BSc3CheC0301

Seat No :_____

B.Sc. Semester - 3 (CBCS) Examination
December. -2020 [OLD COURSE]
CHEMISTRY (CORE)

Time: 1:30 Hours

Marks: 42

Instructions:
1. Figure to the right indicate marks.
2. There are five questions in the question paper.
3. Answer any three of the following questions.

Q. 1 (A) Give any two postulates of wave mechanics. [04]

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

(1) Explain: sp - hybridization.

(2) What is eigen function and eigen value. Explain with examples.
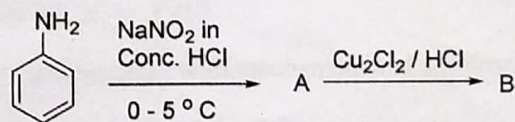
(3) Give any three differences of BMO and ABMO.

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

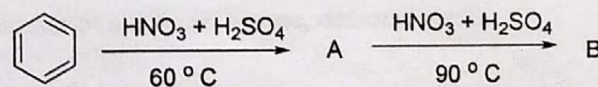(1) Give the atomic number, symbol and name of lanthanide elements.

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

(1) Give the uses of lanthanides.

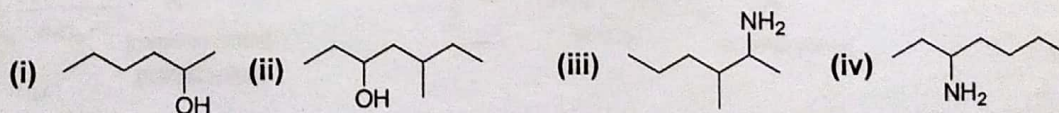(2) Complete the following reactions.

(a)

(b)

(3) Discuss: Fitting reaction with mechanism and applications.

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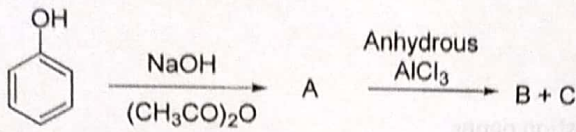

(i)   (ii)   (iii)   (iv)

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

(1) Write note on: Hinsberg Reaction

(2) Give the synthesis of alcohol from the reduction of aldehyde, ketone, carboxylic acid and ester.

(3) Give any three preparations amine.

Q. 4 (A) Answer the following: [04]

Complete the following reactions.

Q. 4 (B) Answer the following (Any Two) [10]

(1) Explain: Kolbe-Schmitt reaction with mechanism and application.

(2) Explain: Sulphur system by phase diagram.

(3) Explain: water system by phase diagram.

Q. 5 (A) Give the limitations of Henry's Law. [04]

Q. 5 (B) Answer the following (Any Two) [10]

(1) State and explain Raoult's Law.

(2) Give any three applications of Distribution law.

(3) Explain: Nernst distribution law with limitations.

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BSc3CheC301x   Seat No :_____

B.Sc. Semester - 3 (CBCS) Examination
Oct/Nov. -2019 [NEW COURSE]
Chemistry-C301 (Core)

Time: 2:30 Hours   Marks: 70

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate marks.

Q. 1 (A) Write note on: Lanthanide contraction   [04]

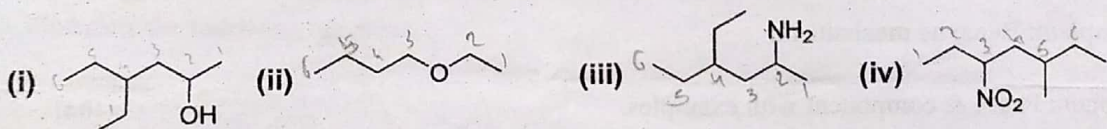**Q. 1 (B)** Answer the following (Any Two)   [10]

     (1) Determination of co-efficient for sp^2 - hybridization.

     (2) Show that $\Psi = \sqrt{\dfrac{2}{a}}\, \sin\dfrac{\pi}{a}x$ is normalized wave function and

         $\Psi_I = \sqrt{\dfrac{2}{a}}\, \sin\dfrac{\pi x}{a}$ and $\Psi_{II} = \sqrt{\dfrac{2}{a}}\, \sin\dfrac{2\pi x}{a}$ are orthogonal to each other, where $0 < x < a$.

     (3) Give the uses of lanthanides.

Q. 2 (A) Give the IUPAC name of each of following molecules.   [04]

(i)   (ii)   (iii)   (iv)

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

     (1) Discuss: Fries rearrangement with mechanism and applications.
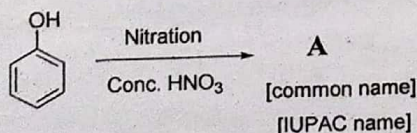
     (2) Give the following synthesis of alcohol;
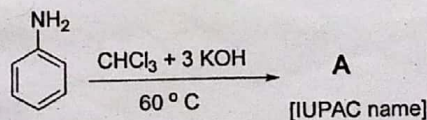   (a) by Grignard reaction.
         (b) by reduction of aldehyde, ketone, carboxylic acid.

     (3) Complete the following reactions;

     (a)
         OH →(Nitration, Conc. HNO_3)→ A [common name] [IUPAC name]

     (b)
         NH_2 →($CHCl_3$ + 3 KOH, 60 °C)→ A [IUPAC name]

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Q. 3 (A) Give the limitations of Henry's Law.   [04]

Q. 3 (B) Answer the following (Any Two)   [10]
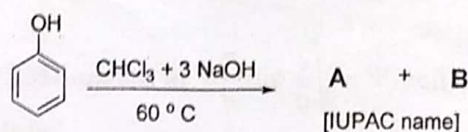
   (1) Explain: water system by phase diagram.

   (2) Write note on: Azeotropic mixtures.

   (3) Give the statement, derivation and limitations of Nernst distribution law.

Q. 4 (A) Complete the following reactions;   [04]
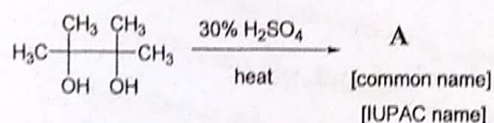
   (a)   (b)

Q. 4 (B) Answer the following (Any Two)   [10]

   (1) Write note on: Basicity of amines with effect of substitution.

   (2) Prove that: wave function $\Psi = \cos ikx$ is eigen function for operator $\dfrac{d^2}{dx^2}$ but not for $\dfrac{d}{dx}$

   (3) Explain: Benzyne mechanism.

Q. 5 (A) Explain: Phase & component with examples.   [04]

Q. 5 (B) Answer the following (Any Two)   [10]

   (1) State and explain Raoult's Law.

   (2) Preparation & chemical reactions of diazonium salts.

   (3) A mixture of liquids A & B exhibits ideal behaviour. At 90 °C, the total vapour pressure of a liquid solution containing 1.5 mol A and 2.5 mol B is 330 torr. Upon the addition of 1 more mol of B to the solution, the vapour pressure is 350 torr. Calculate the vapour pressure of pure A & pure B at 90 °C.

BSc3CheC0301

Seat No :_____

B.Sc. Semester - 3 (*CBCS*) Examination

Oct/Nov. -2018

CHEMISTRY(CORE)

54

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

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]**

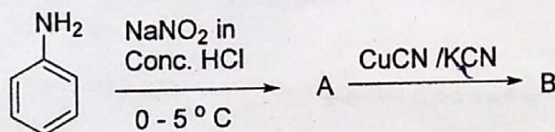(1) Give any five postulates of wave mechanics.

(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.

$$\underset{\text{NH}_2}{\bigcirc} \xrightarrow[\text{0 - 5 °C}]{\substack{\text{NaNO}_2 \text{ in} \\ \text{Conc. HCl}}} A \xrightarrow{\text{CuCN /KCN}} B$$
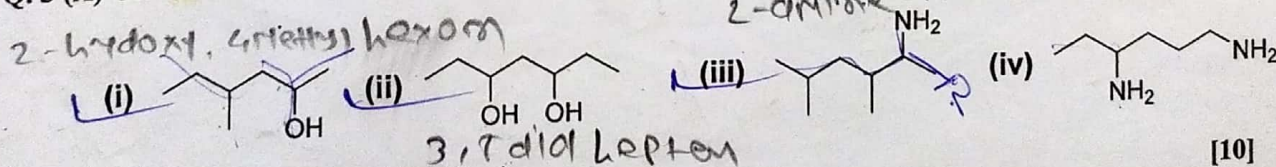
Q. 2 (B) Answer the following (Any Two) **[10]**

(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]**

2-hydoxy, 4-methyl hexon

2-amine 3, di ꣣꣣꣣

(i)   (ii)   3, 7 diol Lepton   (iii)   (iv)

Q. 3 (B) Answer the following (Any Two) **[10]**
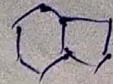
(1) Write note on:
   (a) Hinsberg Reaction
   (b) Lucas Test

(2) Give the following synthesis of phenol:
   (a) Dow process
   (b) Cumene process

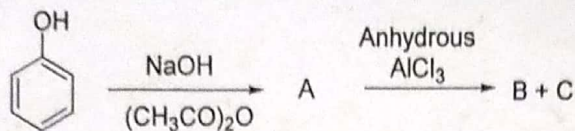(3) Give any one preparations of aliphatic amine, aromatic amine, nitro, nitrile and isonitrile compounds.

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: $N_2 = 6.51 \times 10^7$mm, $O_2 = 3.30 \times 10^7$mm, pressure of air over water is 760mm.

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