



A Charutar Vidya Mandal's Institution
V.P. & R.P.T.P. SCIENCE COLLEGE
(AUTONOMOUS) (Grant-in-Aid)
Affiliated to Sardar Patel University
VALLABH VIDYANAGAR-388120

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Bachelor of Science (Semester 2) External Examination April – 2025 (NEP)

Subject code : US02IDCHE01

Subject name : Fundamentals of Chemistry-II

Date : 10-04-25, (Thursday)

Time : 02:00 P.M. to 03:30 P.M.

Total marks : 25

Q. 1 Write the most appropriate answer from the following multiple-choice question. [5]

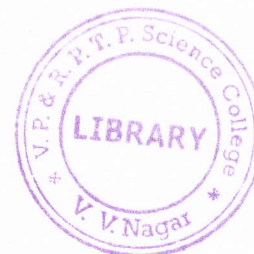
- (1) What was the term proposed by Werner for the number of groups bound directly to the metal ion in a coordination complex?
(a) Secondary valence (b) Primary valence (c) Oxidation number (d) Polyhedra.
- (2) Coordination number is a characteristic of which of the following?
(a) Ligand (b) Central atom (c) Coordination entity (d) Coordination compound.
- (3) Which of the following is used as a catalyst in nitration of benzene ?
(a) Both Conc. HNO_3 and Conc. H_2SO_4 (b) Conc. HNO_3 (c) Conc. H_2SO_4 (d) None of these.
- (4) In Arrhenius plot, intercept is equal to :
(a) $\ln A$ (b) $\ln k$ (c) $-E_a/R$ (d) $\log_{10} a$.
- (5) Rate constant of a reaction depends upon :
(a) Time (b) Temperature (c) initial concentration (d) none of these.

Q. 2 ANSWER THE FOLLOWING

(a) In the co-ordination compound $[\text{Cu}(\text{acac})_2]$:

[5]

- (a) The oxidation state of copper is ____.
- (b) The co-ordination number of copper ion is ____.
- (c) The dentate character of ligand is ____.
- (d) Ionic charge on complex is ____.
- (e) IUPAC name of the co-ordination compound is ____.



(b) Give detail stepwise reaction mechanism for nitration of benzene.

[5]

OR

[P.T.O.]

Q. 2 ANSWER THE FOLLOWING

- (a) What are ligands ? Giving illustration, give the classification of ligands based on the number of donor atoms present in ligands. [5]
- (b) What are the limitations of Friedel-Crafts alkylation? Give detail stepwise reaction mechanism for alkylation of benzene. [5]

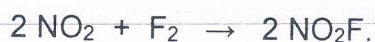
Q.3 ANSWER THE FOLLOWING

- (a) What is an integrated rate law ? Derive integrated rate for second order reaction. [5]
- (b) For reaction : $\text{C}_2\text{H}_5\text{I} + \text{OH}^- \rightarrow \text{C}_2\text{H}_5\text{OH} + \text{I}^-$ [5]
 $K = 5.03 \times 10^{-2} \text{ M}^{-1}\text{Sec}^{-1}$ at 289°K and $K = 6.71 \text{ M}^{-1} \text{Sec}^{-1}$ at 333°K . What is the activation energy of the reaction ? What is the rate constant at 305°K ? (Given: $R = 1.987$).

OR

Q. 3 ANSWER THE FOLLOWING

- (a) Write Arrhenius equation and give meaning of each term involve in it and also draw the graph. [5]
- (b) What is reaction mechanism ? Write mechanism and differential rate law of following reaction. [5]



THE END

