

B.Sc. Semester - 3 (CBCS) Examination

Oct/Nov. -2018

CHEMISTRY(CORE)

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
 2. Figures to the right indicate marks.
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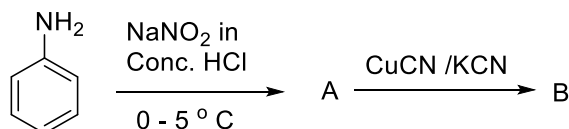
Q. 1 (A) Give any four difference between bonding molecular orbitals (BMO) and anti-bonding molecular orbitals (ABMO). [04]

Q. 1 (B) Answer the following (Any Two) [10]

- (1) Give any five postulates of wave mechanics.
- (2) Derive Schrodinger's wave equation in three dimensions using Cartesian co-ordinates.
- (3) Explain: sp - hybridization.

Q. 2 (A) Answer the following: [04]

- (1) Give the components and applications of Misch Metal
- (2) Complete the following reactions.



Q. 2 (B) Answer the following (Any Two) [10]

- (1) Give the atomic number, symbol, name, electronic configuration, oxidation state and M^{+3} color of lanthanide elements.
- (2) Discuss: Ullmann reaction with mechanism and applications.
- (3) Discuss: Elimination – Addition (benzyne) mechanism for the aromatic nucleophilic substitution.

Q. 3 (A) Give the IUPAC name of each of following molecules. [04]



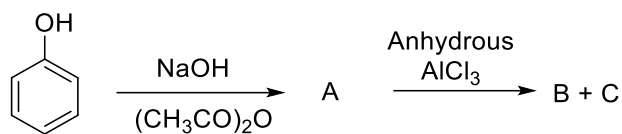
Q. 3 (B) Answer the following (Any Two) [10]

- (1) Write note on:
 - (a) Hinsberg Reaction
 - (b) Lucas Test
- (2) Give the following synthesis of phenol:
 - (a) Dow process
 - (b) Cumene process
- (3) Give any one preparations of aliphatic amine, aromatic amine, nitro, nitrile and isonitrile compounds.

Q. 4 (A) Answer the following:

[04]

- (1) Define: (i) Component (ii) Degree of freedom
- (2) Complete the following reactions.



Q. 4 (B) Answer the following (Any Two)

[10]

- (1) Explain: Reimer-Tiemann reaction with mechanism and application.
- (2) Explain: Sulphur system by phase diagram.
- (3) Explain: Pinacol-Pinacolone rearrangement with mechanism and application.

Q. 5 (A) Calculate ΔG_{mix} at 127 °C when one mole of each two ideal gases are mixed together.

[R=8.314 J/Kmol]

[04]

Q. 5 (B) Answer the following (Any Two)

[10]

- (1) Explain: Vapour pressure composition curve for non-ideal solutions.
- (2) Give any five applications of Distribution law.
- (3) Calculate the relative proportion of N_2 and O_2 in water if we assume that air contains 75% N_2 and 25% O_2 . Henry constant: $N_2 = 6.51 \times 10^7 \text{ mm}$, $O_2 = 3.30 \times 10^7 \text{ mm}$, pressure of air over water is 760mm.
