Seat No. _____

HU-003-1012004

B. Sc. (Sem. II) (CBCS) (WEF 2016)

Examination

May - 2023
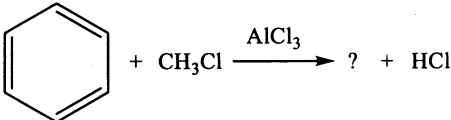
Chemistry Theory : C-201

Faculty Code : 003

Subject Code : 1012004

Time : $2\frac{1}{2}$ / Total Marks : 70

Instructions :

   (1)   This question paper contains 5 questions and all are compulsory.

   (2)   All questions carry equal marks.

   (3)   Figures given in right side are total marks of that question.

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

      (1)   What is Schottky defect ?

      (2)   Define structural isomerism.

      (3)   Write the electronic configuration of Cu.

      (4)   Define Paramagnetic substance.

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

      (1)   Define Ionization Isomerism with example.

      (2)   Give name, symbol and atomic number of first transition series elements.

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

      (1)   Discuss spin only magnetic momentum of inner orbital complex $[Fe(CN)_6]^{-4}$.

      (2)   Write a note on derivation of (r^+ / r^-) ratio in square planner crystal lattice.

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

      (1)   Write a note on types of ligands.

      (2)   Write a note on semiconductors.

2 (a) Answer the following questions :   **4**
     (1) The smallest cycloalkane is _____
     (2) Which conformer of ethane is most stable ?
     (3) Draw the structure of Bicyclo[2,2,0] hexane.
     (4) Define Dihedral angle.

     (b) Answer any one :   **2**
     (1) Explain spiro compound with example.
     (2) Explain Diels-Alder reaction.

     (c) Answer any one :   **3**
     (1) Briefly discus Baeyer's Strain Theory.
     (2) Draw energy level diagram of ethane conformers.

     (d) Answer any one :   **5**
     (1) Discuss conformational analysis of n-butane.
     (2) Discuss the chemical properties of cycloalkanes.

3 (a) Answer the following questions :   **4**
     (1) What is Huckel's Rule ?
     (2) What are Annulenes ?
     (3) Complete the reaction :

$+ CH_3Cl \xrightarrow{AlCl_3} ? + HCl$

     (4) Benzene gives _____ substitution reaction.

     (b) Answer any one :   **2**
     (1) Why cyclopentadienyl anion is aromatic ?
     (2) Naphthalene is aromatic but [10] annulene is non-aromatic. Explain.

     (c) Answer any one :   **3**
     (1) In Aniline substitution occurs at ortho and para position. Explain.
     (2) Explain Friedel-Crafts Acylation with example.

     (d) Answer any one :   **5**
     (1) Write a note on electrophilic aromatic substitution reaction with mechanism.
     (2) Discuss the reactions with mechanism.
         (a) Halogenation of benzene
         (b) Nitration of benzene
         (c) Sulphonation of benzene

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

    (1) Define pH.

    (2) What is common ion effect ?

    (3) What is molar solubility ?

    (4) $H_2O + H_2O \rightleftharpoons H_3O^+ + OH^+$

    From the given reaction, at equilibrium ionic product of water, K_w = _____.

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

    (1) $CH_3COOH_{(aq)} \rightarrow CH_3COO^-_{(aq)} + H^+_{(aq)}$

    What is K_a for the above reaction ?

    (2) Define Axis of Symmetry.

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

    (1) Write a note on pH Scale.

    (2) Write a note on Miller Indices

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

    (1) Write a note on solubility and solubility product of sparingly soluble salt.

    (2) Discuss the internal structure of NaCl (Rock Salt) by X-Ray diffraction data.

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

    (1) Define Plane of Symmetry in crystallography.

    (2) Draw the structure of Body Centered Cubic Lattice.

    (3) Give Bragg's equation.

    (4) Define Crystal Lattice.

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

    (1) Define Degree of dissociation.

    (2) Draw unit cell of NaCl.

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

    (1) Discuss hydrolysis of salts of weak acids and strong base.

    (2) Define : Simple cubic lattice, face centered cubic lattice, body centered cubic lattice.

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

    (1) Explain Buffer solution in detail.

    (2) Explain Bragg's Law of diffraction.

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