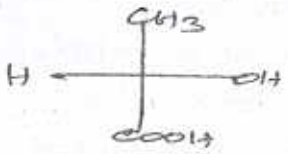
7. (a) Discuss the Woodward-Hoffmann rule for $4n\pi$ electron system.

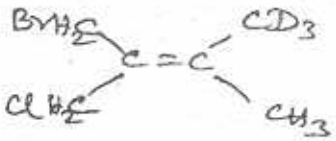
(b) Explain why (2 + 2) cycloaddition takes place photochemically while (4+2) cycloaddition occurs thermally using frontier molecular orbital theory.

(c) Discuss the mechanism of any two sigma tropic rearrangements. (4 + 8 + 8)

8. (a) Write the conformations of 2,3-dichlorobutane and analyse their stability.

(b) Designate RS/EZ notation for the following and justify

(i) 

(ii) 

(c) Draw the conformations of per-hydro phenanthrene and perhydroanthracene and discuss.

(d) Describe the optical activity and stability of cis and trans -1,2-dimethylcyclohexane.

(4 +4 + 6 +6)

Reg. No. : .....

D 643 **Q.P. Code : [D 07 PCH 01]**

(For the candidates admitted from 2007 onwards)

M.Sc. DEGREE EXAMINATION, DECEMBER 2009.

First Year

Chemistry

ORGANIC CHEMISTRY — I

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.

(5 × 20 = 100)

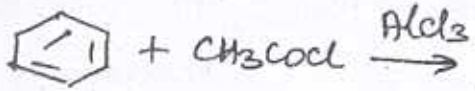
1. (a) Cyclopentadienyl anion is aromatic but cyclopentadienyl cation is non-aromatic- Explain.

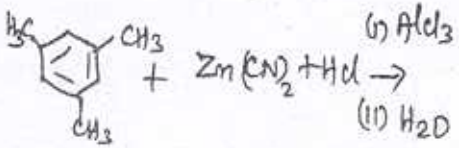
(b) Illustrate with suitable examples, how analysis of intermediates and stereochemical studies can be used to find out reaction mechanism.

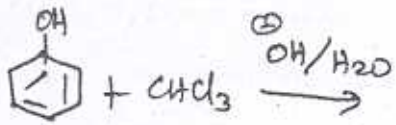
(c) Discuss kinetic and thermodynamic control with a suitable reaction. (4 + 8 + 8)

2. (a) Illustrate with resonance structures, the orientation of nitro and methoxy groups in aromatic electrophelic substitution.

(b) Complete the following and discuss the mechanism

(i) 

(ii) 

(iii) 

(8 + 12)

3. (a) Illustrate neighbouring group participation by $c=c$ bond with a reaction.

(b) Give any examples of Ambident substrates and explain their behaviour.

(c) Discuss the mechanism of ester hydrolysis by B_{AC^2}, A_{AC^2} and A_{Ae^1} processes. (4 + 4 + 12)

4. (a) How Nitrenes are generated? Give any two reactions of Nitrenes.

(b) Discuss the stereochemistry and mechanism of elimination in Bridge head ring compound and Chugaev reaction.

(c) Write an account of the following :

(i) E_i mechanism

(ii) Structure of carbenes. (4 + 8 + 8)

5. (a) Explain the stability of triphenylmethyl free radical with resonance structures.

(b) Describe the free radical elimination and addition reactions.

(c) Write a note on the following

(i) ullman reaction

(ii) sandmeyer reaction. (4 + 8 + 8)

6. Describe the mechanism and synthetic utility of the following

(a) stobbe reaction

(b) Knowenegal reaction

(c) Darzan reaction

(d) Michael addition

(e) Hydroborahon. (5 × 4 = 20)

Reg. No. : .....

D 644 Q.P. Code : [D 07 PCH 02]

(For the candidates admitted from 2007 onwards)

M.Sc. DEGREE EXAMINATION, DECEMBER 2009.

First Year

Chemistry

INORGANIC CHEMISTRY — I

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.

(5 × 20 = 100)

1. (a) Discuss the methods of synthesis of carbonyl clusters. (10)

   (b) How will you obtain the high-valent alkylidynes and alkylindenes? (10)

2. (a) Give a brief summary on dislocation effects. (10)

   (b) How will you prepare borazine? Discuss the structure of hexagonal boron nitride. (10)

3. (a) Explain in detail the Meissner effect. (10)

(b) What is called a fluxiod? Discuss the effect of flow of persistent current in a ring of a type I superconductor. (10)

4. (a) List the different types of nuclear forces and interactions in nature. Discuss. (10)

(b) Give a detailed account of the merits of the liquid drop model. (10)

5. (a) What is known as a nuclear isomer? Discuss its correlation with magic numbers. (10)

(b) Explain elastic and inelastic scattering. (10)

6. (a) Give an example and explain isotope exchange reaction. (10)

(b) Describe the hard core performation theory of fission. (10)

7. (a) Sketch the proportional counter and describe. (10)

(b) Describe the reactions taking place in NAI scintillator. (10)

8. (a) What is called Anger effect? Explain the principles. (10)

(b) Give the schematic diagram of a differential thermal analyser and describe. (10)

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8. (a) Compare MB, BE and FD statistics. (5)

(b) Give a comparative account of Einstein and Debye theory of specific heat of solids. (10)

(c) Derive an expression for translational partition function of a molecule. (5)

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Reg. No. : .....

D 645 Q.P. Code : [D 07 PCH 03]

(For the candidates admitted from 2007 onwards)

M.Sc. DEGREE EXAMINATION, DECEMBER 2009.

First Year

Chemistry

PHYSICAL CHEMISTRY – I

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.

(5 × 20 = 100)

1. (a) Construct the multiplication table for the symmetry operations of NH_3 molecule. (5)

(b) Describe the sequence of steps proposed for classifying molecules into point groups. (10)

(c) Assign the point group to the following molecules.

(i) HCl

(ii) SF_6

(iii) H_2O

(iv) CH_2Cl_2

(v) Benzene. (5)

2. (a) What is called an irreducible representation of the group? (5)

(b) Construct the character table for C_{2v} and explain. (10)

(c) State orthogonality theorem and explain. (5)

3. (a) State the conditions of an acceptance wave function. (5)

(b) Deduce the time – dependent Schrodinger wave equation. (10)

(c) Give the first postulate of quantum mechanics and explain. (5)

4. (a) Explain briefly the Schrodinger equation for a rigid rotator. (5)

(b) Derive an expression for energy of a particle assumed to be in one dimensional box. (10)

(c) Sketch the energy levels of a quantum – mechanical harmonic oscillator and explain. (5)

5. (a) Discuss the concept of electron orbitals. (5)

(b) Indicate how Schrodinger wave equation for H – atom can be separated for variables r, θ and ϕ. (10)

(c) Discuss the applications of line – independent perturbation theory. (5)

6. (a) Discuss the various of fugacity with temperature. (5)

(b) Define fugacity. How is the fugacity for an ideal gas determined using graphical method. (10)

(c) How will you determine the activity of an electrolyte from freezing point measurements? (5)

7. (a) State Stirling's approximation. Discuss its uses. (5)

(b) Derive the Maxwell – Boltzmann distribution law. (10)

(c) Account for the statement – 'Entropy is a logarithmic function of probability'. (5)