GREENLAWNS SCHOOL, WORLI

PRELIMINARY EXAMINATION: 2019-2020

*CHEMISTRY*

Std: X Marks: 80

Date: 15/01/2020 Time: 2 hrs

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.

**Section I** is compulsory. Attempt **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) Identify the following gases: [5]

1. A gas dried by quicklime.
2. A gas having rotten egg odour.
3. A gas which liberates iodine from potassium iodide solution.
4. A gas which turns anhydrous blue cobalt chloride paper pink.
5. A gas which turns lime water milky but has no effect on acidified KMnO4 or K2Cr2O7 solution.

(b) Select the odd one out and give a reason to support your answer: [5]

1. CH4, C2H2, C2H6, C3H8
2. Molten sodium chloride, alcohol, carbon tetrachloride, sugar solution
3. NH41+, Ca2+, Zn2+, Pb2+
4. Dil. HCl, dil. HNO3, dil. H2SO4, dil. CH3COOH
5. NH4OH, NaOH, KOH, Ca(OH)2

(c) Mention difference between the following on the basis of the given criteria: [5]

1. Copper chloride and calcium chloride (flame test)
2. Ferric chloride and ferrous chloride (sodium hydroxide)
3. Ethene and ethane (bromine)
4. Copper sulphate and zinc sulphate (ammonium hydroxide)
5. Sodium sulphite and sodium sulphate (barium chloride solution)

(d) Fill in the blanks: [5]

 Sulphuric acid is manufactured by (i) \_\_\_\_\_\_\_\_\_\_\_ process where both gases

(ii) \_\_\_\_\_\_\_\_ and (iii) \_\_\_\_\_\_\_\_\_ react reversibly in the presence of (iv) \_\_\_\_\_\_\_\_\_\_ as catalyst to form sulphur trioxide. In this reaction heat is evolved. (v) \_\_\_\_\_\_\_\_\_\_\_ acid is formed when sulphur trioxide is absorbed in sulphuric acid.

(e) Write balanced chemical equations for the following reactions: [5]

1. Catalytic oxidation of ammonia.
2. Zinc with hot concentrated potassium hydroxide.
3. Concentrated sulphuric acid and sulphur.
4. Copper and dilute nitric acid.
5. Concentrated hydrochloric acid and lead dioxide.

(f) Give reason for the following: [5]

1. Water is a polar covalent compound.
2. A molecule of ammonia has one lone pair of electrons.
3. Atomic size decreases across a period but increases down a group of the periodic table.
4. Duralumin is used to make aircrafts.
5. A yellow colour appears in conc. Nitric acid when left standing in an ordinary glass bottle.

(g) Give a suitable term for each of the following: [5]

1. Organic compounds having same molecular formula but different structural formula.
2. A substance prepared by adding other metal to a base metal in appropriate proportions.
3. The number of atoms present in 12 g of carbon 6C12.
4. The amount of energy released when an atom in the gaseous state accepts an electron to form an anion.
5. The salt formed by partial replacement of hydroxyl radicals of a diacidic or triacidic base with an acid radical.

(h) Give the structural formula of the following: [2]

1. Propanal ii. Ethanoic acid

(i) The percentage composition by weight and the molecular weight of a compound is given. [3]

 Find the empirical and molecular formula. (C=12, O=16, H=1)

 C = 26.67%, H = 2.22%, O = 71.11 % ; Molecular weight = 90 amu

**SECTION II (40 Marks)**

*Attempt* ***any four*** *questions from this section*

**Question 2**

(a) Write balanced chemical equation for the preparation of lead chloride from lead [2]

 carbonate.

(b) Draw the electron dot structure for the formation of Carbon tetrachloride and CaO. [2]

(c) Write chemical equation for the following reactions along with conditions, if necessary. [3]

1. Dehydration of ethanol.
2. Hydrolysis of chloroethane.
3. Esterification of ethanol.

(d) Aqueous Copper (II) sulphate is electrolysed using copper electrodes. [3]

1. Write the reaction taking place at anode and cathode.
2. State the observation at anode.

**Question 3**

(a) What volume of propane is burnt for every 500 cc of Oxygen used in the reactions under [3]

 the same conditions? State the law on which the problem is based.

 C3H8 + 5O2 → 3CO2 + 4H2O

(b) Give balanced equations for the preparation of the following salts: [3]

1. Iron [III] chloride from Fe
2. Potassium sulphate from KOH
3. Copper [II] sulphate from CuO

(c) State the inference drawn from the following observations: [2]

1. A salt ‘X’ which reacts with dil. Sulphuric acid and turns moist lead acetate paper silvery black. State the anion in ‘X’.
2. A salt ‘Y’ on heating with sodium hydroxide solution evolves a gas which turns methyl orange from orange to yellow. State the cation in ‘Y’.

(d) Give a balanced equation for conversion of the hydroxide of the metal in Period – 3, [1]

 Group 13 of the Periodic Table – to its respective oxide by thermal decomposition.

(e) What is Catenation? [1]

**Question 4**

(a) i. Ammonia gas can be prepared from magnesium nitride. Write a balanced equation for [1]

 the preparation of the gas.

 ii. Why ammonia gas is not prepared in laboratory by above mentioned process? [1]

1. The solution of ammonia in water behaves as an alkali. Explain. [1]

(b) Give equations for the laboratory preparation of the following: [2]

1. Methane from sodium ethanoate
2. Ethyne from calcium carbide

(c) With respect to electrolytic reduction of alumina, give reasons for the following: [3]

1. Fused alumina is electrolytically reduced to alumina.
2. Carbon anodes are continuously replaced during the electrolysis.
3. Electrolytic reduction of alumina is a continuous process.

(d) A flask ‘A’ holds 2.8 kg of hydrogen at s.t.p. Calculate the weight of a diatomic gas N2 [1]

 it can hold at s.t.p. (N=14)

(e) What is the empirical formula of Octane (C8H18) [1]

**Question 5**

(a) Draw an electron dot diagram of a hydronium ion and label the lone pair of electrons. [1]

(b) Calculate the percentage of sodium in Cryolite, correct to the nearest whole number. [2]

 (F=19, Na=23, Al=27)

(c) Which concentrated acid will oxidize sulphur directly to sulphuric acid? Write the equation [2]

 for the same.

(d) i. If HX is a weak acid, what particles will be present in the dilute solution apart from [1]

 water?

 ii. What ions must be present in a solution used for electroplating a particular metal? [1]

 iii. Why is electrolysis an example of redox reaction? [1]

(e) This question is related to Group 17 elements in the periodic table. From this group name: [2]

1. The solid halogen
2. The liquid halogen
3. Gaseous halogen having greenish yellow colour
4. Halogen with electronic configuration 2,7

**Question 6**

(a) Carry out the following conversions: [3]

1. Acetic acid to calcium acetate
2. Ethanol to sodium ethoxide
3. Alumina to sodium aluminate

(b) A metal article is to be electroplated with silver. The electrolyte selected is sodium

 argentocyanide.

1. Why is sodium argentocyanide preferred to silver nitrate as an electrolyte? [1]
2. Mention one condition to ensure that the deposit is smooth, firm and long lasting. [1]
3. Write the reaction taking place at the cathode and anode. [2]

(c) Oxygen is evolved by heating KClO3 using MnO2 as a catalyst. [3]

 2KClO3 2KCl + 3O2

1. Calculate the mass of KClO3 required to produce 6.72 litre of oxygen at STP.

 (K=39, Cl=35.5, O=16)

1. Calculate the number of moles of oxygen present in the above volume and also the number of molecules.

**Question 7**

(a) With respect to the laboratory preparation of hydrogen chloride gas: [3]

1. Write the equation for its preparation, mentioning the condition required.
2. Name the drying agent used and give a reason for the choice.
3. State a safety precaution taken during the preparation of hydrochloric acid.

(b) A gas cylinder can hold 1 kg of hydrogen gas at room temperature and pressure. [3]

1. Find the number of moles of hydrogen present.
2. If the number of molecules of hydrogen in the cylinder is X, calculate the number of CO2 molecules in the cylinder under the same conditions of temperature and pressure.
3. State the law that helped you to arrive at the above result.

(c) Draw two different isomers of the organic compound having the molecular formula [2]

 C5H12.

(d) Two solutions X and Y have pH values of 3 and 9 respectively. Which one of these two [1]

 will give a pink colour with phenolphthalein indicator?

(e) Why is electrolysis of acidulated water considered to be an example of catalysis? [1]

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