BFD

2006

CHEMISTRY - II (Optional)

000042

Standard : Degree

Nature : Conventional

Total Marks : 200

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 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 the formation of haloalkanes when propene reacts with HBr on the basis of Markonikov's and antiMarkanikov's rule. **10**

(b) Give the synthesis of quinoline by Skraup method & isoquinoline by Bischler-Napieralski synthesis. **10**

(c) What are polypeptides ? Describe solid phase peptide synthesis of polypeptides. **10**

(d) What is photochemistry ? What is its scope in daily-life ? State and explain Stark-Einstein Law of photochemical equivalence. **10**

(e) What are alkadienes ? How are they classified ? Give the details of Diels Alder reaction. **10**

P.T.O.

Marks

SECTION - A

2. Answer the following sub-questions :

(a) What are reactive intermediates ? Define carbocation & explain the structure & shape of carbocation. 10

(b) Define the term optical activity and discuss the optical isomerism of tartaric acid. 10

(c) Explain why in UV spectrum there are no sharp peaks as in IR spectrum ? The UV spectrum of an ethanolic solution of aniline shows a λ_{max} at 230nm but its solution in a dilute acid shows λ_{max} at 203nm. Explain. 10

(d) Explain the principle of NMR spectroscopy. Predict the number of NMR signals in the following compounds :

(i) CH_3-CH_2-Br (ii) $\begin{matrix} CH_2 & - & CH_2 \\ | & & | \\ Cl & & Cl \end{matrix}$

(iii) $CH_3-\underset{\underset{O}{\|}}{C}-CH_3$.

Why TMS is used as a reference standard in chemical shift measurement ? 10

3. Answer the following sub-questions :

(a) Write the mechanism of chlorination of methane. Explain how hyperconjugation is useful for stability of free radicals ? 10

(b) Explain the cause of geometrical isomerism. Discuss the chemical methods to determine configuration of geometrical isomers. 10

(c) What are the difficulties in the interpretation of an IR spectrum ? Explain the different types of vibrations associated with bonds in a molecule. 10

(d) What is chemical shift ? How is it expressed ? Explain the splitting of *nmr* signals in the following :

Compounds : (i) $CH_3\ CH_2OH$ and (ii) $CH_3-CH_2-\overset{\overset{O}{\|}}{C}-H$ 10

Marks

SECTION - B

4. Answer the following sub-questions :

(a) (i) What is Huckel rule ? How is it useful to explain the aromaticity ?

(ii) Give the A_{AC}^1 & A_{AC}^2 mechanism of preparation of ester using acid catalysed esterification reaction. **10**

(b) What are phenols ? Complete the reactions of phenol with the following reagents. **10**

(i) Br_2 water (ii) dil. HNO_3

(iii) Br_2/CS_2 at 0°C (iv) conc. $HNO_3 + H_2SO_4$

(c) Give an account of reactivity of aldehydes & ketones towards nucleophiles. Give the mechanism of aldol condensation. **10**

(d) What are amines ? How are they classified ? Explain the Hofmann's degradation method. **10**

5. Answer the following sub-questions :

(a) (i) Discuss the characteristics of aromatic compounds.

(ii) Give a detailed account of strength of carboxylic acids. Explain why chloroacetic acid is more acidic than acetic acid ? **10**

(b) Discuss the mechanism of Fries reaction with two applications. **10**

(c) Discuss Cannizzaro's reaction with mechanism. What is crossed Cannizzaro's reaction ? **10**

(d) How do primary, secondary and tertiary aromatic amines differ in their reactions towards nitrous acid ? Give account of a Gattermann reaction. **10**

Marks

SECTION - C

6. Answer the following sub-questions :

(a) Give the mechanism of Claisen condensation as involved in the synthesis of acetoacetic ester. **10**

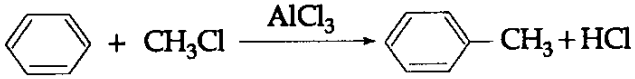
(b) What are carbohydrates ? What are different sources ? Give a detailed account of mutarotation. **10**

(c) What are polymers ? Explain the mechanism of free radical vinyl polymerisation. **10**

(d) (i) Give the synthesis and use of the Alizarin.

(ii) What is green Chemistry ? What is its importance ?

Calculate the percentage atom economy & E-factor for the following reaction.



(At-wts. : C=12, H=1 & CI = 35.5) **10**

7. Answer the following sub-questions :

(a) Describe the synthesis of malonic ester and show how resonance stabilises malonic ester anion on treatment with sodium ethoxide. **10**

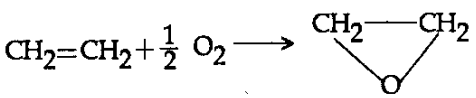
(b) Give an account of commercial importance of carbohydrates ? Give the following reactions of D-glucose and D-fructose.

(i) Acetylation (ii) Reduction with $NaBH_4$ or catalytic hydrogenation. **10**

(c) What is Ziegler-Natta catalyst ? Explain the mechanism of polymerisation of propylene using this catalyst. **10**

(d) (i) What is a dye ? Write a note on reactive dyes.

(ii) State & explain the principles as (i) energy efficiency and (ii) derivatisation involved in green chemistry approach. Find out % atom economy of the following reaction :



(At. wts. : H=1, C=12, O=16) **10**

P.T.O.

Marks

SECTION - D

8. Answer the following sub-questions :

(a) State and explain Kohlrausch's law of independent migration of ions. How will you determine the molar conductivity at infinite dilution of weak electrolytes on the basis of this law ? **10**

(b) Explain how *emf* measurements can be used to determine the change in enthalpy, equilibrium constant and free energy of a chemical reaction. **10**

(c) State the Schrodinger wave equation and explain the significance of wave function ψ. **10**

(d) What are the distinct advantages of computer interfacing with instruments ? **10**

9. Answer the following sub-questions :

(a) Discuss the effect of concentration on the molar conductivity of weak and strong electrolytes. **10**

(b) What are storage cells ? Describe the principle and working of alkaline storage cell. Describe the reaction taking place in alkaline storage cell. **10**

(c) Explain the operator concept. What conditions must an operator fulfil so that it becomes a linear operator ? **10**

(d) How are computers effective in data processing & data storage in instruments ? **10**

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