BCHET-141

ASSIGNMENT BOOKLET

Bachelor's Degree Programme
(BSCG)

ANALYTICAL METHODS IN CHEMISTRY

Valid from 1st January, 2022 to 31st December, 2022

School of Sciences
Indira Gandhi National Open University
Maidan Garhi
New Delhi-110068
(2022)

Dear Student,

Please read the section on assignments in the Programme Guide for B. Sc. 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 it consists of two parts, Part A and B. It covers all blocks of the course. The total marks of all the parts are 100, of which 35% 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:

ROLL NO.: ……

NAME: ……

ADDRESS: ……

……

……

COURSE CODE: …….

COURSE TITLE: …….

ASSIGNMENT NO.: ……..…

STUDY CENTRE: ……..….. **DATE:** …….……...

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) Solve Part (A) and Part (B) of this assignment, and **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 1st January, 2022 to 31st December, 2022**. If you have failed in this assignment or fail to submit it by December, 2022, then you need to get the assignment for the year 2023, 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 this assignment.

We wish you good luck.

ASSIGNMENT

ANALYTICAL METHODS IN CHEMISTRY

Course Code: BCHET-141
Assignment Code: BCHET-141/TMA/2022
Maximum Marks: 100

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

Par A (50 marks)

1 Define and differentiate between accuracy and precision with the help of suitable examples. (5)

2 Define determinate errors. Briefly describe different sources of determinate errors. (5)

3 Discuss the principle of solvent extraction. (5)

4 Using a suitable diagram how will you extract an organic compound present in aqueous layer using chloroform as the solvent. (5)

5 Explain the classification of chromatographic techniques using a suitable diagram. (5)

6 How can you separate the components of a mixture using column chromatography? Explain using suitable diagram. (5)

7 Define different types of capacities used in ion exchange chromatography? (5)

8 (a) Explain the extraction of Pb^{2+} ions using dithizone giving the structure of the complex form. (2)

(b) What is bathc extraction. (2)

(c) What is chabazite? (1)

9 (a) What is reverse phase chromatography? (3)

(b) Give any two examples of stationary phases which can be used in column chromatography? (2)

10 What is direct potentiometry? Write Nernst equation for the following cell: (5)

$$Zn(s) \mid Zn^{2+}(a_1) \parallel Cu^{2+}(a_2) \mid Cu(s)$$

Part B (50 marks)

11 Calculate the potential of following electrodes: (5)

i) A copper electrode immersed in 0.04 *M* $Cu(NO_3)_2$

ii) A zinc electrode immersed in 0.05 *M* $Zn(NO_3)_2$.

12 Discuss design and working of a calomel electrode. (5)

13 Distinguish between molar conductivity and limiting molar conductivity. Explain why limiting ionic mobilities of H^+ and OH^- ions are exceptionally high. (5)

14 The conductivity of 0.3 M HCl is 0.2384 Ω^{-1} cm^{-1}. What is the molar conductivity of the solution? (5)

15 List the factors affecting TG curve. Taking a suitable example, explain the effect (5)

of furnace atmosphere on TG curve.

16 A mixture of $CaCO_3$ and CaO is analysed using TGA technique. TG curve of the sample indicates that there is a mass change from 584.2 mg to 374.5 mg between 500-900°C. Calculate the percentage of $CaCO_3$ in the sample. (5)

17 (a) Define electromagnetic radiation and state the relationship between the velocity and wavelength of an electromagnetic radiation. (2)

(b) The Gyan Vani transmission of IGNOU is broadcast at a frequency of 105.6 MHz in the Delhi region. Compute the energy of a photon corresponding to this frequency. (3)

18 Enlist different types of species that absorb in the UV-VIS region and explain the types of transitions observed in organic compounds. (5)

19 Sampling is an important consideration in IR spectrometry. Describe the methods used for sampling for IR measurement in solid state. (5)

20 (a) List the factors that determine the signal intensity in flame photometry. (2)

(b) Describe standard addition method of analysis for flame photometric measurements (3)