Ref

Reg. No. : .....

D 2108 Q.P. Code : [D 07 PCH 01]

(For the candidates admitted from 2007 onwards)

M.Sc. DEGREE EXAMINATION, MAY 2013.

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) Explain how primary kinetic isotope effect is helpful in determining the rate determining step of a reaction taking the case of aromatic electrophilic substitution reaction as on example.

(b) Describe the importance of the σ constant of different substituents. Explain the sign of σ constant.

(c) Indicate how isotope labeling is useful in identifying the location of breakage during ester hydrologysis.

(d) What are annuleness? How are they classified/named? Draw the structures of [14] annulene and [16] annulene showing the exact number of inner and outer C-H bonds in each case. (5+5+5+5)

2. (a) Discuss the mechanism of Reimer Tiemann reaction. Explain why this reaction is so special with phenolic compounds.

(b) Compare the case of reaction and range of products formed for Fridel Craft acylation and Fridel craft.

(c) Write a note on the effect of group already present in the ring in directing the incoming electrophile in an armotic substitution reaction.

(d) Discuss the mechanism of Jacobson reaction. (5+5+7+3)

3. (a) Discuss the different mechanisms of ester hydrolysis.

(b) Explain the effect of substrate structure, solvent polarity, nucleophilicity of the reagent and the leaving group ability of departing group an the course of aliphatic nucleophilic substitution reactions. (8+12)

4. (a) Discuss the methods of generating carbenes. What are the types of carbenes? Indicate how the different type of carbenes react with olefins to yield stereo specific products or otherwise.

(b) Bring out the similarities between cope elimination, Chugaev elimination and Hoffmann elimination.

(c) Compare the mechanistic features of E1, E2 and E1cB reactions. Explain how the course of these reactions are influenced by different factors. (6+6+8)

5. (a) Give a list of rearrangement reactions that go via free radical intermediates. Provide specific examples to each case.

(b) Describe the methods of preparing long lived free radicals.

(c) Explain the mechanisms of sandmeyer reaction, Pechmann reaction, Ullmann reaction and Hunsdiector reaction. (4+4+12)

6. (a) Discuss the importance of Witting reaction in alkene synthesis.

(b) Explain how Dieckmann reaction is related to Stobbe condensation.

(c) Hydroboration and hydration reaction are complimentary to each other. Illustrate with examples.

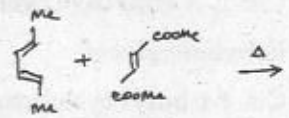
(d) Explain why Michael addition is labeled as 1, 4 addition reaction. Discuss the nature of the nucleophilies involved in Michael addition reactions. (5+5+5+5)

7. (a) Draw the orbital correlation diagram for the electro cyclic dis rotatary ring closure of 1, 3, 5- hexatriene.

(b) Indicate the use of frontier orbital theory in explaining the course of cyclo addition reaction and the stereospecificity associated with this reaction.

(c) Illustrate di– π – methane rearrangement with an example. Explain the mechanism of the reaction.

(d) Write the products in the following reactions with correct stereo chemistry wherever applicable. (7+4+3+6)

(i) 

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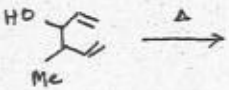
(iii) 

8. (a) Distinguish between :

(i) Configuration and conformation

(ii) DL way of nomenclature and RS nomenclature

(iii) Fischer projection and Newman projection

(iv) Enantiomers and diastereomers.

(b) What are the geometrical forms of perlydrophenanthrene? Write the conformational structures of all such forms.

(c) Write the more stable conforms of

(i) Meso-2, 3 dibromobutane

(ii) Cis-1, 3 dimethye cyclohexane

(iii) Ethylene glycol

(iv) Cis-4-t-butyl cyclohexanol. (10+6+4)

Reg. No. : .....

D 2109 **Q.P. Code : [D 07 PCH 02]**

(For the candidates admitted from 2007 onwards)

M.Sc. DEGREE EXAMINATION, MAY 2013.

First Year

Chemistry

INORGANIC CHEMISTRY — I

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.

$(5 \times 20 = 100)$

1. (a) Write short notes on inorganic rings and cages. (10)

   (b) Discuss the preparation, structure and bonding in $Re_2 cls^{2-}$ (10)

2. (a) What is heterocaternism? Explain the structure and bonding in cyclic phosphazines. (10)

   (b) Discuss stoichiometric and non-stoichiometric defects in solid with suitable examples. (10)

3. (a) What are superconductors? Mention their important properties and applications. (10)

(b) Write short notes on

(i) Electrical properties of solids

(ii) Thermoelectirc properties of solids. (10)

4. (a) Explain in detail liquid drop model. (10)

(b) Account the different types of nuclear forces. (10)

5. (a) Explain the theory of alpha emission. (10)

(b) Write notes on the following

(i) Nuclear isomerism

(ii) Internal conversion

(iii) Nuclear cross section. (10)

6. (a) Distinguish between nuclear fission and nuclear fusion reactions. What is the source of energy in these reactions? Distinguish between an atom bomb and a hydrogen bomb. (10)

(b) Describe the nuclear reactions relavant to stellar energy. (10)

7. (a) Describe the working principle of GM counter as a function of graphical representation. (10)

(b) Explain the principle and working of synchrotron in detail. (10)

8. (a) What is the principle involved differential Thermal analysis what are the factors affecting differential thermal analysis curve? (10)

(b) Describe the principle of AES and mention its applications. (10)

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D 2110 **Q.P. Code : [D 07 PCH 03]**

(For the candidates admitted from 2007 onwards)

M.Sc. DEGREE EXAMINATION, MAY 2013.

First Year

Chemistry

PHYSICAL CHEMISTRY – I

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.

$(5 \times 20 = 100)$

1. (a) Discuss the various types of symmetry elements. (6)

   (b) Describe the different points groups. (6)

   (c) Construct a group multiplication table for the H_2O molecule. (8)

2. (a) Give the statement of the great orthoganality theorem. What are its significances? (10)

   (b) Construct a character table for C_{2v} point group. (10)

3. (a) What are the requirements for an acceptable wave function? (6)

(b) Explain Born's interpretation of ψ. (6)

(c) Explain the role of operators. (8)

4. (a) Solve the Schrodinger wave equation for a particle in a three dimensional box. (10)

(b) For a particle executing simple harmonic oscillations, solve the Schrodinger wave equation. (10)

5. (a) Explain the probability distribution curves for S and P orbitals. (10)

(b) Discuss how the variation method is applied to the He atom. (10)

6. (a) Describe how the fugacity of a gas is determined by the graphical method. (10)

(b) Explain the measurement of activity of a solvent from colligative properties. (10)

7. (a) Derive the Maxwell-Boltzmann distribution equation. (10)

(b) Explain the thermodynamic probabilities of systems in equilibrium. (5)

(c) Bring out the relationship between total partition function of a molecule and the separate partition functions. (5)

8. (a) Derive the equation for rotational partition function. (5)

(b) Evaluate the translational partition function for 1 mole of nitrogen gas at 300K and 1atm. Assume, the gas behaves ideally. (5)

(c) Derive the equation for Bose-Einstein distribution. (10)
