

ATUL VIDYALAYA
FIRST PRELIMINARY EXAMINATION 2012-13
CHEMISTRY (TYPE B)
Paper – 1
(Theory)

STD: XII
DATE: 24-9-12
SESSION: II

TIME: 3 HRS
MM: 70

(Candidates are allowed additional 15 minutes for only reading the paper. They must NOT start writing during this time).

Answer all questions in Part I and six questions from Part II, choosing two questions from Section A, two from Section B and two from Section C. All working, including rough work, should be done on the same sheet as, and adjacent to, the rest of the answer. The intended marks for questions or parts of questions are given in brackets []. Balanced equations must be given wherever possible and diagrams where they are helpful. When solving numerical problems, all essential working must be shown. In working out problems use the following data: Gas Constant $R = 1.987 \text{ cal deg}^{-1} \text{ mol}^{-1} = 8.314 \text{ JK}^{-1} \text{ mol}^{-1} = 0.0821 \text{ dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$ | $1 \text{ atm} = 1 \text{ dm}^3 \text{ atm} = 101.3 \text{ J}$. 1 Faraday = 96500 Coulombs.

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SECTION – I
(Answer all the questions)
PART-I

Question 1

(a) Correct the following statements: [5]

- (i) Blister copper is an ore of copper.
- (ii) Co-ordination number of Cl^- ion in NaCl crystal is 12.
- (iii) Valence shell configuration of transition metals is $ns^2 np^6 nd^{1-10}$
- (iv) Ethyl cyanide can be prepared from ethyl bromide by the action of AgCN.
- (v) Oxalic acid decolourises alkaline KMnO_4 .

(b) Choose the correct alternative from the choices given: [5]

- (i) Stereo isomers which are related to each other as an object and its non-superimposable mirror image are called:
Geometrical isomers, Enantiomers, Tautomers, Diastereomers
- (ii) Octahedral complexes are expected to have:
 sp^2d hybridisation, sp^3d^2 hybridisation, sp^3 hybridisation, dsp^2 hybridisation.
- (iii) Reducing agent used to convert Fe_2O_3 to Fe in blast furnace is
Carbon, hydrogen, Carbon monoxide, Sulphur dioxide.
- (iv) Molecular weight of Na_2SO_4 as determined by the use of colligative property will be:
Equal to normal value, Half of the normal value, double of the normal value, one third of the normal value.
- (v) CH_3MgI when treated by acetaldehyde followed by hydrolysis forms:
Acetone, a secondary alcohol, a tertiary alcohol, propanal.

(c) Fill in the blanks by choosing the appropriate word/words from those given in the brackets: [5]

[formaldehyde, acetaldehyde cyanohydrin, first, second, independent, proton, tartaric acid, acetone, dependent, cathode, potassium permanganate, potassium dichromate, anode, redox titrations, neutron, photography, lactic acid, methyl cyanide, yellow, phenol, white, acetoxime]

- (i) The half life period of a -----order reaction is -----on the concentration of the reactant.

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- (ii) In a galvanic cell, the movement of electrons in the external circuit is from ----- to -----.
- (iii) Acetaldehyde reacts with HCN to give -----which on hydrolysis gives -----.
- (iv) A ----- precipitate is obtained on adding iodine and sodium hydroxide to -----.
- (v) ----- can be extracted from pyrolusite ore and is used in -----.

(d) Match the following:**[5]**

- | | |
|---|-------------------------|
| (i) HCOOH | 1. Poisonous |
| (ii) C ₆ H ₅ CHO | 2. Tollen's reagent |
| (iii) HCHO | 3. Cannizaro's reaction |
| (iv) CH ₃ OH | 4. Diazotisation |
| (v) C ₆ H ₅ NH ₂ | 5. Urotropine |

SECTION-II**PART-II**(Answer any **two** questions)**Question 2**

- (a) The resistance of a 0.05M NaOH solution is 31.6 ohms measured in A conductivity cell. At 25°C the cell constant of the conductivity cell is 0.378 cm⁻¹. Calculate the molar conductivity of NaOH solution at this temperature. **[3]**
- (b) Give reasons for the following:
- (i) The number of hydrogen ion in an aqueous solution of acetic acid increases considerably with dilution while this is not the case with an aqueous solution of hydrogen chloride.
- (ii) To precipitate metallic hydroxide of group III a mixture of ammonium chloride and ammonium hydroxide is used. **[4]**
- (c)
- (i) For diamond, state the element present at the lattice sites, the number of nearest neighbours for each atom and the type of cell. State the hybridisation of the carbon atom in diamond.
- (ii) The rate constant of a first order reaction is $4.5 \times 10^{-2} \text{ sec}^{-1}$. Calculate the time required for the initial concentration of 0.4 M of the reactant to be reduced to 0.2 M. **[3]**

Question 3

- (a) Explain the following:
- (i) Zinc displaces hydrogen from acid solution [$E_{\text{O}}\text{Zn}^{2+}/\text{Zn} = -0.76\text{volts}$]
- (ii) The hydride of sulphur is a gas but hydride of oxygen is a liquid. **[3]**
- (b) What is the effect of temperature and catalyst on the rate of a reaction? **[2]**
- (c) Give one example each to illustrate that water acts as a Bronsted acid as well as Bronsted base. **[3]**
- (d) Find the pH of 0.05 M H₂SO₄ solution. **[2]**

Question 4

- (a) (i) The molality of an aqueous solution of cane sugar is 0.4445, What is the mole fraction of cane sugar?
- (ii) 3.5 gm of albumin (the most abundant proteins in blood) in 100 ml of water

produces an osmotic pressure of 0.014 atm at 25°C. What is the molecular weight of albumin? [5]

(b) Draw electron dot or any suitable diagram for nitric acid. [1]

(c) Sodium chloride has rock salt structure. What are the co-ordination numbers of Na⁺ ion and Cl⁻ ion? Discuss the effect of the pressure and temperature on the coordination number? [4]

PART B

(Answer any **two** questions)

Question 5

(a) Name the following co-ordination compounds using IUPAC names: [1 ½]

(i) [PtCl(NH₂CH₃)(NH₃)₂]Cl ii. [Cr(NH₃)₆]³⁺ iii. [Ni(NH₃)₅Cl]NO₃

(b) Explain why ClF₃ exists but FCl₃ does not exist. [1 ½]

(c) Complete the following reactions with balanced chemical equations: [2]

(i) XeF₄ + H₂O → -----

(ii) XeF₂ + H₂O → -----

Question 6

(a) Write balance equations for the following reactions:

(i) Bromine is treated with alkaline hydrogen peroxide.

(ii) Silver is treated with hot and concentrated sulphuric acid

(iii) Potassium permanganate is heated. [3]

(b) Give reasons for the following:

(i) Cr²⁺ is a strong reducing agent where Mn²⁺ is not. [Cr=24, Mn=25]

(ii) The transition metals ions such as Cu⁺, Ag⁺ are colourless. [2]

Question 7

(a) State the steps in the preparation of potassium dichromate from chromite ore.

How does acidified solution of potassium dichromate react with

(i) FeSO₄

(ii) H₂S. Write balanced equations. [4]

(b) Variable oxidation states are shown by representative elements and transition elements. How is this behaviour different for the two types? Illustrate with one example in each case. [1]

PART C

(Answer any **two** questions)

Question 8

(a) Explain why: - [2]

H₂SO₄ converts KI to corresponding HI and then oxidise it into iodine.

(b) When halo alkane interacts with water molecule, less amount of energy is released which is not sufficient to break the original H-bond between water molecule and to form new H-bond with halo alkane and water. [3]

(c) What happens when [5]

(i) Methyl Chloride is treated with KCN

(ii) Chlorobenzene is subjected to hydrolysis

(iii) Propene is treated with Cl₂ in the presence of U.V. light OR is heated.

(iv) Chlorobenzene is treated with acetyl chloride in presence Of anhyd. AlCl₃

(v) Chloroform is slowly oxidized by air in presence of light.

Question 9

(a) Name four types of isomerism that a molecular formula C₄H₇Cl can give rise to.

Represent the structures relevant to the isomerism. [4]

- (b) [3]
- (i) Write chemical equation for the reaction between urea and nitrous acid and name the product.
 - (ii) What is the organic compound formed when chlorine is bubbled through boiling acetic acid for a short time in the presence of iodine? If the compound is treated with a concentrated solution of ammonia, what is the organic compound formed?
 - (iii) Give a chemical test to distinguish between acetone and acetaldehyde.
- (c) [3]
- (i) How is iodoform prepared from acetone?
 - (ii) What is the action of bromine water on (1) glucose (2) fructose?
 - (iii) What is the product formed when aniline is brominated? Is bromination is electrophilic or nucleophilic reaction?

Question 10

- (i) Differentiate between addition polymer and condensation polymer. [3]
- (ii) Why 1° amines have got higher boiling point than 3° amines? [2]
- (iii) Discuss Williamson synthesis. [3]
- (iv) Phenols do not undergo substitution of the — OH group like alcohols. Explain. [2]
