

ST. JOSEPH'S ACADEMY, DEHRADUN
2ND PRELIMINARY EXAMINATION 2022-23

SUBJECT: CHEMISTRY

CLASS: X

M.M.: 80 TIME: 2 HOURS

NAME OF THE STUDENT....

CLASS/SECTION

ROLL NO..

Answers to this Paper must be written on the paper provided separately.
You will not be allowed to write during 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-A is compulsory. Attempt **any four** questions from Section B.
The intended marks for questions or parts of questions are given in brackets [].

SECTION-A

(Attempt **all** questions from this Section)

Question 1.

Choose one correct answer to the questions from the given options:

[15]

- (i) An electrolyte which completely dissociates into ions is:
 - (a) Alcohol
 - (b) Carbonic acid
 - (c) Sucrose
 - (d) Sodium hydroxide
- (ii) The most electronegative element from the following elements is:
 - (a) Magnesium
 - (b) Chlorine
 - (c) Aluminum
 - (d) Sulphur
- (iii) The property which is characteristic of an electrovalent compound is:
 - (a) it is easily soluble in polar solvent
 - (b) it has a high melting point
 - (c) it is a weak electrolyte
 - (d) it often exists as a liquid
- (iv) The reason for using aluminum in the alloy duralumin is:
 - (a) Aluminium is brittle
 - (b) Aluminium gives strength
 - (c) Aluminium brings lightness
 - (d) Aluminium lowers melting point
- (v) Which of the following is a tribasic acid?
 - (a) HCl
 - (b) H_3PO_4
 - (c) H_2SO_4
 - (d) HCOOH
- (vi) The gelatinous white precipitate which is soluble in excess of ammonium hydroxide is of:
 - (a) Calcium hydroxide
 - (b) Zinc hydroxide
 - (c) Magnesium hydroxide
 - (d) Lead hydroxide
- (vii) If the relative molecular mass of carbon dioxide is 44, then its vapour density is:
 - (a) 22
 - (b) 32
 - (c) 44
 - (d) 88

- (viii) The aqueous solution of which gas is the major part of aqua regia:
- Hydrogen Chloride
 - Ammonia
 - Hydrogen sulphide
 - Sulphur dioxide
- (ix) An explosive formed when ammonia and chlorine react together is:
- NOCl
 - NH_4Cl
 - NCl_3
 - HCl
- (x) An aqueous compound which turns colourless phenolphthalein into pink:
- Ammonium hydroxide
 - Nitric acid
 - Anhydrous calcium chloride
 - Sulphuric acid
- (xi) The acid which can produce carbon from cane sugar is:
- Concentrated hydrochloric acid
 - Concentrated nitric acid
 - Concentrated Sulphuric acid
 - Concentrated acetic acid
- (xii) The organic compound formed by the hydration of ethene is:
- Ethanol
 - Ethanal
 - Ethanoic acid
 - Ethyne
- (xiii) IUPAC name of $\text{CH}_3\text{-C}\equiv\text{C-CH}_3$ is:
- Butanol
 - But-2-yne
 - Butanoic acid
 - Butane
- (xiv) The inert electrode used in the electrolysis of acidified water is:
- Nickel
 - Platinum
 - Copper
 - Silver
- (xv) The bond between the atom of a group I metal and that of the group ¹⁶~~V~~ element is:
- electrovalent
 - covalent
 - non-polar covalent
 - coordinate covalent

Question 2.

- (i) Compound A is bubbled through bromine dissolved in carbon tetrachloride and the product is $\text{CH}_2\text{Br}-\text{CH}_2\text{Br}$



- Draw the structural formula of A.
- What type of reaction has A undergone?
- What is your observation?
- Name (not formula) the compound, from which A is formed at 170°C in acidic medium.
- What is the procedure of converting the product mentioned in part (iv) back to A. (equation is must).

[5]

(ii) Match the following Column A with Column B.

[5]

Column A

- (a) Basic Salt
- (b) PbO
- (c) Cu(OH)₂
- (d) HCl
- (e) Solder

Column B

- 1. Buff yellow
- 2. Soluble in excess NH₄OH
- 3. Cu(OH)Cl
- 4. Fuse
- 5. Polar compound

(iii) Complete the following by choosing the correct answers from the bracket:

- (a) The functional group in acetaldehyde is _____. [CHO/-COOH]
- (b) A metal chloride reacts with conc. H₂SO₄ giving a gas which when passed through alkaline phenolphthalein changes from _____. [colourless to pink/ pink to colourless]
- (c) Liquor ammonia is _____ in nature [Neutral / Basic]
- (d) Common name of carboxylic acid with two carbon atoms is [Formic acid/acetic acid]
- (e) Electrolysis of acidified water is an example of _____. [Oxidation/redox reaction].

(iv) Identify the following:

[5]

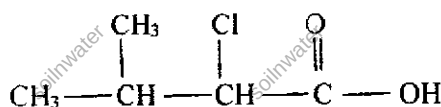
- (a) The most electronegative element of the Periodic Table.
- (b) What is the addition of Al(OH)₃ to sodium aluminate for recovery of Al(OH)₃ called?
- (c) The process of separation of ions which are already present in an ionic compound.
- (d) A mineral from which metal can be extracted with a profit.
- (e) The type of isomerism exhibited by But-1-ene and But-2-ene.

[5]

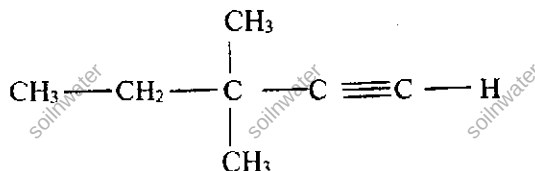
(v) (a) Name the following compounds in IUPAC system:

[5]

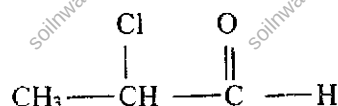
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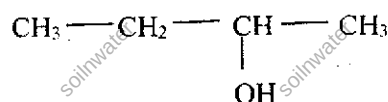
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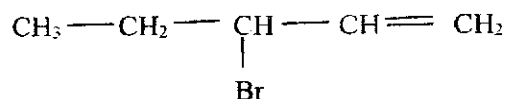
3.



4.



5.



Question 3.

- (i) Identify the anion present in each of the following compounds. [2]
- (a) When barium chloride solution is added to a solution of compound B, a white precipitate insoluble in dilute hydrochloric acid is formed.
- (b) When conc HCl is passed over heated MnO_2 a gas A is produced which turns moist starch iodide paper blue black.
- (ii) Write the products and balance the equation. [2]
- (a) $\text{C} + \text{conc HNO}_3 \rightarrow$
- (b) $\text{Ca(HSO}_3)_2 + \text{HCl} \rightarrow$
- (iii) Arrange the following as per the instruction given in the brackets: [3]
- (a) Be, Li, F, C, B, N, O. (decreasing order of electropositive character)
- (b) F, Cl, Br, I (increasing order of electron affinity)
- (c) Cs, K, Rb, Na (increasing ionization potential)
- (iv) Fill in the blanks by selecting the appropriate word from the given choice: [3]
- (a) A chemical bond formed by the complete transfer of electrons from one atom to another is called _____ (ionic/covalent)
- (b) Sodium chloride loses _____ (one/two) electron (s) from its outermost shell to acquire the inert gas configuration of neon.
- (c) Covalent compound usually contains _____ (ions/molecules)

Question 4.

- (i) For each of the substances given below, describe the role played in the extraction of aluminium. [2]
- (a) Calcium fluoride
- (b) Sodium hydroxide
- (ii) Calculate: [2]
- (a) The total percentage of Aluminum in Na_3AlF_6 [Na=23, Al=27, F=19].
- (b) If the empirical formula of a compound is CHO and its vapour density is 29, find the molecular formula of the compound. $[C=12, H=1, O=16]$
- (iii) The following questions are pertaining to the laboratory preparation of nitric acid. [3]
- (a) Why glass apparatus should be used for the preparation of nitric acid by heating concentrated sulphuric acid and potassium nitrate?
- (b) Write a chemical equation to illustrate the acidic nature of nitric acid.
- (c) Why nitric acid exhibit oxidising property?
- (iv) Explain the following: [3]
- (a) Distillation or boiling cannot be used to concentrate nitric acid beyond a certain concentration.
- (b) Water is never poured on concentrated acid to dilute it.
- (c) Hydrogen chloride gas is not collected over water.

Question 5.

- (i) (a) State why ammonium nitrate is not used in the preparation of ammonia. [1+1=2]
- (b) Write a balanced chemical equation for the formation of ammonia using laboratory method.
- (ii) Name the gas evolved based on the following observations: [2]
- (a) Reaction of metal sulphide with Dil H_2SO_4 .
- (b) Zinc metal when boiled with alkali solution evolves a gas which burns with a pop sound.
- (iii) Give balanced chemical equations for the following: [3]
- (a) Thermal decomposition of nitric acid.
- (b) Action of heat on aluminium hydroxide.
- (c) Lead oxide reacts with potassium hydroxide.

- (iv) State one relevant observation for each of the following reactions: [3]
- Dilute hydrochloric acid is added to silver nitrate solution.
 - Ammonium hydroxide solution is added in excess to copper sulphate solution.
 - Concentrated nitric acid is added to copper turning.

Question 6.

- (i) Answer the following on the basis of metallurgy of aluminum. [2]
- Why coke layer is sprinkled over electrolytic mixture.
 - Why carbon anodes are periodically replaced.
- (ii) Solve: [3]
- A compound has the following percentage composition by mass, carbon 14.4%, hydrogen 1.2% and chlorine 84.5%. Determine the empirical formula of this compound. (H=1, C=12 and Cl=35.5)
- (iii) State the conditions required for the following reactions: [2]
- Conversion of nitrogen and hydrogen to ammonia.
 - Conversion of Sulphur di oxide to sulphur trioxide.
- (iv) Choose the role played by concentrated Sulphuric acid as A, B, C which is responsible for the reactions 1 to 3. [3]
- Oxidizing agent
 - Dehydrating agent
 - Non-volatile acid
- $\text{KNO}_3 + \text{H}_2\text{SO}_4 \xrightarrow{<200^\circ\text{C}} \text{KHSO}_4 + \text{HNO}_3$
 - $\text{C}_{12}\text{H}_{22}\text{O}_{11} \xrightarrow{\text{conc H}_2\text{SO}_4} 12\text{C} + 11\text{H}_2\text{O}$
 - $\text{S} + 2\text{H}_2\text{SO}_4 \longrightarrow 2\text{H}_2\text{O} + 3\text{SO}_2$

Question 7.

- (i) Calculate the vapour density and molecular mass of CO_2 , if 200 mL of gas at STP weighs 0.40g, [1 L of H_2 at STP weighs 0.09g]: [3]
- (ii) Choose the answer from the list which fits the description. [Ammonia, ethane, hydrogen chloride, hydrogen sulphides, ethyne] [3]
- The gas is used as a reducing agent in reducing copper oxide to copper.
 - This gas produces dense white fumes with ammonia gas.
 - This gas has a characteristic rotten egg smell.
- (iii) Give balanced chemical equations for the following: [4]
- Conversion of ethane from sodium propanoate.
 - Methane with chlorine.
 - Ethene with Bromine.
 - Ethyne from 1,2 Dibromo ethane.

Question 8.

- (i) Draw the electron dot structure for the following. [2]
- NH_4^+ [N=7, H=1]
 - MgCl_2 [Mg=12, Cl= 17]
- (ii) Distinguish between the following as directed: [2]
- Calcium Sulphate and Calcium carbonate by using dilute HCl
 - Lead nitrate solution and Zinc nitrate solution using an alkali.
- (iii) Name the particles present in: [3]
- Glucose.
 - Acetic acid.
 - Dilute Sulphuric acid.
- (iv) Give your observation for the following: [3]
- Copper nitrate crystals are heated.
 - Hydrated copper sulphate is heated.
 - Molten lead bromide is electrolyzed.