

ATUL VIDYALAYA
SECOND PRELIMINARY EXAMINATION 2012-13
PAPER 2-CHEMISTRY (TYPE B)

STD: XII
DATE: -11-12
SESSION: I

TIME: 3HRS
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.

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

Question 1

a. Choose the correct answer from the alternatives given: [5]

- (i) Sulphur can be extracted from deposits in earth's crust by:
(1). Froth floatation process (2). Frasch process (3). Frankel process (4).
Friedel Craft's process.
- (ii) Co-ordination number of Ag^+ in complex formation is:
(1). 1 (2). 2 (3). 4 (4). 6
- (iii) The calculated bond order of O_2^- is
(1). 2.5 (2) 2.0 (3) 1.5 (4) 1.0
- (iv) Allotropic form of sulphur which is stable at room temperature is
(1). Colloidal sulphur (2) rhombic sulphur (3) monoclinic sulphur (4) powdered sulphur
- (v) Which is an extensive property:
(1) Temperature (2) refractive index (3) volume (4) viscosity.

b. Answer the following questions: [5]

- (i) 0.1 M urea solution shows less depression in freezing point than 0.1 M MgCl_2 solution. Explain.
- (ii) What is the pH of a solution whose hydroxyl ion concentration is 10^{-2} M ?
- (iii) If neutral litmus solution is added to sodium acetate solution, what will you observe and why?
- (iv) State why the boiling point of HF is very high.
- (v) Define piezoelectricity and give one use of piezoelectric crystals.

c. Fill in the blanks choosing words from the following: [5]

neutral, acidic, positive, alkaline, salt, hydrolysis, negative, six, zero, four, half, sp^2 , sp^3 , pyramidal, octahedral.

- (i) (1) An aqueous solution of sodium carbonate is ----- due to -----
- (ii) Nitrogen atom in ammonia undergoes ----- hybridisation and the geometry of the molecule is -----.
- (iii) For the cell reaction to be spontaneous, E° of the cell is -----.
- (iv) The unit cell of sodium chloride has ----- Na^+ and ----- Cl^-
- (v) The bond order of H_2 molecule is ----- while that of H_2^+ is -----.

d. Match the following:

[5]

- | | |
|------------------|-------------------------|
| (i) RNA | (a) isoelectronic point |
| (ii) Enzyme | (b) Non-reducing sugar |
| (iii) Amino acid | (c) Globular proteins |
| (iv) Sucrose | (d) Polysaccharide |
| (v) Starch | (e) Purines |

PART - II
SECTION A

(Answer any **two** questions)

Question 2

- (a) The bond angles in methane, ammonia and water are different although these molecules have the same hybridisation, sp^3 . Give a suitable reason for this.
- (b) What is a catalyst? Write the types of catalysis with suitable examples. [5]
- (c) Calculate the mole fraction of water in a sodium hydroxide solution which has 80g of NaOH and 54 g of H_2O . [Relative atomic masses: Na=23, O=16, H=1]
- (d) Calculate the freezing point of a solution containing 0.520 g glucose ($C_6H_{12}O_6$) dissolved in 80.20 g of water. For water $k_f = 1.861 \text{ K kg mol}^{-1}$. [5]

Question 3

- (a) (i) What is salt hydrolysis?
(ii) Calculate the degree of ionisation and $[H_3O^+]$ of a 0.15 M acetic acid
Solution $\alpha_{\text{acetic acid}} = 1.8 \times 10^{-5}$ [5]
- (b) At 25°C the equivalent conductivity of maleic acid at a dilution of 30 litres is 180. At infinite dilution it is 390. Calculate the dissociation constant of the acid.
- (c) Calculate the emf of the cell at 298 K.
 $Fe_{(s)} | Fe^{2+}_{(0.001 \text{ mol L}^{-1})} || H^+_{(1.0 \text{ mol L}^{-1})} | H_2, 1 \text{ atm} | Pt, E^\circ Fe^{2+}/Fe = -0.440V$ [5]

Question 4

- (a) (i) Water acts as a Bronsted acid as well as a Bronsted base. Give one example each to illustrate this.
(ii) The solubility product of AgCl is 1×10^{-10} at 25°C . Calculate the solubility of silver chloride in (a) pure water, (b) 0.2M NaCl. [5]
- (b) Using Valence bond theory of complexes explain the geometry and diamagnetic nature of ion $[Co(NH_3)_6]^{3+}$. [5]

SECTION B

(Answer any **two** questions)

Question 5

- (a) (i) Differentiate between co-ordination compounds and double salts.
(ii) What are ligands? Give one example each of a monodentate and bidentate ligand.
(iii) Draw the resonance structure of ozone. [5]

Question 6

- (a) Give balanced chemical equations for the following reactions. [5]
- (i) Sulphur dioxide reacts with aqueous NaOH.

- (ii) Fluorine is passed into cold water.
- (iii) Conc. H_2SO_4 is heated with sucrose.

Question 7

- (a) Explain why? [5]
- (i) Fe^{3+} is more paramagnetic than Fe^{2+} ion.
 - (ii) Oxygen shows maximum covalency of two.
 - (iii) Water is liquid while H_2S is a gas.
- (b) Complete and balance the following equations:
- (i) $\text{O}_3 + \text{Hg} \rightarrow$
 - (ii) $\text{KMnO}_4 + \text{H}_2\text{SO}_4 + \text{FeSO}_4 \rightarrow$
 - (iii) $\text{H}_2\text{SO}_4 + \text{S} \rightarrow$

SECTION C(Answer any **two** questions)**Question 8**

- (a) Name two types of isomerism having a molecular formula $\text{C}_4\text{H}_9\text{Cl}$. Represent the structure relative to the isomerism. [5]
- (b)
- (i) Write the chemical equation for the reaction between ethylamine and nitrous acid and name the organic compound formed.
 - (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 this compound is treated with a concentrated solution of ammonia, what is the organic compound formed?
 - (iii) Give a chemical test to distinguish between an aldehyde and a ketone.
 - (iv) Write the balanced chemical equation for the reaction taking place and name the organic compound formed when diethyl ether is refluxed with a concentrated solution of hydroiodic acid.
 - (v) How is iodoform prepared from acetone? [5]

Question 9

- (a) What happens when: [3]
- (i) Ethyl iodide reacts with AgNO_2 and product is reduced?
 - (ii) Ethyl bromide is treated with AgCN and product is hydrolysed?
 - (iii) Ethyl magnesium bromide is treated with cyanogen chloride?
- (b) Complete the following reactions and name the type of reaction to which each belong: [3]
- (i) $\text{CH}_3\text{Br} + \text{KOH}(\text{aq}) \rightarrow \text{-----}$
 - (ii) $\text{CH}_2=\text{CH}_2 + \text{HCl} \rightarrow \text{-----}$
 - (iii) $\text{C}_2\text{H}_5\text{OH} \xrightarrow[\text{443K}]{\text{conc. H}_2\text{SO}_4} \text{-----}$
- (c) How is phenol prepared from chloro benzene? Give all the equations. [4]

Question 10

- (a) How the following conversions can be achieved [5]
- (i) P-nitroaniline from Aniline.
 - (ii) Aniline from Benzene

contd on pg-4

- (iii) Phenol from Benzene
 - (iv) Phenol from nitrobenzene
 - (v) Acetone from acetylene
- (b) [5]
- (i) How will you obtain glucose from starch?
 - (ii) What happens when fructose is oxidised by conc.HNO₃.
