

ASSIGNMENT BOOKLET**Organic Chemistry****Bachelor's Degree Programme (B.Sc.)****(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.



School of Sciences
Indira Gandhi National Open University
New Delhi
(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 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, 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 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.

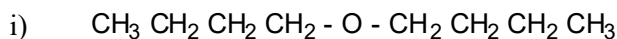
Tutor Marked Assignment

CHE-05: Organic Chemistry

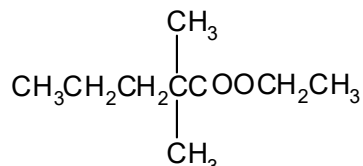
Course Code: CHE-05
Assignment Code: CHE-05/TMA/2021
Maximum Marks: 100

- 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) Write the IUPAC names of the following compounds: (2)



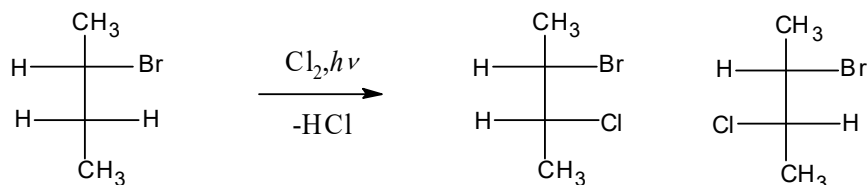
ii)



b) Using explain the formation of ethane molecule giving the formation of hybrid orbitals. suitable diagrams. (3)

2. Explain chirality giving suitable example. How can chirality be checked using elements of symmetry? Discuss giving different elements of symmetry. (5)

3. The chlorination of 2-bromobutane is given below. (5)

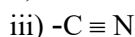
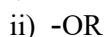
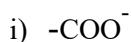


Identify the chiral centres in the reactant and the products and determine their configuration as *R/S*.

4. a) Explain intermolecular and intramolecular hydrogen bonding giving suitable examples. (3)

b) The splitting of signal of -OH proton is not observed in the NMR spectrum of an ordinary sample of commercial sample of ethanol but it is observed in NMR spectrum of pure anhydrous ethanol. Explain. (2)

5. a) Classify the following groups as electron donating or electron withdrawing substituents. (2)



b) What is hyperconjugation? Explain the relative stability of primary, secondary and tertiary carbocations using hyperconjugation? (3)

6. a) Answer the following questions in one or two lines. (1×3)

i) What is the composition of natural gas?

ii) What are the limitations of Wurtz reaction?

iii) Give any two reducing agents used for the reduction of alkyl halides to alkanes.

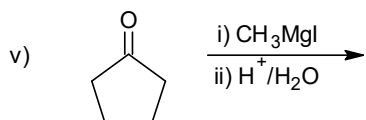
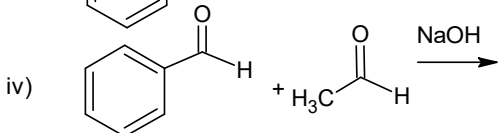
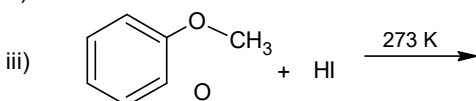
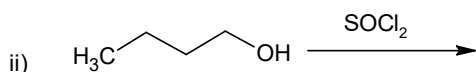
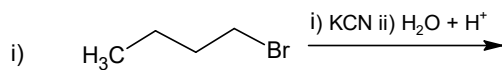
b) Give reaction of the following changes: (1×2)

i) 1,5-dibromopentane to cyclopentane

ii) Heptane to toluene

7. a) Draw the orbital diagram of alkene. (2)
 b) Answer the following questions in one or two lines. (1×3)
 i) Why are alkenes more soluble in water than the corresponding alkanes?
 ii) Dehydrohalogenation of 1-bromobutane gives only one product while 2-bromobutane gives two products. Explain.
 iii) What is a regiospecific reaction?
8. a) Arrange the following bases in increasing order of basic strength and give any one reason for your answer. (2)
 $\text{CH}_3\text{CH}_2^- > \text{CH}_2 = \text{CH}^- > \text{CH} \equiv \text{C}^-$
 b) Suggest a method for the preparation of the following compounds. (1×3)
 i) A *trans*-Alkene from alkyne
 ii) Propanone from propyne
 iii) 1-Hexyne from 1,2-dibromohexane
9. a) Draw all possible resonance structures of the carbocation formed during nitration of bromobenzene. (2)
 b) How would you carry out the following? (1×3)
 i) Conversion of benzene to ethylbenzene
 ii) Conversion of nitration of naphthalene at high temperature
 iii) Conversion of propylbenzene to benzoic acid
10. a) Write the structure of the following compounds: (2)
 i) 3-Methyl-1,3-thiazol
 ii) 2-Amino-1,4-diazine
 b) i) 2-Position in furan is more reactive than the 3-position towards electrophilic substitution. Explain. (3)
 ii) Pyrrole is more basic than pyridine. Explain.
11. What product(s) would you expect from each of the following reactions? Write the mechanism of the reactions and also mention the reason for the relative amounts of products formation where necessary.
- a) $(\text{CH}_3)_3\text{C}-\underset{\text{OH}}{\text{CH}}\text{CH}_3 + \text{HBr} \longrightarrow$ (2½)
- b) $\text{CH}_3\text{CH}_2-\underset{\text{CH}_3}{\overset{\text{Br}}{\text{C}}}-\text{CH}_3 \xrightarrow{\text{Strong Base}}$ (2½)
12. a) Phenols are acidic in character while alcohols are almost neutral. Explain. (2½)
 b) Oxiranes are more reactive than open chain ethers. (2½)
13. Complete the following reactions and discuss their mechanisms:
- a) $\text{CH}_3\text{COCH}_3 + \text{CH}_3\text{MgBr} \xrightarrow[\text{ii) H}_2\text{O, H}^+]{\text{i) Ether}}$ (2½)
- b) $\text{CH}_3\text{COCH}_3 + \text{Br}_2 \xrightarrow{\text{OH}^-}$ (2½)

14. Complete following reactions: (5)



15. Discuss the mechanism of Fischer esterification of carboxylic acids. (5)

16. a) Explain the formation of 3-hydroxy esters from 2-bromoesters. What is the name of this reaction? (3)

b) Explain the reaction of 2-amino acids with ninhydrin. (2)

17. Briefly explain the following reactions: (3+2)

i) Beckmann rearrangement

ii) Bouveault Blanc reduction

18. a) How can you prepare 1, 4-dinitrobenzene from benzenamine? Explain. (3)

b) Explain the uses of nitro compounds. (2)

19. How can butanamine be synthesised

i) from butane nitrile, and (2)

ii) using Gabriel synthesis? (3)

20. Using suitable structures, differentiate between amylose and amylopectin. (5)