

MCH-022

ASSIGNMENTBOOKLET

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

SEPARATION AND SPECTROSCOPIC METHODS

(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, NewDelhi-110068
(2025)**

Dear Learner,

Please read the Section on assignments in the Programme Guide for M.Sc. in Chemistry/M.Sc.in Analytical Chemistry 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	:
(NAME AND CODE)	DATE:

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 4cm 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 solved assignment.

- 7) This assignment is valid from **1 July, 2025 to 30 June, 2026**. If you have failed in this assignment or fail to submit it by **30 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 Separation and Spectroscopic Methods

Course Code: MCH-022
Assignment Code: MCH-022/TMA/2026
Maximum Marks: 100

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

1. (a) Briefly discuss the extraction of metal ions using crown ethers. (5)
(b) Giving suitable examples, discuss the role of masking agents in extractions. (5)
2. (a) What are the characteristics of stationary phases used in liquid-solid chromatography? Discuss various types of adsorbents used. (5)
(b) Give any five comparisons between PC and TLC. (5)
3. (a) Give a brief account of various injection systems used in gas chromatography. (5)
(b) Draw a schematic diagram of an HPLC instrument and also list the components. (5)
4. (a) Discuss the use of hydrous oxides of polyvalent metals as synthetic ion exchangers giving suitable examples. (5)
(b) Describe the unique features of size exclusion chromatography. (5)
5. (a) Discuss the applications of membrane separations in (5)
(i) water treatment
(ii) production of table salt
(b) Give important aspects of capillary electrochromatography. (5)
6. (a) Explain the nature of absorption spectra for the transition and inner transition elements by UV-Vis spectroscopy. Also specify the reasons of difference between the two. (5)
(b) What are the advantages of UV-Vis spectrometry for quantitative determinations? Write the steps involved in the quantitative determinations using this technique. (5)
7. (a) How does FTIR differ from traditional dispersive IR spectrometry? Write any four advantages of the FTIR spectrometry. (5)
(b) What are the two aspects in which fluorimetry differs from phosphorimetry? Describe the aspects. (5)
8. (a) List the characteristics of atomisation-excitation source in atomic emission spectrometry. Name the three types of plasma sources. (5)
(b) Describe the principle of FT-NMR spectroscopy. Explain how is this spectroscopy advantageous over the CW-NMR spectroscopy. (5)
9. (a) What is DEPT in ^{13}C NMR spectroscopy? Describe the features of its various types. (5)

- (b) List the limitations of 1D NMR spectroscopy. How does 2D NMR help in fulfilling the limitations? (5)
10. (a) What are the two types of ion sources used in mass spectrometry? Explain these sources. (5)
- (b) Compare GC-MS and LC-MS and LC-MS with reference to the sample types and the solvents used. (5)