ADU

2007

CHEMISTRY - II (Optional)

100054

Standard : Degree **Total Marks : 200**

Nature : Conventional **Duration : 3 Hours**

Note :

(i) *Answers must be written in* ***English.***

(ii) *Question* ***No. 1*** *is* ***Compulsory.*** *Of the remaining questions, attempt* ***any four*** *selecting one question from* ***each section.***

(iii) *Figures to the* ***RIGHT*** *indicate marks of the respective question.*

(iv) *Use of log table, non-programmable calculator is permitted, but any other table/code/reference book are not permitted.*

(v) *Make suitable assumptions, wherever be necessary and state the same.*

(vi) *Number of optional questions upto the prescribed number in the order in which they have been solved will only be assessed. Excess answers will not be assessed.*

(vii) *Credit will be given for orderly, concise and effective writing.*

(viii) *Candidate should not write roll number, any name (including their own), signature, address or any indication of their identity anywhere inside the answer book otherwise he/she will be penalised.*

(ix) *For each slab of 10 and 15 marks, the examinee is expected to write answers in 125 and 200 words respectively.*

1. Answer any ***Four*** of the following questions :

(a) Explain Hofmann elimination rule with suitable example. Give the mechanism of the reaction Give the following reactions of propene. **10**

(i) Epoxidation

(ii) Ozonolysis

(b) Explain the synthesis of quinoline by Skarup synthesis. What is the action of following reagents on pyridine ? **10**

(i) $Na + C_2 H_5 OH$

(ii) CH_3I

P.T.O.

Marks

(c) Give Merrifield solid phase peptide synthesis and Explain structure of ribonucleotides **10**

(d) Give the differences between thermal and photochemical processes. Explain the terms **10**

(i) Phosphorescence

(ii) Intersystem crossing

(e) Give any two methods for the preparation of alkynes. Give the following reactions- **10**

(i) 1, 3-butadiene is treated with Br_2 at 313K.

(ii) Propyne is treated with Na.

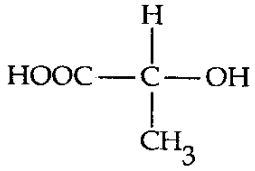
(iii) 1, 3-butadiene is reacted with maleic anhydride.

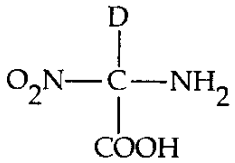
SECTION - A

2. Answer the following sub-questions :

(a) Explain the terms hyperconjugation and inductive effect. Give the structure of carbocation. Explain "p-nitrophenol is steam non-volitile while o-nitrophenol is steam volatile". **10**

(b) What is plane of symmetry ? Label R or S for the following compounds **10**

(i) 

(ii) 

Draw different conformations of cyclohexane

(c) Explain the terms bathochromic and hypochromic shift. Write note on finger print region ? What are the advantages of I.R. spectroscopy ? **10**

Marks

(d) What is meant by spin-spin coupling ? Give no. of signals, approximate positions and splitting of signals of the following compounds : **10**

(i) Ethyl acetate

(ii) Ethyl bromide

(iii) Acetaldehyde

(iv) Toluene

3. Answer the following sub-questions :

(a) Explain the terms resonance and electromeric effect ? Give the structure of carbanion. Explain "Triphenyl methyl free radical is less stable than expected" **10**

(b) What is centre of symmetry ? Differentiate between enantiomers and diastereoisomers. Which conformation of methyl cyclohexane is more stable and why ? **10**

(c) Explain the terms hypsochromic and hyperchromic shift ? Explain "I.R. spectroscopy gives sharp peaks while U.V. spectroscopy gives broad humps". **10**

(d) What is chemical shift ? A organic compound gave the following data on analysis. Find its structural formula (explain your answer) : **10**

(i) Molecular formula C_3H_8O.

(ii) Two peaks in I.R. spectra at 3300-3500cm^{-1} and 1100cm^{-1}

(iii) Three NMR signals as-δ 2.0 ppm(d) δ 2.2 ppm(m) and δ 4.0 ppm(s).

SECTION - B

4. Answer the following sub-questions :

(a) Write short note on the following : **10**

(i) Friedel-Craft reaction

(ii) Esterification reaction

(b) What is pinacol ? How is it prepared ? Give the account of pinacol pinacolone rearrangement reaction. **10**

Marks

(b) What is pH ? How is it determined by using quinhydrone electrode ? The E° of the following cell is 0.6615 V calculate equlibrium constant for the cell treaction. **10**

$Pb \mid Pb^{+2}(a=1) \mid\mid I^{-}(a=1), I_2(s) \mid Pt$

(c) (i) State Schrodinger wave equation. and explain the terms involved in it and **10**

(ii) the physical significance of wave function.

(d) Explain the use of computers in chemical analysis. **10**

9. Answer the following sub-questions :

(a) Define primary and secondary reference electrode ? Write note on calomel electrode. **10**

(b) Write note on hydrogen-oxygen fuel cell ? Explain any two methods for the preventation of corrosion. **10**

(c) Discuss the application of Schrodinger wave equation for hydrogen atom. **10**

(d) What do you understand by active and passive application of computers ? **10**

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(c) Give the mechanism of Benzoin condensation reaction. Give one reaction of the following with suitable aldehyde or ketone. **10**

(i) MPV reduction

(ii) Cannizzaro's reaction

(d) How will you prepare alkyl amine from : **10**

(i) Nitrile

(ii) Nitroalkane

(iii) Aldehyde

How will you distinguish primary and secondary amines ?

5. Answer the following sub-questions :

(a) Explain the mechanism of nitration reaction of benzene. How will you convert carboxylic acid to **10**

(i) Amide

(ii) Acid chloride

(iii) $\propto$-bromoacid

(b) Give the mechanism of Reimer-Tiemann reaction. Describe oxidative clevage of vicinal glycols by periodic acid. **10**

(c) (i) Complete the following reaction, name the reaction and give its mechanism **10**
$CH_3-CHO \xrightarrow{Na_2CO_3}$?

(ii) What happens when (give reaction) ?

(1) 2-Butenal is treated with sodium borohydride

(2) Butanone is treated with zinc amalgam + HCI

(d) Give one reaction of the synthesis of primary amine from **10**

(i) Amide

(ii) Phthalimide

Discuss the use of diazonium salt in the synthesis of various organic compounds in which diazonium group is replaced by other atoms or groups.

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SECTION - C

6. Answer the following sub-questions :

(a) Describe Claisen condensation method for the preparation of ethyl acetoacetate. How it can be used to prepare following compounds : **10**

(i) Ethyl methyl ketone

(ii) Butanedioic acid.

(b) How is pyranose ring structure of D (+) glucose determined by Haworth and Hirst method ? **10**

(c) What is polymerisation ? Explain addition polymerisation. Give preparation of Novolok resin. **10**

(d) (i) Give the sysnthesis of crystal violet. **10**

(ii) What is the atom economy ? Calculate % atom economy of the following reaction :

$$CH_3-CH_2-CH_2-CI+KOH_{(alc)} \xrightarrow{\Delta} CH_3-CH-CH_2+KCI+H_2O$$

7. Answer the following sub-questions :

(a) What is tautomerisation ? Explain it in ethyl acetoacetate. How is a following compounds prepared from dithiane derivative : **10**

(i) Phenyl propanone

(ii) n-dipentyl ketone

(b) What is mutarotation ? Explain mutarotation in D (+) glucose. Write note on sucrose. **10**

(c) Explain Ziegler - Natta polymerization. Give the synthesis of terylene. **10**

(d) (i) Give the synthesis of Malachite green. **10**

(ii) Explain role of catalyst and solvent in green chemistry.

SECTION - D

8. Answer the following sub-questions :

(a) Define standard hydrogen gas electrode ? What are its limitation ? Discuss condometric titration of : **10**

(i) Strong base against strong acid.

(ii) Mixture of strong and weak acid against weak base.