

ASSIGNMENT BOOKLET**Bachelor's Degree Programme (B.Sc.)****ORGANIC REACTION MECHANISM****(Valid from 1st January, 2021 to 31st December, 2021)****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.



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(2021)

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 per cent, 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 Assignment is valid from 1st January, 2021 to 31st December, 2021.
 - ii) The response to this assignment is to be submitted to the Study Centre Coordinator within eight weeks of the receipt of the course material in order to get the feedback and comments on the evaluated assignment.
 - iii) 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

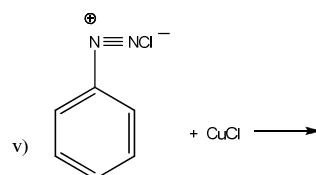
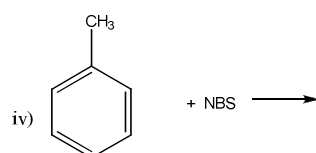
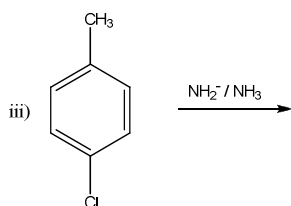
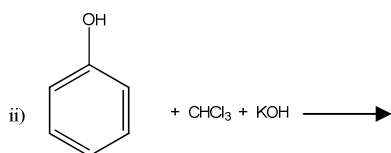
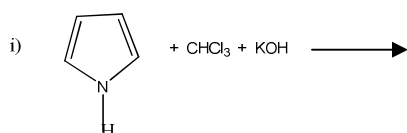
Organic Reaction Mechanism

Course Code: CHE-06
Assignment Code: CHE-06/TMA/2021
Maximum Marks: 100

Note: Answer all the questions:

1. a) Explain why: (5)
- i) a higher value of pK_a indicates a strong nucleophilic character?
 - ii) a tertiary amine is more basic than a primary amine?
 - iii) NO_2 is a better electrophile as compared to NH_4^+ ?
 - iv) NH_3 is less basic than CH_3NH_2 ?
 - v) ROH is a better nucleophile than H_2O ?
- b) Draw and explain the potential energy diagram for the reaction, (5)
- $$\text{A} \xrightarrow{\text{step 1}} \text{B} \xrightarrow{\text{step 2}} \text{C}$$
- i) When step 1 is the rate determining step.
 - ii) When step 2 is the rate determining step.
2. a) What is primary isotope effect? How is it different from the secondary isotope effect? Explain with the help of an example of electrophilic substitution in aromatic compounds. (5)
- b) Which one in the following pairs is more stable and why? Explain the factors responsible for this. (5)
- i) $(\text{CH}_3)_2\text{CH}_2^+$ and $(\text{CH}_3)_3\text{CH}^+$
 - ii) $(\text{C}_6\text{H}_5)_2\text{CH}^+$ and $\text{CH}_2 = \text{CH} - \text{CH}_2^+$
3. a) Differentiate between the $\text{S}_{\text{N}}2$ and $\text{S}_{\text{N}}\text{Ar}2$ mechanisms of reactions. (5)
- b) Explain the following statements. (5)
- i) For Diels-Alder reaction, a diene must be able to adopt a *cis* geometry.
 - ii) Low molecular-weight ozonides cannot be isolated easily.
 - iii) Alkenes are readily hydroxylated.
4. a) Explain the following: (5)
- i) Aromatic aldehydes are less reactive than aliphatic aldehyde.
 - ii) In Wittig reaction, the methyl, primary and secondary alkyl halide used to prepare Wittig reagent (ylide) but not tertiary.
 - iv) In aldol condensation aldehyde must contain an α -hydrogen atom.
- b) Explain the following: (5)
- i) E_2 elimination does not give rearranged product
 - ii) E_1 elimination does not follow Saytzeff rule.
 - iii) E_2 elimination is an *anti* elimination
 - iv) Isotope effect is absent in E_1 elimination
5. a) How would you convert the following: (5)

- i) Haptanal to Haptane
 ii) 2-Cyclohexanone to 2-Cyclohexanol
 iii) 3-Heptyne to *trans*-3-Heptene
- b) Give the mechanism of the following reactions: (5)
- i) Perkin condensation
 ii) Michael addition
 iii) Wolff – Kishner reduction
6. a) Cycloaddition reaction of carbene generated by the photolysis of diazo methane in inert gas with *cis*-2-butene is not stereospecific. Explain with the help of steps involved in the reaction. (5)
- b) Complete the following reactions: (5)



7. a) Using FMO model, explain why in thermal condition disrotatory motion would necessary for cyclisation of 1,3,5- hexatriene and conrotatory for 2,4-hexadiene (5)
- b) Discuss the viability of [1,3] and [1,5] hydrogen shifts on the basis of orbital symmetry and geometry consideration. (5)
8. a) How are the energies of excited molecules from the triplet state dissipated? Draw a Jablonski diagram to depict energy change during these processes. (5)
- b) Complete and write mechanism of the following reaction. (5)
- $$(\text{CH}_3)_2\text{C}=\text{CH}_2 + (\text{C}_6\text{H}_5)_2\text{C}=\text{O} \xrightarrow{h\nu}$$
9. a) Taking a suitable example discuss the role of protecting groups in organic synthesis. (5)
- b) Write the mechanism of the following rearrangement reaction (any two): (5)

- i) Pinacol – pinacolone
- ii) Curtius
- iii) Beckmann
- iv) Baeyer-villiger

10. Write short notes on the following

(10)

- i) Chain growth and step growth polymers
- ii) Cleaning action of soaps
- iii) Acid and Basic dyes
- iv) Analgesics