DCX-003-1013004   Seat No. _____

B. Sc. (Sem. III) (CBCS) (W.E.F. 2016) Examination

August - 2022

Chemistry : C - 301

(Old Course)

Faculty Code : 003

Subject Code : 1013004

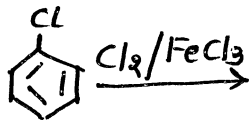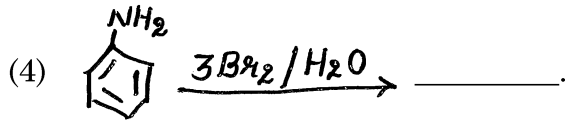Time : **2.30 Hours**]   [Total Marks : **70**

Instructions : (1) There are ten questions.

(2) Answer any five questions.

(3) All questions carry equal marks. (14 marks)

(4) Figures to the right side indicate marks.

1   Answer the following questions :

(a) Answer in short :   4

   (1) Give the symbol of Hamiltonian operator.

   (2) Write the symbol of Laplacian operator.

   (3) Give full form of LCAO.

   (4) Define : Gerade Orbital.

(b) Define Eigen function and Eigen value.   2

(c) Discuss postulates of wave mechanics.   3

(d) Derive Schrödinger wave equation in three dimensions. 5
   (Cartesian coordinates)

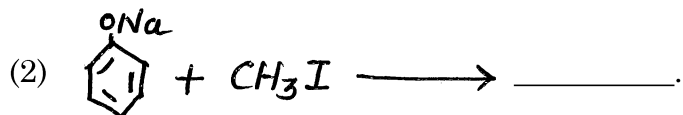2   Answer the following questions :

(a) Answer in short :   4

   (1) Ψ is denoted as _____ function in Schrödinger
      equation.

   (2) In $\lambda = \dfrac{h}{\rho}$ equation, what is h?

   (3) Give the full form of MOT.

   (4) What is Ungerade Orbitals?

(b) Write difference between BMO and ABMO.   2

(c) Explain π and π^* molecular orbitals.   3

(d) Derive the wave functions of sp hybrid orbitals.   5

3   Answer the following questions :
    (a)   Answer in short :   4
          (1)   Give the symbol of Gadolinium.
          (2)   What will be the colour of La^{+3} ion?
          (3)   Define : Aromatic halogen compound.
          (4)   Give the structure of Benzyl chloride.
    (b)   Discuss Misch Metal.   2
    (c)   Write uses of Lanthanides and their compounds.   3
    (d)   Explain Ion exchange method for isolation of   5
          Lanthanides.

4   Answer the following questions :
    (a)   Answer in short :   4
          (1)   What is Lanthanide series?
          (2)   Give the atomic number of Ce.
          (3)   Define : Benzyne.
          (4)   Give the structure of p-Nitrophenol.
    (b)   Complete the reaction :   2

    (c)   Explain Ulmann reaction.   3
    (d)   Give the preparation of Arylhalide by direct   5
          halogenation and from diazonium salts.

5   Answer the following questions :
    (a)   Answer in short :   4
          (1)   Define : Alcohol.
          (2)   What is the use of Lucas test?
          (3)   What is amino compound?

          (4)

    (b)   Give the reaction of epoxides with $LiAlH_4$.   2
    (c)   Give the sulphonation reactions of Phenol.   3
    (d)   Give methods for preparation of 1°, 2°, 3° alcohols   5
          by Grignard reagent.

6 Answer the following questions :

   (a) Answer in short :   **4**

       (1) Define : Phenol.

       (2) [structure of sodium phenoxide, ONa] $+ CH_3I \longrightarrow$ _____ .

       (3) Give the structure of Nitrobenzene.

       (4) Define : Acylation.

   (b) Discuss classification of amine compounds in short.   **2**

   (c) Explain nitration of aniline with reactions.   **3**

   (d) Write a note on Heinsberg's method in reference   **5**
of amines.

7 Answer the following questions :

   (a) Answer in short :   **4**

       (1) Give structure of Pyrogallol.

       (2) Give structure of 3-Aminophenol.

       (3) $F = C - P + 2$ in which name of term F is _____ .

       (4) Define : Component.

   (b) Give one application of Fries Rearrangement.   **2**

   (c) Write a note on Claisen Rearrangement.   **3**

   (d) Explain Reimer-Tiemann reaction with mechanism.   **5**

8 Answer the following questions :

   (a) Answer in short :   **4**

       (1) What is Kolbe's - Schmitt reaction?

       (2) Give the structure of Ethylamine.

       (3) In phase rule P means _____ .

       (4) In Pb-Ag system 2.6% _____ and 97.4% _____ present.

   (b) Write down limitations of phase rule.   **2**

   (c) Explain Water system by phase diagram.   **3**

   (d) Explain Mg-Zn system with phase diagram.   **5**

9 Answer the following questions :

(a) Answer in short :   **4**

   (1) Define : Solvent.

   (2) Define : Azeotrops.

   (3) Define : Nernst Distribution Law.

   (4) The ratio of the concentrations in the two solvents is known as the _____ coefficient as per Nernst.

(b) Give Raoult's law for Ideal solutions.   **2**

(c) Give the types of solutions with example.   **3**

(d) Explain Steam distillation in detail.   **5**

10 Answer the following questions :

(a) Answer in short :   **4**

   (1) Define : Saturated solution.

   (2) What is fractional distillation?

   (3) Give the partition-coefficient value of Iodine in H_2O - CCl_4 system.

   (4) What is the importance of solvent extraction?

(b) Explain effect of concentration of solute in reference of distribution law.   **2**

(c) Write down application of Nernst distribution law.   **3**

(d) Explain vapour pressure-composition curves of ideal and non-ideal solutions.   **5**

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