, H=1, O=16, N=14

h. Draw an electron dot structure of the compound formed when ammonia is dissolved in water. [2]

i. Give one word for the following/name the following: [5]

i. The amount of substance which contains the same number of units as the number of atoms in 12 g of carbon -12.
ii. An alloy in which the base metal is mercury
iii. The process of separation of ions already present in an ionic compound
iv. The gas which has a rotten egg smell
v. An anion which gives the brown ring test.

Section II (40 Marks)

(Attempt any four questions from this Section)

Question 2

a. Define electrolysis. [1]
b. What is the name of the process used for concentration (enrichment) of sulphide ores. [1]
c. Write balanced equations for: [2]
   i. When alumina is dissolved in concentrated sodium hydroxide
   ii. Zinc blende is roasted in air
d. Give the composition of Duralumin [1]
e. Three solutions P, Q and R are given whose pH is 13, 6 and 2 respectively. Pick and write the solution which will [5]

37

i. Liberate ammonia gas from ammonium sulphate on heating.
ii. Liberate hydrogen gas on reacting with zinc granules
iii Contain molecules as well as ions in solution.
iv What will happen when phenolphthalein is added to solution Q and solution R?

Question 3

a. i. Write the formula of the sulphate of an element X whose atomic number is 13. [5]
ii. Name the type of bonding in the oxide of an element which belongs to period 2 , group 14.
iii. Name the element in the modern periodic table which belongs to
a. period 3 with least atomic size
b. Group 17 which is a strong oxidizing agent
c. Period 2 which has the lowest electron affinity.

b. Identify the anions in the salts A, B, C, D and E on the basis of the reactions given below: [5]

i. When silver nitrate is added to a solution of salt A white precipitate insoluble in dilute nitric acid is formed.
ii. Addition of dilute HCl to salt B produces a gas which turns lead acetate paper black.
iii. When freshly prepared solution of ferrous sulphate is added to the solution of salt C and concentrated sulphuric acid is gently poured from the sides of the test tube, a brown ring is formed.
iv. When dilute sulphuric acid is added to salt D, a gas is produced which turns acidified potassium dichromate solution from orange to green.
v. Addition of dilute HCl to the salt E produces effervescence. The gas turns lime water milky but does not have any effect on potassium permanganate solution.

Question 4

a. Write balanced equations for the following [4]
i. Monochloroethane is hydrolysed with aq KOH.
ii. A mixture of soda lime and sodium acetate is heated.
iii. Water is added to calcium carbide
iv. 1,2 –Dichloroethane is heated with concentrated KOH.

b. i. What is glacial acetic acid? [1]
ii. Define esterification. Taking suitable reactants write a balanced chemical equation for esterification. [2]
iii. State Avogadro's law. [1]

c. A gas cylinder contains 24×10^{24} molecules of nitrogen gas. If Avogadro's number is 6×10^{23} and the relative atomic mass of nitrogen is 14. Calculate: [2]

i. Mass of nitrogen gas in the cylinder

ii. Volume of nitrogen at STP in dm

Question 5

a. Following questions pertain to the industrial method of preparation of ammonia gas. [5]

i. Name the process

ii. Can anhydrous calcium chloride be used as a drying agent in the preparation? Give suitable reasons for your answer.

iii. How is the gas collected? Why?

iv. What is formed when ammonia reacts with excess of chlorine?

b. i. The percentage composition of the different components of an inorganic compound is 42.1% of sodium, 18.9% of phosphorous and 39% of oxygen. Find the empirical formula and the molecular formula of the compound if its vapour density is 328. [5]

ii. State Gay-Lussac's law.

Question 6

$NH_3 +$

a. The following questions pertain to the preparation of nitric acid [5]

i. What are reactants used for the preparation of nitric acid in the laboratory?

ii. Nitric acid is always kept in opaque glass jars. Give reason.

iii. Temperature plays a very important role in the preparation of nitric acid. Justify this statement.

iv. Name the gas evolved when copper reacts with

a. Dilute nitric acid

b. Concentrated nitric acid

v. Name the method used from the list given below for the preparation of the following salts: simple displacement, neutralization, decomposition by acid, double decomposition, direct synthesis. [3]

i. Sodium nitrate

ii. Lead chloride

iii. Zinc sulphate.

$Pb + HCl \rightarrow PbCl_2 + H_2$

vi. Of the reactions given below state whether they are oxidation or reduction reactions [2]

$Cu \rightarrow Cu^{2+} + 2e^-$ and $2Cl - 2e^- \rightarrow Cl_2$

39

shishuvan

Question 7

i. Complete the following. What is A, B, C, D and E [5]

copper ←A— Copper(II) oxide —B→ Copper (II) sulphate

Copper(II) oxide —D→ Copper (II) Carbonate

Copper (II) sulphate —C→ Copper (II)Sulphide

ii. Choose the appropriate word from the given words and complete the statement given below: addition, carbohydrates, electrochemical, unsaturated, saturated, substitution, homologous, hydrocarbons C_nH_{2n+2}, C_nH_{2n}, C_nH_{2n-1} [5]

The alkanes form a/an ________________ series, with the general formula __________. They undergo ___________ reactions. The alkanes are ________________, which generally undergo ____________reactions.

☺☺☺☺☺☺☺☺☺☺☺☺☺☺☺All The Best☺☺☺☺☺☺☺☺☺☺☺☺☺☺☺

[illegible] → Cu + H_2O

CuO + H_2SO_4 → [illegible]

CuO + H_2SO_4 → $CuSO_4$ + H_2O

$CuSO_4$ + H_2S → CuS + H_2SO_4