**Assignment Booklet**

**CHE-06**

# Bachelor's Degree Programme (B.Sc.)

# ORGANIC REACTION MECHANISM

## (Valid from 1st January, 2022 to 31st December, 2022)

### 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**
**New Delhi, 110068**
**(2022)**

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 was sent to 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 for this course. This assignment is based on Blocks 1 to 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:

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ENROLMENT NO.:……

NAME:……

ADDRESS:……

……

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COURSE CODE : ……

COURSE TITLE : ……

ASSIGNMENT NO.: ……

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

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**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 Assignment is valid from 1st January, 2022 to 31st December, 2022.

ii) 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.

iii) In any case, you have to submit the assignment response before filling the exam for 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/2022**
**Maximum Marks: 100**

**Answer all the questions given below.**

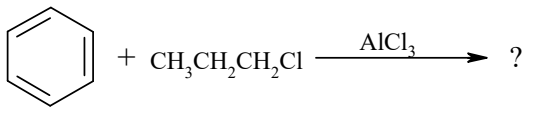
1. a) Define a nucleophile and nucleophilicity. How is the nucleophilicity different from the basicity? Explain with the help of an example. (5)

   b) With the help of examples explain the factors affecting the basicity of a molecule. (5)

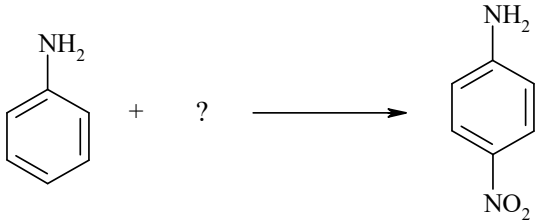
2. a) What is meant by thermodynamic and kinetic control in chemical reactions? Explain taking an example of addition of HCl to 1, 3-butadiene. (5)

   b) Explain how isotopic studies help in ascertaining the mechanism of reactions. (5)

3. a) Complete the following reactions.

   i) 
   

   (2)

   ii) 
   

   b) Does pyridine undergo Friedel-Crafts alkylation? Explain your answer. (2)

   c) Explain the following: (3)
   i) Alkynes are more reactive towards electrophilic reagents.
   ii) Addition of HBr to conjugated diene gives 1, 4 addition product as major product.

   d) Complete the following reactions. (3)

   i) $CH_3CH_2CH=CH_2 \xrightarrow[H_2O,OH^-]{BH_3}$

   ii) $CH_3C\equiv CCH_3 \xrightarrow[H_2O_2,OH^-]{BH_3}$

   iii) $CH_3CH_2CH=CH_2 \xrightarrow[Cr_2O_7^{-2},\ H^+]{BH_3}$

4. a) Explain the following with suitable examples. (4)
   i) Aldehyde without α - hydrogen does not undergo Cannizzaro reaction.
   ii) For Michael addition electron withdrawing group must be present with carbon – carbon double bond.

   b) Explain the following terms with suitable examples. (4)
   i) Schiff's base
   ii) Hemiacetal

c) What do you understand by *syn*-elimination and *anti*-elimination. Explain with a suitable example. (2)

5. a) i) Define the Saytzeff rule. (3)
ii) The elimination of HCl from chlorofumaric acid is 50 times faster than from chloromalic acid. Explain.

b) Calculate the oxidation state of carboxylic C-atoms in $CH_3COOH$. (1)

c) What is selective oxidation? Give one example. (2)

d) Answer the following. (4)
i) Who got the Nobel prize for Chemistry in 1973?
ii) What do you understand by poisoned catalyst?
iii) What is radical ion?
iv) In which year Wolff – Kishner reaction was discovered?

6. a) Give five methods for generation of carbenes. (5)

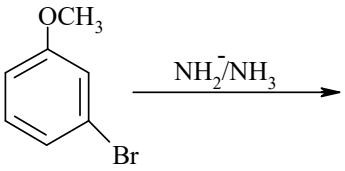
b) Complete the following reactions and write down various steps involved in them. (5)

i) $CH_3NH_2 + CHCl_3 \xrightarrow{KOH}$

ii) $CH_3\overset{\overset{O}{\|}}{C}-NH_2 + Br_2 \xrightarrow{NaOH}$

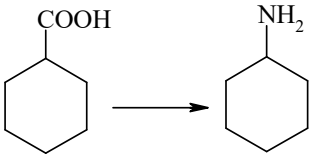
iii) $CH_2=CH-CH_2Br \xrightarrow[h\nu]{HBr}$

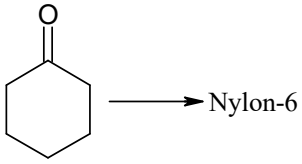
iv) $C_6H_5\overset{+}{N}_2Cl + CuCl \xrightarrow{HCl}$

v) 


7. a) What are the motivating factors for the Wagner-Meerwein rearrangement? Discuss its mechanism with a suitable example. (5)

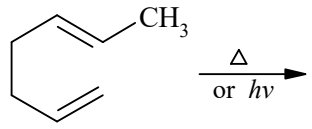
b) Write down various steps involved in the following conversions: (5)

i) 


ii) 


8. a) With suitable examples explain [2+2] and [4+2] cycloaddition reactions. (5)

b) Complete the following reaction and give its mechanism. (5)




9. a) Draw the Jabslonski diagram showing excitation and deactivation routes. (5)

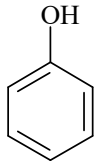
b) Give the classification of dyes based on their chemical structures. Give one example for each case. (5)

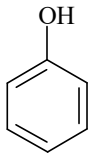
10. a) Complete the following reactions: (5)

i) $(CH_3)_2C = CH_2 + (C_6H_5)_2C = O \xrightarrow{h\upsilon}$

ii) $CH_3\overset{O}{\overset{\|}{C}}CH_2\overset{O}{\overset{\|}{C}}OC_2H_5 \xrightarrow[(2)\ Br(CH_2)_4Br]{(1)\ NaOC_2H_5/C_2H_5OH} \xrightarrow{(3)\ H^+/H_2O/\Delta}$

iii) Malonic ester + Urea $\xrightarrow[383\ K]{NaOC_2H_5/C_2H_5OH}$

iv)  + HCHO $\xrightarrow[\Delta]{H^+}$

v)  $\xrightarrow[(2)\ H^+/H_2O]{(1)\ NaOH,\ CO_2}$

b) Discuss the role of activating, deactivating and protecting groups briefly in organic synthesis. (5)