DAY — 09 SEAT NUMBER | | | | | | |

2016	II	29	1100	J-767	(E)

CHEMISTRY (55)

(PHYSICAL AND INORGANIC CHEMISTRY)

Time : 3 Hrs. **(7 Pages)** **Max. Marks : 70**

Notes :

(i) All questions are compulsory.

(ii) Answers of both the sections should be written in same answer book.

(iii) Draw well labelled diagrams and write balanced equations wherever necessary.

(iv) Figures to the right indicate full marks.

(v) Use of logarithmic table is allowed.

(vi) Every new question must be started on a new page.

SECTION - I

Q. 1. Answer any SIX of the following : **[12]**

(i) What is ferromagnetism? Iron (z = 26) is strongly ferromagnetic. Explain.

(ii) Define boiling point. Write the formula to determine molar mass of a solute using freezing point depression method.

(iii) Write mathematical equations of first law of thermodynamics for the following processes :

(a) Adiabatic process

(b) Isochoric process

(iv) Explain graphical method to determine activation energy of a reaction.

(v) Write the names and chemical formulae of any one ore of iron and zinc each.

(vi) What is the action of

(a) Sodium on arsenic

(b) Magnesium on bismuth

(vii) Define Enthalpy of sublimation. How is it related to enthalpy of fusion and enthalpy of vaporization?

(viii) What are Ellingham diagrams? Write any two features of it.

Q. 2. Answer any THREE of the following : **[9]**

(i) Silver crystallises in FCC structure. If density of silver is $10{\cdot}51\ g.cm^{-3}$, calculate the volume of unit cell.
[Atomic mass of silver (Ag) = $108\ g.m^{-1}$]

(ii) The vapour pressure of pure benzene is 640 mm of Hg. $2{\cdot}175 \times 10^{-3}$kg of non-volatile solute is added to 39 gram of benzene, the vapour pressure of solution is 600 mm of Hg. Calculate molar mass of solute (C = 12, H = 1).

(iii) Calculate C–Cl bond enthalpy from following reaction :
$CH_3Cl_{(g)} + Cl_{2(g)} \rightarrow CH_2Cl_{2(g)} + HCl_{(g)}\ \Delta H° = -104KJ$
If C-H, Cl-Cl and H-Cl bond enthalpies are 414, 243 and 431 KJ-Mol^{-1} respectively.

(iv) Define cell constant. Draw a neat and well labelled diagram of primary reference electrode.

Q. 3. Answer any ONE of the following : [7]

(A) Write four points of differences between properties of nitrogen and other elements of group 15.

Explain the structure of ClF_3.

Conductivity of a solution is $6 \cdot 23 \times 10^{-5} \Omega^{-1} cm^{-1}$ and its resistance is 13710Ω. If the electrodes are 0·7cm apart, calculate the cross-sectional area of electrode.

Why is molality of a solution independent of temperature?

(B) What are neutral oxides? Explain the nature of zinc oxide with the help of the reactions.

Define 'Molar conductivity' and 'zero order reaction'.

In a first order reaction $x \rightarrow y$, 40% of the given sample of compound remains unreacted in 45 minutes. Calculate rate constant of the reaction.

Q. 4. Select and write the most appropriate answer from the given alternatives for each sub-question : [7]

(i) The molecular formula $H_2S_2O_2$ represents which oxoacid among the following?

(a) Hydrosulphurous acid

(b) Thiosulphurous acid

(c) Sulphuric acid

(d) Pyrosulphurous acid

(ii) Iodine exists as –

(a) polar molecular solid

(b) ionic solid

(c) nonpolar molecular solid

(d) hydrogen bonded molecular solid

(iii) Absolute entropies of solids, liquids and gases can be determined by –

(a) Measuring heat capacity of substance at various temperatures.

(b) Subtracting standard entropy of reactants from products.

(c) Measuring vibrational motion of molecules.

(d) Using formula $\Delta S^\circ = S^\circ_T - S^\circ_O$.

(iv) The determination of molar mass from elevation in boiling point is called as –

(a) cryoscopy (b) colorimetry

(c) ebullioscopy (d) spectroscopy

(v) The process of leaching alumina, using sodium carbonate is called –

(a) Bayer's process (b) Decomposition

(c) Cyanide process (d) Hall's process

(vi) On calculating the strength of current in amperes if a charge of 840 C (coulomb) passes through an electrolyte in 7 minutes, it will be –

(a) 1 (b) 2

(c) 3 (d) 4

(vii) $A \rightarrow B$ is a first order reaction with rate $6{\cdot}6 \times 10^{-5} m\text{–}s^{-1}$. When [A] is 0·6 m, rate constant of the reaction is –

(a) $1{\cdot}1 \times 10^{-5} s^{-1}$ (b) $1{\cdot}1 \times 10^{-4} s^{-1}$

(c) $9 \times 10^{-5} s^{-1}$ (d) $9 \times 10^{-4} s^{-1}$

SECTION - II

Q. 5. Answer any SIX of the following : **[12]**

(i) Why is Sc^{3+} colourless while Ti^{3+} coloured? (Atomic number Sc = 21, Ti =22)

(ii) Illustrate with example, the difference between a double salt and a co-ordination compound.

(iii) How is chlorobenzene prepared from aniline? How is chlorobenzene converted into diphenyl?

(iv) What is metamerism? Explain metamerism with suitable examples of ethers.

(v) What are ketones? How are ketones classified?

(vi) How are (a) 1- nitropropane and (b) 2 - nitropropane prepared from suitable oxime?

(vii) Define antioxidants. Draw structure of BHT.

(viii) What are carbohydrates? Write the reaction for the preparation of Nylon-6.

Q. 6. Answer any THREE of the following : **[9]**

(i) What are f-block elements? Distinguish between lanthanoid and actinoids.

(ii) Explain the terms -

(a) Optical activity

(b) Ligand

(c) Interstitial compounds.

(iii) Write the formula of Tetraminodichloroplatinum (IV) chloride. How is propene converted into 1- bromopropane and 2 - bromopropane?

(iv) What are broad-spectrum antibiotics?

How are polythene and neoprene prepared?

Q. 7. Answer any ONE of the following : [7]

(i) Explain the mechanism of esterification. Write the reactions involved in dehydration of 1°, 2° and 3° alcohols.

(ii) What are vitamins? Name any two diseases caused by deficiency of Vitamin A. Write the structures of

(a) nucleoside (b) nucleotide

How are 1 - nitropropane, 2-nitropropane and 2-methyl 2-nitropropane are distinguished from each other using nitrous acid?

Q. 8. Select and write the most appropriate answers from the given alternatives : [7]

(i) The preparation of alkyl fluoride from alkyl chloride, in presence of metallic fluorides is known as

(a) Williamson's reaction (b) Finkelstein reaction

(c) Swarts reaction (d) Wurtz reaction

(ii) Identify the weakest acidic compound amongst the following

(a) p-nitrophenol (b) p-chlorophenol

(c) p-cresol (d) p-aminophenol

(iii) On acid hydrolysis, propane nitrile gives

(a) propanal (b) acetic acid

(c) propionamide (d) propanoic acid

(iv) Which of the following amines yields foul smelling product with holoform and alcoholic KOH?

(a) Ethyl amine (b) Diethyl amine

(c) Triethyl amine (d) Ethyl methyl amine

(v) Which of the following NOT present in DNA?

(a) adenine (b) Guanine

(c) Thymine (d) Uracil

(vi) Amongst the followings, identify a copolymer?

(a) Orlon (b) PVC

(c) PHBV (d) Teflon

(vii) Phenelzine is used as an

(a) analgesic (b) antiseptic

(c) antipyretic (d) antidepressant

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[12]