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(FYUGP)

(2nd Semester)

CHEMISTRY

(MINOR)



Paper : CHEM.M-2 (T)

(Organic Chemistry—I : Basics and Hydrocarbons)

Full Marks : 75

Pass Marks : 40%

Time : 3 hours

(PART : B—DESCRIPTIVE)

(Marks : 50)

*The figures in the margin indicate full marks
for the questions*

1. (a) Giving examples explain the classification of organic compounds with respect to hybridization. 3
- (b) Describe the rules for IUPAC nomenclature of branched-chain alkanes with example. 3
- (c) Define hybridization and determine the hybridization of carbon in methane, ethene and ethyne. 1+1+1+1=4

(2)

OR

2. (a) Explain the mechanism of an S_N1 reaction with a suitable example. 3

(b) Differentiate between inductive effect and hyperconjugation with suitable examples. $1\frac{1}{2} + 1\frac{1}{2} = 3$

(c) Define electrophiles and nucleophiles with two examples of each. 4

3. (a) What is chirality? Explain how a molecule with one chiral centre shows optical activity with an example. $1 + 2 = 3$

(b) What are *meso*-compounds? Explain with an example how they differ from enantiomers in terms of optical activity. $1 + 2 = 3$

(c) Explain the Fischer and Sawhorse projection formulae with example of 2-butanol. $2 + 2 = 4$

OR

4. (a) What is geometrical isomerism? Explain the difference between *cis-trans* with examples. 4

(b) What is the difference between enantiomers and diastereomers? 3

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(Continued)

(3)

(c) Define racemic mixtures with examples. 3

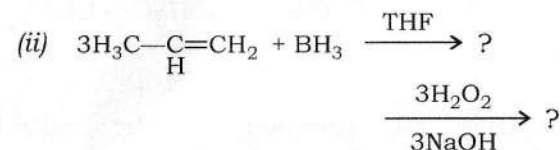
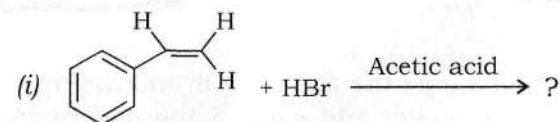
5. (a) With suitable examples, explain any two of the following reactions : $3 \times 2 = 6$

(i) Wurtz reaction

(ii) Diels-Alder reaction

(iii) Ozonolysis of alkenes

(b) Give the product(s) of the following only : $1 + 2 + 1 = 4$



OR

6. (a) Draw the various conformations of *n*-butane (Newman projection formula) and show the relative stability by drawing their potential energy diagram. $4 + 2 = 6$

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(Turn Over)

(b) Write short notes on the following : $2 \times 2 = 4$

- (i) Chlorination of methane under UV light with mechanism
- (ii) Catalytic hydrogenation of ethylene with mechanism

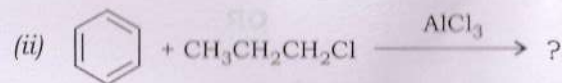
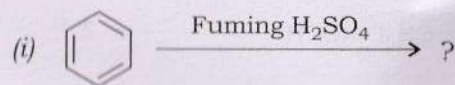
7. (a) What is Baeyer's strain theory? What are its limitations? $1\frac{1}{2} + 1\frac{1}{2} = 3$

(b) Discuss the conformations of cyclohexane and give their stability orders. $3 + 1 = 4$

(c) Arrange the following in increasing order of acidity and explain the observation : 3
 $\text{HC} \equiv \text{CH}$, $\text{H}_2\text{C} = \text{CH}_2$, $\text{H}_3\text{C} - \text{CH}_3$

OR

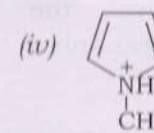
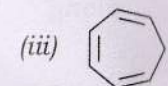
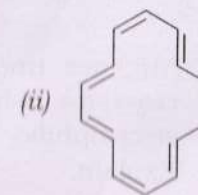
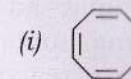
8. (a) Give the products of the following reactions with mechanism : $3 \times 2 = 6$



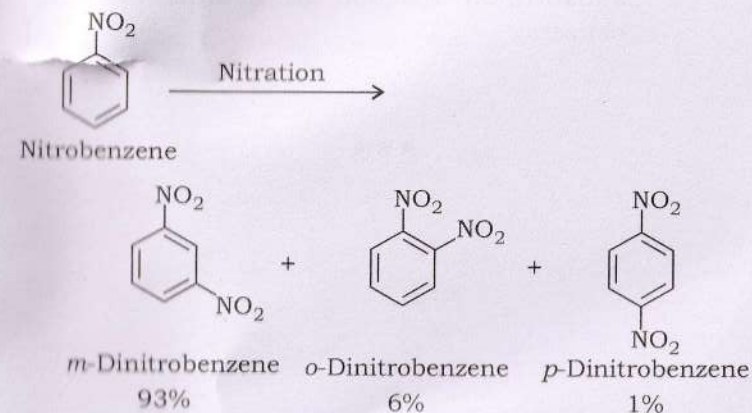
(b) Give reasons, why chlorine is deactivating but *ortho*-, *para*-directing. 3

(c) Give an example of an anti-aromatic organic compound. 1

9. (a) Classify the following into aromatic, anti-aromatic and non-aromatic compounds : $1 \times 5 = 5$



(b) Account for the different percentage yields in the reaction given below : 3

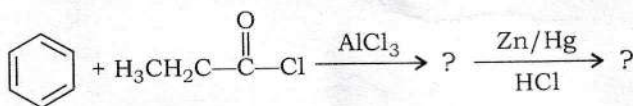


- (c) Write a short note on chlorination of benzene in the absence of sunlight. 2

OR

10. (a) "Alkenes undergo electrophilic addition reactions whereas benzene undergoes electrophilic substitution reactions." Explain. 3

- (b) Give the product(s) along with mechanism : 3



- (c) Write a short note on nitration reaction. 3
- (d) Explain how orientation affects the substitution reaction of di-substituted benzene. 1

Subject Code : Bs/CHEM.M-2 (T)

To be filled in by the Candidate

BA / BSc / BCom / BBA / BCA
2nd Semester End Term
Examination, **2025 (FYUGP)**

Subject

Paper

INSTRUCTIONS TO CANDIDATES

1. The Booklet No. of this script should be quoted in the answer script meant for descriptive type questions and vice versa.
2. This paper should be **ANSWERED FIRST** and submitted within **1 (one) Hour** of the commencement of the Examination.
3. While answering the questions of this booklet, any cutting, erasing, overwriting or furnishing more than one answer is prohibited. Any rough work, if required, should be done only on the main Answer Book. Instructions given in each question should be followed for answering that question only.

Signature of
Scrutiniser(s)

Signature of
Examiner(s)

Booklet No. A

52

Date Stamp

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2nd Semester End Term
Examination, **2025 (FYUGP)**

Roll No.

Regn. No.

Subject

Paper

DESCRIPTIVE TYPE

Booklet No. B

Signature of
Invigilator(s)

2025

(FYUGP)

(2nd Semester)

CHEMISTRY

(MINOR)

Paper : CHEM.M-2 (T)

(Organic Chemistry—I : Basics and Hydrocarbons)

(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

SECTION—I

(Marks : 15)

Choose the correct answer and put a Tick (✓) mark
against the brackets provided : 1×15=15

1. Which of the following effects is a permanent
electronic displacement effect?

(a) Electromeric effect ()

(b) Inductive effect ()

(c) Hyperconjugation effect ()

(d) Both (b) and (c) ()

2. Which of the following molecules has a dipole moment of zero?

- (a) Water ()
- (b) Carbon tetrachloride ()
- (c) Ammonia ()
- (d) Hydrogen fluoride ()

3. The stability of carbocations follows the order

- (a) Methyl < Primary < Secondary < Tertiary ()
- (b) Tertiary < Secondary < Primary < Methyl ()
- (c) Secondary < Tertiary < Primary < Methyl ()
- (d) Methyl < Secondary < Primary < Tertiary ()

4. Which of the following is a nucleophile?

- (a) H^+ ()
- (b) Cl^- ()
- (c) $AlCl_3$ ()
- (d) BF_3 ()

5. The most stable conformation of ethane is

(a) eclipsed ()

(b) staggered ()

(c) gauche ()

(d) anti ()

6. In the CIP rule for *E/Z* notation, priority is assigned based on

(a) atomic mass ()

(b) oxidation state ()

(c) atomic number ()

(d) number of valence electrons ()

7. A *meso*-compound is

(a) optically active ()

(b) optically inactive due to symmetry ()

(c) a mixture of enantiomers ()

(d) a compound with no chiral center ()

8. LPG mostly contains

(a) methane ()

(b) ethane ()

(c) butane ()

(d) propane ()

9. Hexane when heated at 500 °C gives lower alkane and alkene. This reaction is known as

(a) isomerization ()

(b) aromatization ()

(c) catalytic reforming ()

(d) pyrolysis ()

10. The most reactive alkane is

(a) methane ()

(b) propane ()

(c) *n*-butane ()

(d) isobutane ()

11. Addition of HBr to propene takes place in accordance with

- (a) Wurtz reaction ()
- (b) Markownikoff's rule ()
- (c) Kolbe's reaction ()
- (d) haloform reaction ()

12. Which of the following is incorrect for electrophilic substitution?

- (a) $-\text{NO}_2$ is deactivating and *m*-directing ()
- (b) $-\text{Cl}$ is activating and *o*, *p*-directing ()
- (c) $-\text{OH}$ is activating and *o*, *p*-directing ()
- (d) $-\text{CH}_3$ is activating and *o*, *p*-directing ()

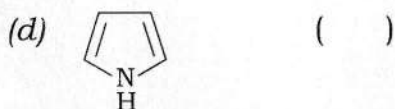
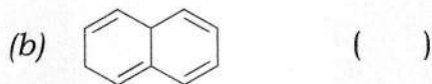
13. Which of the following is most reactive in electrophilic substitution?

- (a)  ()
- (b)  ()
- (c)  ()
- (d)  ()

14. The role of AlCl_3 in alkylation of benzene with CH_3Cl is

- (a) to produce CH_3^+ ()
- (b) to produce Cl^+ ()
- (c) to produce AlCl_4^- ()
- (d) None of the above ()

15. Which of the following is not an aromatic compound?



(7)

SECTION—II

(Marks : 10)

Answer the following questions in brief :

2×5=10

1. Differentiate between resonance effect and inductive effect.

2. Write the Newman projection of 2-bromobutane.

3. Define cracking in alkanes.

4. What do you mean by the term 'endo rule'?

5. Discuss Hückel's rule.
