ASSIGNMENT BOOKLET

CHE-06

Bachelor's Degree Programme (B.Sc.)

ORGANIC REACTION MECHANISM

(Valid from January 1, 2023 to December 31, 2023)

Please Note

- **You can take electives (56 to 64 credits) from a minimum of TWO and a maximum of FOUR science disciplines, viz. Physics, Chemistry, Life Sciences and Mathematics.**
- **You can opt for elective courses worth a MINIMUM OF 8 CREDITS and a MAXIMUM OF 48 CREDITS from any of these four disciplines.**
- **At least 25% of the total credits that you register for in the elective courses from Life Sciences, Chemistry and Physics disciplines must be from the laboratory courses. For example, if you opt for a total of 64 credits of electives in these 3 disciplines, at least 16 credits should be from lab courses.**
- **You cannot appear in the Term-End Examination of any course without registering for the course. Otherwise, your result will not be declared and the onus will be on you.**

School of Sciences
Indira Gandhi National Open University
Maidan Garhi, New Delhi-110068
(2023)

Dear Student,

We hope, you are familiar with the system of evaluation to be followed for the Bachelor's Degree Programme. At this stage you may probably like to re-read the section on assignments in the Programme Guide that we sent you after your enrolment. A weightage of 30 percent, as you are aware, has been earmarked for continuous evaluation, which would consist of one tutor-marked assignment. The assignment is based on Blocks 1, 2, 3 and 4.

Instructions for Formatting Your Assignments

Before attempting the assignments, please read the following instructions carefully.

1 On top of the first page of your answer sheet, please write the details exactly in the following format:

ENROLMENT NO:…..……..……

NAME:……..……

ADDRESS:…….....……

……

……

COURSE CODE : ….....……

COURSE TITLE : ….....……

ASSIGNMENT NO.: ….....……

STUDY CENTRE : ….....…… DATE:..…….
(NAME AND CODE)

PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION AND TO AVOID DELAY.

2 Use only foolscap size writing paper (but not of very thin variety) for writing your answers.

3 Leave 4 cm margin on the left, top and bottom of your answer sheet.

4 Your answers should be precise.

5 While writing answers, clearly indicate the Question No. and part of the question being solved.

6 Please note that:

i) The response to this assignment is to be submitted to the Study Centre Coordinator within eight weeks of the receipt of this booklet in order to get the feedback and comments on the evaluated assignment.

ii) In any case, you have to submit the assignment response before appearing in the term end examination.

7 We strongly suggest that you should retain a copy of your assignment responses.

Wishing you all good luck.

Tutor Marked Assignment

Organic Reaction Mechanism

Course Code: CHE-06
Assignment Code; CHE-06/TMA/2023
Maximum Marks: 100

Note: * This assignment is based on all the four Blocks of the entire course.

* All questions are compulsory. Marks for the questions are shown within brackets on the right hand side.

* Please answer in your **own words**; do not copy from the course material.

Q.1 a) Give an example of a reaction that undergoes bond heterolysis. Explain the mechanism involved. (5)

b) How does a solvent affect the rate of S_N2 reaction in general? Compare the effect with that of a S_N1 reaction. (5)

Q.2 a) Explain how is NMR spectroscopic study involved in predicting aromaticity of a compound. Why don't aromatic compounds usually undergo nucleophilic substitution reactions? (5)

b) How will you convert benzene to the following?

i) Ethyl phenyl ketone

ii) *p*- Bromobenzyl bromide (5)

Q.3 a) Give the mechanism of the following reactions:

i) Addition of H_2O to alkyne

ii) Addition of HBr to conjugated diene (4)

b) State Markownikoff's rules. (1)

c) Explain the following.

i) Aromatic aldehydes are less reactive than aliphatic aldehydes towards nucleophilic addition reactions.

ii) For aldol condensation aldehyde must contain α-hydrogen.

iii) Crossed claisen condensation in not of synthetic importance. (3)

d) Give the mechanism of Perkin condensation. (2)

Q.4 a) State Hoffmann rule. (1)

b) Explain the following:

i) Rearrangement of carbocation in E1 reaction

ii) Isotope effect in E2 reactions (4)

c) Calculate the oxidation state of the carbon atom in CO_2. (1)

d) How would you prepare *cis* and *trans* alkene from alkyne? (2)

e) Fill in the following blanks.

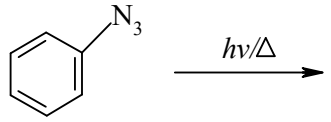
i) Oxidation of ethene in presence of palladium is known as ……..

ii) Reduction of aldehyde to alkane by hydrazine is known as ……..... (2)

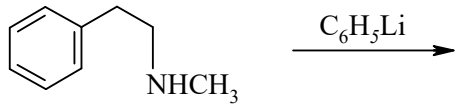
Q.5 a) Discuss the reaction of carbenes with *trans*-2 butane and *cis*-2-butene. Why is the stereospecificity of these reactions lost when these reactions are carried out in the presence of an inert gas? (5)

b) Give the expected product (s) and mechanism of the following reactions.

i)



ii)



(5)

Q.6 Write the mechanism of the following reactions:

a) Reimer-Tiemann reaction

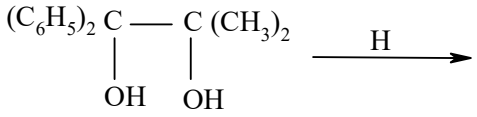
b) Sandmeyer reaction

c) Bromination of 1-propene with N-Bromosuccinimide

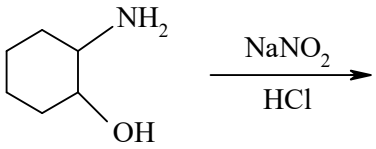
d) Oxidation of 1,2- diols with lead tetra-acetate (10)

Q.7 a) Give the product (s) and mechanism of the following reactions:

i)



ii)



(5)

b) Write the mechanism of Curtius rearrangement. How would you convert 1-propanol to ethanol using this reaction? (5)

Q.8 a) Explain why photo-induced [2+2] cycloaddition is allowed and thermally induced [2+2] cycloaddition is forbidden. (5)

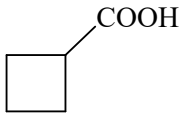
b) Give the expected product and mechanism in the following reactions:

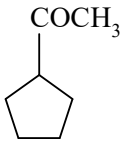
i) $(CH_3)_2C = CH_2 + (C_6H_5)C = O \xrightarrow{hv}$

ii) $(C_6H_5)_2C = O + (CH_3)_2CHOH \xrightarrow{hv}$ (5)

Q.9 a) Starting with aniline how would you prepare *p*-nitroaniline? (5)

b) Show how you could synthesise the following compounds using acetoacetic ester/ malonic ester.

i) 

ii) 

(5)

Q.10 a) What are typical steps involved in the development of an industrial chemical process? (5)

b) Give the production of aspirin. (5)