B. Sc. (Sem. III) (CBCS) Examination

October / November – 2017

Chemistry : C-301

(Chemistry Theory)

(New Course)

Faculty Code : 003
Subject Code : 1013004

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

Instructions : (1) Total five questions, all are compulsory.

(2) Every questions carry 14 marks.

1 (a) Answer the following questions :   **4**

(1) Define Eigen value.

(2) Give full name of LCAO.

(3) Define an operator.

(4) What is the difference between σ and π orbitals ?

(b) Answer any one question :   **2**

(1) Represent any one postulate of wave mechanics.

(2) Define Gerade and Ungerade molecular orbitals.

(c) Answer any one question :   **3**

(1) Derive potential energy equation of H_2^+ molecule ion.

(2) Prove that $\psi_I = \sqrt{\dfrac{2}{a}} \sin \dfrac{\pi x}{a}$ and $\psi_{II} = \sqrt{\dfrac{2}{a}} \sin^3 \dfrac{\pi x}{a}$

are orthogonal to each other. $\left(0 \leq x \leq a\right)$

(d) Answer any one question : **5**

    (1) Calculate the potential energy of H_2 and derive Schrodinger equation for it.

    (2) Derive the wave equations for sp^2 hybrid orbitals.

2 (a) Answer the following questions : **4**

    (1) Write electronic configuration of Lanthanum.

    (2) Define Lanthanide contraction shortly.

    (3) Write the structures of Benzyl chloride and Biphenyl.

    (4) Write only reactions : Bromobenzene from benzene.

(b) Answer any one question : **2**

    (1) What is Misch metal ?

    (2) Give method of preparation of benzyne from aryl halides.

(c) Answer any one question : **3**

    (1) Give the name of ores and minerals of Lanthanides.

    (2) Give chemical reactions of Benzynes.

(d) Answer any **one** question : **5**

    (1) Explain individual isolation of Lanthanides by (a) Ion exchange method (b) Solvent extraction method.

    (2) Explain Wurtz-Fitting and Ullamann reactions.

3 (a) Answer the following questions : **4**

    (1) Give method of preparation of 1° alcohol from Gridnard reagent.

    (2) Write structures of Glycerol and Glycolic acid.

    (3) Write the structures of p-nitro acetanilide and benzene diazonium chloride.

    (4) Define secondary amines, give one example of it.

(b) Answer any **one** question : 2

(1) Explain Lucas test.

(2) Give conversion of : 4-Bromo aniline from aniline.

(c) Answer any one question : 3

(1) Explain diethylether react with Cl_2 at dark and sunlight.

(2) Explain Hinsberg's test.

(d) Answer any one question : 5

(1) Explain it : Epoxide react with alcohol, ammonia and $LiAlH_4$.

(2) Give diazotization of aniline and reactions of diazonium salts.

4 (a) Answer the following questions : 4

(1) Write the structure of Indole-3-aldehyde.

(2) Write the structure of Allyl phenyl ether.

(3) Define phase rule.

(4) Define condensed phase rule.

(b) Answer any one question : 2

(1) Complete it :

(i) Phenol + Chloroform $\xrightarrow{\text{aq. NaOH}}$

(ii) Thiophene $\xrightarrow[\text{KOH}]{\text{CHCl}_3}$

(2) Define Eutectic point.

(c) Answer any one question : 3

(1) Define Fries rearrangement.

(2) Give the application of phase rule.

(d) Answer any one question : 5

(1) Explain pinacol-pinacolone rearrangement with mechanism.

(2) Explain Pb-Ag system with phase diagram.

5   (a)   Answer the following question :   **4**

        (1)   Define azeotropic mixture.

        (2)   Define saturated solutions.

        (3)   Define Nernst distribution law.

        (4)   Define solvent extraction.

   (b)   Answer any one question :   **2**

        (1)   Explain ideal solutions in short.

        (2)   Discuss the effect of temperature on distribution law.

   (c)   Answer any one question :   **3**

        (1)   Explain Henry's law.

        (2)   Derive the thermodynamical derivation of Nernst distribution law.

   (d)   Answer any one question :   **5**

        (1)   Discuss steam distillation in detail.

        (2)   Derive the equation for extraction of substance from solutions.

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