

ASSIGNMENT BOOKLET**Organic Chemistry****Bachelor's Degree Programme (B.Sc.)****(Valid from 1st January, 2020 to 31st December, 2020)****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
(2020)

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 Assignment is valid from 1st January, 2020 to 31st December, 2020.
 - 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 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 CHE-05: Organic Chemistry

Course Code: CHE-05
Assignment Code: CHE-05/TMA/2020
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.
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1. (a) Give the IUPAC names of the following compounds: (2)
- (i)
- $$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3\text{CHCHCH}_3 \\ | \\ \text{CN} \end{array}$$
- (ii) $\text{CH}_3\text{CH}_2\text{OCH}_2\underset{\text{CH}_3}{\text{CH}}\text{CH}_3$
- b) Explain the type of hybridisation present in ethyne using suitable diagrams. (3)
2. Explain asymmetric synthesis using suitable examples. (5)
3. Draw and explain the energy profile associated with ring flipping of chair conformation of cyclohexane. (5)
4. Give reasons for the following: (2+2+1)
- (i) 2, 2-Dimethylpropane has higher melting point than pentane.
(ii) β -carotene is red in color.
(iii) The region of IR spectrum between 675 cm^{-1} and 1250 cm^{-1} is called fingerprint region.
5. What is tautomerism? How is it different from resonance? (5)
6. (a) Explain the following: (3)
- (i) Wurtz reaction, has limited synthetic applications.
(ii) Alkanes are relatively unreactive or do not react with most of the common reagents.
(iii) Physical constants like boiling points, densities, etc. of alkanes generally increase with increase in the number of carbon atoms.
- (b) Give one example each of the following reactions: (2)
- (i) Sabatier-Senderens reaction
(ii) Decarboxylation of the carboxylic acid
7. (a) Explain Saytzeff rule giving suitable example (2)
(b) Give mechanism of the following reactions: (3)
- (i) Birch reduction
(ii) Wittig reaction
(iii) Dehydrohalogenation of alkyl halides
8. (a) What is difference between Markownikoff's and *anti* Markownikoff's rules? Explain with a suitable example. (5)
9. (a) Explain the following: (2)
- (i) The theoretical value of evolved, when hydrogens are added to benzene, is quite high as compared to the experimental value.
(ii) Nitrobenzene does not undergo Friedel-Crafts alkylation.

- (b) What do you understand by *para*-directing activators, *para*-directing deactivators and *meta*-directing deactivators? (3)
10. (a) Explain the following: (2)
- (i) 1-Position in naphthalene is more reactive than the 2-position towards electrophilic substitution.
- (ii) Pyrrole is more basic than pyridine.
- (b) Predict the products of the following reactions: (3)
- i) Oxidation of propylbenzene
- ii) Friedel-Crafts acylation of pyrrole
- iii) Friedel-Crafts alkylation of pyridine
11. (a) Taking a suitable example, write the mechanism of an S_N2 reaction. Explain the effect of the structure of alkyl halides over the reaction rate. (2½)
- (b) Explain why allylic halides are very reactive under S_N1 conditions. (2½)
12. Explain the following:
- (a) *p*-Nitrophenol has higher boiling point and solubility in water than *o*-nitrophenol. (2½)
- (b) Oxiranes are more reactive than open chain ethers. (2½)
13. Complete the following reactions: (5)
- (i) $C_2H_5OH + SOCl_2 \longrightarrow$
- (ii) 2-Butanol $\xrightarrow{H^+/heat}$
- (iii) Phenol $\xrightarrow[\text{(ii) } H^+/H_2O]{\text{(i) } CHCl_3/OH^-}$
- (iv) $\begin{array}{c} O \\ \diagup \quad \diagdown \\ CH_2 \quad CH_2 \end{array} \xrightarrow[\text{(ii) } H^+/H_2O]{\text{(i) } RMgX}$
- (v) $CH_3-S-CH_3 + H_2O_2 \xrightarrow[H^+]{273 K}$
14. (a) How would you carry out the following conversions: (3)
- (i) Ketone to alkane
- (ii) Alcohol to aldehyde
- (iii) Ketone to alcohol
- (b) What is mixed aldol condensation? Write its mechanism (2)
15. Explain the importance and preparation of chloramines T and dichloramine T. (5)
16. (a) Differentiate between lactones and lactides. Give one method of preparation of each of them. (3)
- (b) How can you convert 2-butanone to 2-methyl-2-hydroxybutanoic acid? (2)
17. Discuss the mechanism of Hofmann rearrangement. (5)
18. (a) Why do nitroalkanes behave as weak acids? Explain. (3)
- (b) What is TNT? How can it be prepared? (2)
19. Briefly explain the following: (5)
- (i) Curtius rearrangement
- (ii) Schmidt rearrangement
20. Discuss the secondary structure of a peptide giving suitable diagrams. (5)

