

**BARNES SCHOOL & JUNIOR COLLEGE, DEVLALI
HALF YEARLY EXAMINATION 2011-2012**

CHEMISTRY

Paper – I

(THEORY)

Time : 3 Hrs

CLASS 12

Max Marks : 70

INSTRUCTIONS

Answers to this paper must be written on the paper provided separately.

You will not be allowed to write during the first 15 minutes.

The 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 . This paper is divided into 2 parts.

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.

The intended marks for questions or parts of questions are given in brackets [].

PART I

Question 1.

- (a) Correct the following statements by changing the underlined part of the sentence. [5]

(Do not change the whole sentence.)

- (i) Ferrocene is a Sigma bonded complex.
- (ii) Stereoisomers not related as mirror images are called enantiomers.
- (iii) Ethanal gives silver mirror test with schiff's reagent.
- (iv) An aldehyde is obtained by the oxidation of a carboxylic acid.
- (v) The name of t-butyl alcohol by IUPAC system is 2-methylpropene.

- (b) Fill in the blanks by choosing appropriate word from those given in the brackets : [5]
 (increases, can, cannot, rate, rate constant, below, decreases, above, moles L⁻¹ s⁻¹, glycol, vacant, glycerol, crystal, s⁻¹).

- (i) is an example of trihydric alcohol and is an example of dihydric alcohol.
- (ii) For the first order reaction the unit of rate is and that of rate constant is
- (iii) An aqueous solution of sugar boils 100^o C and freezes 0^o C.
- (iv) Electrons trapped in the sites of the lattice are called F-centres.
- (v) A catalyst start a reaction but it can increase the of the reaction.

- (c) Complete the following statements by selecting the correct alternative from the choices given below : [5]

- (i) A colligative property is
 (A) Boiling point (B) Vapour pressure
 (C) Freezing point (D) Osmotic pressure
- (ii) Species that has bond order 3 is
 (A) Cl₂ (B) N₂
 (C) O₂ (D) F₂
- (iii) The number of tetrahedral voids per atom in a crystal lattice is
 (A) 1 (B) 2
 (C) 3 (D) 4
- (iv) The optical property is same in all directions in
 (A) Crystalline solids (B) Anisotropic solids
 (C) Amorphous solids (D) Ionic solids
- (v) The unit of rate constant in a first order reaction is
 (A) mole L⁻¹ s⁻¹ (B) s⁻¹
 (C) mole² L⁻¹ s⁻¹ (D) mole L⁻¹

- (d) Match the items of Column I with an appropriate item of Column II : [5]

Column I

Column II

- | | |
|-------------------------------------|---------------------|
| (i) Weak acid | (A) Salicylaldehyde |
| (ii) Reimer Tiemen reaction | (B) Iodoform test |
| (iii) Propan-2-ol | (C) Violet colour |
| (iv) Anhydrous $ZnCl_2$ + conc. HCl | (D) Ethanol |
| (v) $FeCl_3$ | (E) Lucas' reagent |

PART II

Answer **six** questions choosing **two** from **section A**, **two** from **section B** and **two** from **section C**.

SECTION A

(Attempt any two questions only)

Question 2.

- (a) A certain aqueous solution boils at $100.303^{\circ}C$. What is its freezing point ?
 K_b for water = $.5Kmol^{-1}$ and $K_f = 1.87 Kmol^{-1}$ [3]
- (b) When 0.3 g of acetic acid is dissolved in 30 g of benzene the freezing point is lowered by $0.45^{\circ}C$. Deduce the value of van't Hoff factor. It is given that K_f (benzene) = $5.12 K Kg mol^{-1}$. [4]
- (c) Explain graphically how the rate of reaction changes with every $10^{\circ}C$ rise in temperature. [2]
- (d) How is the activation energy of a reaction related to its rate constant ? [1]

Question 3.

- (a) Draw the molecular orbital diagram of O_2^+ . What is its bond order ? State whether this molecule is paramagnetic or diamagnetic. [3]
- (b) The molecular weights of sodium chloride and glucose are determined by the depression of freezing point method. Compared to their theoretical molecular weights what will be their observed molecular weights when determined by the above method ? Justify. [3]
- (c) Write short notes on hybridization . [4]

Question 4.

- (a) Name the defect that lowers the density of the solids. [1]
- (b) A metal has a body centred cubic structure. The length of unit cell is 304 pm and density of the metal is 5.96 g cm^{-3} . Calculate the following : [5]
- Volume of the unit cell
 - Mass of the unit cell
 - Number of atoms per unit cell
 - Mass of one atom
 - Mass of one mole of atoms.
- (c) For a reaction $aA + bB \rightarrow mM + nN$ the following data were found : [4]

Initial concentrations		Initial rates in mole $\text{L}^{-1} \text{ s}^{-1}$
[A] In mole L^{-1}	[B] in mole L^{-1}	
0.5	0.5	0.02
1.0	0.5	0.08
1.0	1.0	0.16

Calculate the order of the reaction. What is the value of the specific rate constant ? Write the differential rate law of the reaction.

SECTION B

(Attempt any two questions only)

Question 5.

- (a) Name the type of isomerism shown by the following pair of compounds :
 $[\text{Pt} (\text{OH})_2 (\text{NH}_3)_4] \text{SO}_4$ and $[\text{Pt} \text{SO}_4(\text{NH}_3)_4] (\text{OH}_2)$. How will you identify the isomers with the chemical test ? [3]
- (b) How many moles of AgCl will precipitated when an excess of AgNO_3 is added to the molar solution of $[\text{Cr} \text{Cl} (\text{H}_2\text{O})_5] \text{Cl}_2$? [1]
- (c) Name the coordination compound used for the treatment of cancer. [1]

Question 6.

- (a) Tetrahedral nickel (II) complexes are paramagnetic but square planar Ni (II) are diamagnetic. Explain. Atomic number of Ni = 28. [3]
- (b) Write the IUPC name of the (i) $[\text{Co} \text{Cl} (\text{NH}_3)_5] \text{Cl}_2$ (ii) $[\text{Ni} (\text{CN}_4)]^{-2}$ [2]

Question 7.

- (a) Explain the meaning of
 (i) Ambidentate ligands (ii) Chelate [2]
- (b) Give one example of linkage isomer. [1]
- (c) What is the oxidation number of Fe in $[\text{Fe}(\text{CN})_6]^{-4}$ [2]

SECTION C

(Attempt any two questions only)

Question 8.

- (a) What are enantiomers ? [2]
- (b) In what way does a racemic mixture differ from a chiral compound ? [2]
- (c) Write the names and structures of three isomers which have the same molecular formula $\text{C}_3\text{H}_8\text{O}$. Identify the type of isomerism shown by them. [4]
- (d) Draw structures to illustrate geometrical isomerism. [2]

Question 9.

Describe the following : [10]

- (a) Reimer Tieman Reaction
- (b) Kolbe Schimidt Reaction
- (c) Cannizaro's Reaction
- (d) Aldol Condensation
- (e) Friedel Craft alkylation reaction

Question 10.

- (a) Write a chemical equation to distinguish between ethanol and methanol. [3]
- (b) What happens when [4]
- (i) $\text{C}_6\text{H}_5\text{OH} + \text{Zn} \xrightarrow{\text{heat}} \dots\dots\dots + \dots\dots\dots$
- (i) $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{Conc. H}_2\text{SO}_4 \quad 443 \text{ K}} \dots\dots\dots$
- (c) Identify the products A, B, C in the following sequence of operations : [3]

