

**MCHE-012**

**ASSIGNMENT BOOKLET**

**M.Sc. in Chemistry Programme  
(MSCCHEM)**

**SPECTROSCOPIC IDENTIFICATION OF ORGANIC COMPOUNDS**

**(Valid from July, 2025 to June, 2026)**

**It is compulsory to submit the assignment before filling in  
the examination form.**



**School of Sciences  
Indira Gandhi National Open University  
Maidan Garhi, New Delhi-110068  
(2026)**

Dear Learner,

Please read the Section on Assignments in the Programme Guide for M.Sc. in Chemistry Programme 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 for this course. The assignment is in this booklet, and covers all the four blocks of the course. The total marks of all the parts are 100, of which 40% are needed to pass it.

### Instructions for Formatting Your Assignments

Before attempting the assignment, 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 paper (but not of very thin variety) for writing your answers.
- 3) Leave about 4 cm margin on the left, top and bottom of your assignment response sheet.
- 4) Your answers should be precise.
- 5) Submit the complete assignment answer sheets within the due date.
- 6) The assignment answer sheets are to be submitted to your Study Centre within the due date. Answer sheets received after the due date shall not be accepted.  
*We strongly suggest that you retain a copy of your answer sheets.*
- 7) This assignment is valid from July, 2025 to June, 2026. If you have failed in this assignment or fail to submit it by June, 2026, then you need to get the assignment for the year 2027 and submit it as per the instructions given in the Programme Guide.
- 8) You cannot fill the examination form for this course until you have submitted the assignment.

Wishing you good luck

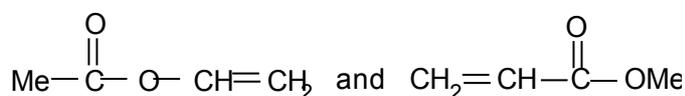
# Tutor Marked Assignment

## Spectroscopic Identification of Organic Compounds

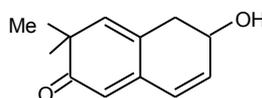
Course Code: MCHE-012  
Assignment Code: MCHE-012/TMA/2025-26  
Maximum Marks: 100

**Note: Attempt all the questions. The marks for each question are indicated against it.**

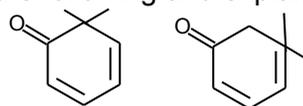
1. a) How does conjugation affect the electronic transitions in organic molecules? Explain showing its effect on absorption maxima with the help of an example. (5)
- b) Describe the effect of substituent on the UV spectra of carbonyl compounds with the help of examples. (5)
2. a) Differentiate between the following compounds on the basis of UV spectra. Explain your answer. (5)



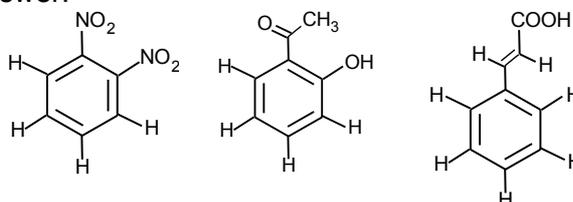
- b) Predict the expected UV and IR spectra of the following compound. (5)



3. a) Predict the  $\lambda_{\text{max}}$  values of the following and explain your answer. (5)



- b) Explain the basis of  $^1\text{H}$  NMR spectroscopy. Which of the atomic nucleus out of  $^{12}\text{C}$ ,  $^2\text{H}$ ,  $^{19}\text{F}$  is not NMR active and which is NMR active? Explain your answer. (5)
4. a) Why is TMS used as a standard in NMR spectroscopy. Explain what do upfield and downfield signify in a NMR spectrum. (5)
- b) Explain the solvent effect in the simplification of complex spectra taking a suitable example. (5)
5. Interpret the NMR spectra of the following compounds. Give the expected  $\delta$  values and explain your answer. (10)



6. a) Write the principle of 2D NMR. How is it different from 1D NMR? (5)
- b) List the benefits and limitations of COSY technique. (5)
7. a) Describe the use of broadband decoupling and off resonance decoupling in  $^{13}\text{C}$  NMR spectroscopy. (5)
- b) Answer the following with respect to HMQC experiment. (5)
  - i) its full form
  - ii) its role in NMR
  - iii) the type of nuclei involved
  - iv) type of spectrum obtained
8. a) Differentiate between COSY and HETCOR experiments in 2D NMR (5)

- b) What is meant by a base peak and a molecular ion peak in mass spectrum? (5)  
How is mass spectrometry used in finding out mass of a compound? Explain.
9. a) Describe different ionisation methods involved in mass spectrometry. (5)  
b) Describe the concept of cleavages taking benzylic cleavages in mass spectrometry. (5)
- 10 a) Explain McLafferty rearrangement with the help of a suitable example. (5)  
b) What kind of information is available from UV, IR, NMR and Mass spectra of an organic compound. Explain with the help of an example. (5)