V I B G Y O R H I G H

Second Preliminary Examination

2020-2021

CHEMISTRY

Grade: X **Max. Marks : 80**

Date : 20/01/2021 **Time Allowed : 2 hours**

INSTRUCTIONS: -

- **Answers to this paper must be written on the paper 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.**
- **The intended marks for the questions or parts of questions are given alongside the questions.**
- **Attempt all questions from Section I and Four questions from Section II, Four out of Six questions.**

SECTION I (40 marks)

Attempt all questions from this section.

Q.1

A) Choose the most appropriate answer: **[5]**

(i) **The organic compound having a carbon-carbon double bond is**:

(a) C_3H_8

(b) C_3H_6

(c) C_3H_4

(d) C_4H_{10}

(ii) **The drying agent used in the laboratory preparation of hydrogen chloride is:**

(a) Quicklime

(b) Concentrated sulphuric acid

(c) Silica gel

(d) Phosphorus pentoxide

(iii) **The hydroxide which is completely soluble in excess sodium hydroxide is**:

(a) $Cu(OH)_2$

(b) $Zn(OH)_2$

(c) $Fe(OH)_2$

(d) $Fe(OH)_3$

(iv) **Which one of the following will be formed when one hydrogen atom is removed from an alkane?**

(a) Alkene

(b) Alkyl

(c) Functional group

(d) Alkyne

(v) **Compound X consists of molecules only. Hence, X will have:**

(a) Crystalline hard structure

(b) Low melting and boiling point

(c) An ionic bond

(d) Strong force of attraction between its molecules

B) Write balanced chemical equation for the following reactions/ conversions: **[5]**

(i) Reaction of ammonia with dilute sulphuric acid.

(ii) Dehydration of sugar by concentrated sulphuric acid.

(iii) Chlorination of ethyne in the presence of an inert solvent.

(iv) Reaction of copper with concentrated nitric acid.

(v) Dissociation of aqueous sodium silver cyanide.

C) Fill in the blanks from choices given in the bracket: **[5]**

(i) Cations are formed by _____ of electrons (loss / gain).

(ii) Dry hydrogen chloride gas can be collected by _____ displacement of air (upward / downward).

(iii) The gas produced on thermal decomposition of concentrated sulphuric acid is _____ (hydrogen sulphide / sulphur dioxide).

(iv) The gas produced when excess ammonia is treated with chlorine is _____ (nitrogen / hydrogen chloride).

(v) The second member of alkene series is _____ (ethene / propene).

D) State one relevant observation for the following: **[5]**

(i) Aqueous barium chloride solution is added to sodium sulphate solution.

(ii) pH paper is introduced in acetic acid (pH value of acetic acid = 2.9).

(iii) Bromine is passed into a solution of ethene in an inert solvent.

(iv) Dilute sulphuric acid is added to sodium sulphite and heated.

(v) At the anode, during the process of electroplating an article with nickel.

E) Solve the following:

(i) Calculate the empirical and molecular formula of a compound whose vapour density is 45, having the following composition: Carbon = 26.59%, Hydrogen = 2.22%, and Oxygen = 71.19%. (C=12, H=1, O=16) **[3]**

(ii) Molecular formula of a compound is $C_6H_{18}O_3$. Find its empirical formula and vapour density. (C=12, H=1, O=16) **[2]**

F) Name the following: **[5]**

(i) A series of compounds having similar structure and chemical properties in which the successive compounds differ by a CH_2 group.

(ii) The pair of electrons in an atom that do not take part in bond formation.

(iii) Process of separation of ions already present in an ionic compound.

(iv) The distance between the centre of the nucleus of an atom and its outermost shell.

(v) The gas evolved on reaction of aluminium with hot and concentrated caustic alkali solution.

G) Draw the structural formula of the following compounds: **[5]**

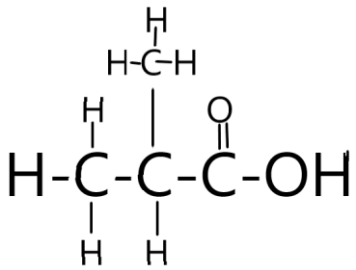
(i) (a) Ethanoic acid

(b) 4-methyl pentan-2-ol

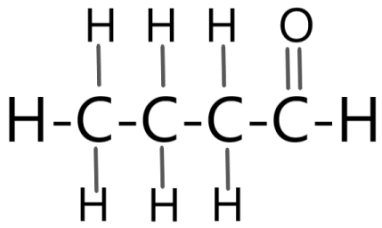
(c) 3-methyl but-1-yne

(ii) **Give the IUPAC names of the following:**

(a)



(b)



H)

(i) **An element Q belongs to 3rd period and group II A.** **[3]**

(a) How many valence electrons will **Q** have?

(b) What is the name given to this group of elements?

(c) Write down the formula of the compound formed between **Q** and another element **T** in group VII A of the same period.

(ii) **Give reasons:** **[2]**

(a) Concentrated nitric acid appears yellow, when it is left for a while in a glass bottle.

(b) Ionic compounds have a high melting point.

SECTION II (40 marks)

Attempt any four questions from this section

Q.2

A) Write balanced equations for the following reactions: - **[3]**

(i) Reaction of copper with cold and dilute nitric acid.

(ii) Reaction of copper [II] sulphide with dilute hydrochloric acid.

(iii) Reaction of carbon with concentrated sulphuric acid.

B) Distinguish between the following: **[3]**

(i) Zinc sulphate and zinc chloride.

(ii) Sodium chloride and sodium nitrate.

(iii) Calcium nitrate and lead nitrate solution.

C) Six elements A, B, C, D, E and F have the following atomic numbers: **[4]**

A=12, B=17, C=18, D=7, E=9 and F=11.

(i) Which of them has the lowest electron affinity?

(ii) Identify the element which belongs to the second period and has the highest ionization energy.

(iii) Identify the element with larger atomic size belonging to second period.

(iv) Write down the formula of the compound formed by **A** and **D**.

Q.3

A) Answer the following pertaining to Baeyer's process:

(i) Write the equations for the conversion of sodium aluminate to pure alumina. **[2]**

(ii) Caustic alkali is added to bauxite ore during purification of bauxite. Give a reason. **[1]**

B)

(i) **Answer the following questions with respect to the manufacture of nitric acid:** **[2]**

(a) Write the equation for the reaction in the absorption tower.

(b) Explain why low temperatures are used in the oxidation chamber.

(ii) Name the solid formed by the reaction of two gases, one of which is acidic and the other, basic in nature. **[1]**

C) Complete the Table: **[4]**

	Reaction at the anode	Product at the cathode
(i) Electrolysis of acidified water using platinum electrodes		
(ii) Electrorefining of copper		

Q.4

A)

(i) Draw electron dot structure to show the formation of the positive ion formed when an acid dissolves in water. **[2]**

(ii) Draw a branched chain isomer of butane. **[1]**

B) Identify cations present in the salt solution in each of the following cases: **[3]**

(i) Sodium hydroxide solution when added to solution (A) gives a reddish brown precipitate.

(ii) Ammonium hydroxide solution when added to solution (B) gives white precipitate which dissolves in excess.

(iii) Sodium hydroxide solution when added to solution (C) gives a pungent smelling gas which turns moist red litmus blue.

C) With reference to laboratory preparation of ammonia using an alkali, answer the following: **[4]**

(i) Write the balanced equation for the laboratory preparation of ammonia.

(ii) Ammonium nitrate is not used as a reactant. Give a reason. .

(iii) Why are the reactants ground thoroughly before the preparation?

(iv) A higher ratio by weight of the alkali is used. Give a reason.

Q.5

A) Write a balanced chemical equation for each of the following reactions: **[3]**

(i) Reaction of moist ammonia with phosphorous pentoxide.

(ii) Reaction of sodium oxide with dilute sulphuric acid.

(iii) Dissociation reaction of cryolite.

B) Differentiate between the following: **[3]**

(i) Mineral and ore

(ii) Universal indicator and common acid- base indicator

(iii) Electrovalency and covalency

C) Give a reason for the following: **[4]**

(i) A special arrangement is used for preparation of hydrochloric acid from hydrogen chloride gas.

(ii) During catalytic oxidation of ammonia, the catalyst continues to glow even after heating is discontinued.

(iii) Concentrated sulphuric acid acts as a strong dehydrating agent.

(iv) Almost 90% of all known compounds are organic in nature.

Q.6

A)

(i) Draw electron dot structure to show the formation of ammonia. **[2]**

(ii) Draw the structure of the second member of the alkyne series. **[1]**

B) Name the following **[3]**

(i) The element with the maximum non-metallic character from the elements of period-2.

(ii) A compound which during electrolysis in its molten state liberates a reddish brown gas.

(iii) The normal salt of acetic acid with sodium hydroxide.

C)

(i) A solution contains Mg^{2+} ions, Fe^{2+} ions and Cu^{2+} ions. On passing current through this solution, which ions will be discharged at the cathode and why? **[2]**

(ii) **Fill in the blanks:** **[2]**

(a) A solution of sodium carbonate contains _____ (ions only, molecules only, ions and molecules)

(b) Higher the pH value of a solution, the more _____ (acidic, alkaline) it is.

Q.7

A) Define the following **[3]**

(i) Salt

(ii) Ionization potential

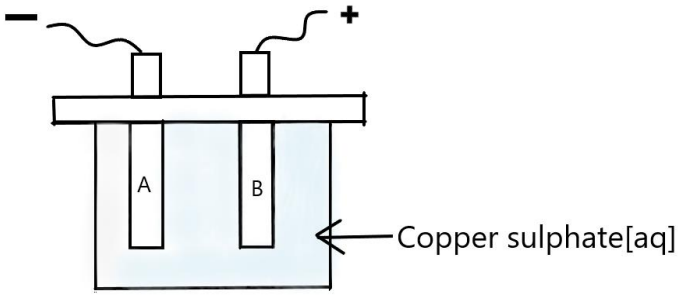
(iii) Alkali

B)

(i) A gas cylinder of capacity 20 dm^3 is filled with gas X, the mass of which is 10 grams. When the same cylinder is filled with hydrogen gas at the same temperature and pressure, the mass of hydrogen is 2 grams. Find the relative molecular mass of the gas X. **[2]**

(ii) State the empirical formula of a compound whose molecular formula is H_2CO_2 **[1]**

C) Answer the following questions with reference to electrolysis of aqueous copper sulphate using copper electrodes. **[4]**



(i) Which electrode (A or B) is termed as 'oxidizing electrode'?

(ii) Identify the ion which is formed at the anode during the electrolysis of copper sulphate solution using copper electrodes.

(iii) State one appropriate observation that occurs at the cathode.

(iv) The electrolyte aqueous copper[II] sulphate may be acidified with traces of dilute sulphuric acid. Suggest a reason for the same.

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