

II PUC MID-TERM EXAMINATION, SEPT./OCT. - 2026

Time : 3 Hours

SUBJECT : CHEMISTRY (34)

Max Marks : 70

PART-A

- I Select the correct option from the given choices: 15x1=15**
- If molality of the dilute solution is halved, then the value of the molal depression constant will be
a) halved b) tripled c) doubled d) unchanged
 - The cell used in Apollo space program for providing electric power is
a) Daniel cell b) $H_2 - O_2$ fuel cell c) Dry cell d) Mercury cell
 - The common oxidation state shown by the element with atomic number 21 is
a) +3 b) + 4 c) + 5 d) Both + 3 and + 4
 - Statement I : Replacement of the diazonium group by iodine does not require the presence of cuprous halide
Statement II : It is difficult to prepare Iodobenzene from diazonium salts.
a) Both Statement I and II are correct
b) Both Statement I and II are incorrect
c) Statement I is correct and Statement II is incorrect
d) Statement I is incorrect and Statement II is correct
 - Phenol reacts with Bromine water to form a white precipitate of A. A is
a) O-Bromophenol b) P-Bromophenol
c) m-Bromophenol d) 2, 4, 6 - Tribromophenol
 - The mixture which shows positive deviation from Raoult's law is
a) n-hexane and n-heptane b) Phenol and aniline
c) Ethanol and acetone d) Chloroform and acetone
 - The product obtained when $I^{(-)}$ reacts with $KMnO_4$ in faintly alkaline or neutral medium is
a) IO_3^- b) $IMnO_4^+$ c) I_2 d) I_3O^-
 - The pair of electrolytes that possess same value of the constant (A) in the Debye-Huckel-Onsager equation, $\Lambda_m = \Lambda_m^\circ - A\sqrt{C}$ is
a) NH_4Cl , $NaBr$ b) $NaBr$, $MgSO_4$ c) $NaCl$, $CaCl_2$ d) $MgSO_4$, Na_2SO_4
 - Chlorobenzene on reaction with $NaOH$ at 623 K and 300 atm pressure followed by acidic hydrolysis produces.
a) Phenol b) Sodium phenoxide c) Benzoic acid d) Benzaldehyde
 - IUPAC name of the compound $CH_3 - O - C_2H_5$ is
a) Ethoxymethane b) Methoxyethane c) Ethylmethylether d) Methyl ethanoate
 - The percentage of helium filled in the tank used by most scuba divers to dilute air in deep dives is
a) 32.1 b) 11.7 c) 74.2 d) 56.2
 - In fermentation process, the enzyme which converts sucrose into glucose and fructose is
a) Zymase b) Maltase c) Invertase d) Lipase
 - In a reaction, when the concentration of reactant is increased two times, the increase in rate of reaction was four times. Order of the reaction is
a) Zero b) 1 c) 2 d) 3

(P.T.O.)

- 14) Isopropyl magnesium bromide reacts with water to form
a) Isopropyl alcohol b) n-propyl bromide c) n-propyl alcohol d) Propane
- 15) Match the following transition metal / compounds with their catalytic activity in the corresponding process.

Transition metal/compounds	Name of the process
A. $\text{TiCl}_4 + \text{Al}(\text{CH}_3)_3$	i) Wacker process
B. PdCl_2	ii) Contact process
C. Ni	iii) Manufacture of polythene
D. V_2O_5	iv) Hydrogenation of fats
a) A-i, B-ii, C-iii, D-iv	b) A-iii, B-i, C-ii, D-iv
c) A-iii, B-i, C-iv, D-ii	d) A-i, B-ii, C-iv, D-iii

II Fill in the blanks by choosing the appropriate word from those given in the brackets:
5x1=5

(retention, inversion, spontaneous, increases, anti-Markovnikov's, hydrogen)

- 16) The positive E^0 value shows that the reactions are _____.
- 17) SN^2 reactions of optically active alkyl halides are accompanied by _____ of configuration.
- 18) The gas liberated when lanthanoids react with acids is _____.
- 19) As temperature decreases solubility of gases in liquid _____.
- 20) In hydroboration-oxidation, the product formed is in accordance with _____ rule.

PART-B

III Answer any THREE of the following. Each question carries two marks. 3x2=6

- 21) What is Lucas reagent ? Which class of alcohols does produce turbidity immediately with it?
- 22) Write any two differences between order and molecularity of a reaction.
- 23) Study of Actinoids is difficult. Give two reasons.
- 24) What is a secondary cell ? Give an example for it.
- 25) Complete the following reaction and also name the reaction.



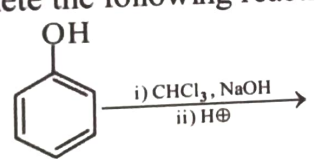
PART-C

IV Answer any THREE of the following. Each question carries three marks. 3x3=9

- 26) What is Lanthanoid Contraction ? Mention any two consequences of it.
- 27) a) Calculate the magnetic moment of Fe^{2+} by using spin only formula ($Z = 26$) (2)
b) Zn^{2+} is colourless. Give reason. (1)
- 28) Write the chemical equations involved in the preparation of potassium dichromate from chromite ore.
- 29) What are interstitial compounds ? Give any two characteristics of interstitial compounds.
- 30) Write the formula of the three different types of compounds formed when lanthanoids react with carbon (or) heated with carbon.

- V Answer any TWO of the following. Each question carries three marks. 2x3=6**
- 31) Write a neat labelled diagram, cell representation and half cell reaction of standard hydrogen electrode (SHE). (2)
- 32) a) Name any two methods to prevent corrosion. (2)
b) Give an example for inert electrode. (1)
- 33) What are ideal solutions ? Give any two characteristics of ideal solution. (3)
- 34) Derive an integrated rate equation for the rate constant of zero order reaction. (2)

PART-D

- VI Answer any FOUR of the following. Each question carries five marks. 4x5=20**
- 35) a) How is phenol manufactured by cumene process? (3)
b) pKa values of phenol, O-Cresol, and O-nitrophenol are 10.0, 10.2 and 7.2 respectively. Arrange the given compounds in the increasing order of their acidic strength. (2)
- 36) a) Write the mechanism for acid catalysed dehydration of Ethanol to Ethene. (3)
b) Complete the following reactions. (2)
- i) $\text{CH}_3 - \text{CH}_2 - \text{OH} + [\text{O}] \xrightarrow{\text{PCC}} \text{_____}$
- ii) $\text{CH}_3 - \overset{\text{O}}{\parallel}{\text{C}} - \text{CH}_3 + \text{H}_2 \xrightarrow{\text{Pd}} \text{_____}$ (2)
- 37) a) Explain Williamson's ether synthesis with an example. (2)
b) Complete the following reaction and also name the reaction.
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- c) Name the major product formed when anisole is treated with Bromine in ethanoic acid. (1)
- 38) a) Explain $\text{S}_{\text{N}}1$ mechanism for the conversion of tertiary butyl bromide to tertiary butyl alcohol. (2)
b) Aryl halides are extremely less reactive towards nucleophilic substitution reactions. Give two reasons. (2)
c) Among Iodobutane and chlorobutane, which one would under $\text{S}_{\text{N}}2$ reaction faster ? (1)
- 39) a) What are enantiomers ? Give example. (2)
b) Name the products formed in Friedel-Crafts methylation of Chlorobenzene. (2)
c) What is a Chiral carbon atom ? (1)
- 40) A compound 'M' with molecular formula C_3H_6 reacts with HBr to give compound 'N' which on reaction with sodium metal in dry ether produces compound 'P'. Compound 'N' on reaction with some reagent 'R' yields compound 'M'. Compound 'M' on reaction with reagent 'X' produces isomer of compound 'N'. Write the structures of M, N and P. Mention the reagents R and X. (2)

PART-E

[Numerical Problems]

- VII Answer any THREE of the following. Each question carries three marks. 3x3=9**
- 41) A first order reaction is found to have a rate constant, $K = 5.5 \times 10^{-14} \text{ s}^{-1}$. Find the half-life of the reaction. (3)

- 42) Calculate the value of $\log K_c$ (K_c = equilibrium constant) for the following cell reaction.



Given $E_{\text{cell}}^0 = 0.236 \text{ V}$ at 298 K

- 43) 200 cm^3 of an aqueous solution of a protein contains 1.26 g of the protein. The osmotic pressure of such a solution at 300 K is found to be $2.57 \times 10^{-3} \text{ bar}$. Calculate the molar mass of the protein.

Given : $R = 0.083 \text{ L bar mol}^{-1} \text{ K}^{-1}$

- 44) The mole fraction of helium in a saturated solution at 20°C is 1.2×10^{-6} . Find the partial pressure of helium above the solution. Given Henry's law constant at $20^\circ \text{C} = 144.97 \text{ K bar}$.

- 45) The standard electrode potential for Daniel cell is 1.1 V . Calculate the standard Gibbs energy for the reaction



Given : $1F = 96500 \text{ C}$

- 46) A solution of CuSO_4 is electrolysed for 10 minutes with a current of 1.5 amperes . What is the mass of the copper deposited at the cathode ?

[Given : Molar mass of Copper = 63 g mol^{-1} and $1F = 96500 \text{ C mol}^{-1}$]
