

**BCHCT-137**

**ASSIGNMENT BOOKLET**

**Bachelor's Degree Programme  
(BSCM)**

**COORDINATION CHEMISTRY, STATES OF MATTER &  
CHEMICAL KINETICS**

**Valid from 1<sup>st</sup> January, 2025 to 31<sup>st</sup> December, 2025**

**It is Compulsory to submit the Assignment before filling in the Term-  
End Examination Form.**



**School of Sciences  
Indira Gandhi National Open University  
Maidan Garhi, New Delhi-110068  
(2025)**

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 1<sup>st</sup> January, 2025 to 31<sup>st</sup> December, 2025**. If you have failed in this assignment or fail to submit it by December, 2025, then you need to get the assignment for the year 2026, 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.

## Tutor Marked Assignment

### BCHCT-137: COORDINATION CHEMISTRY, STATES OF MATTER & CHEMICAL KINETICS

Course Code: BCHCT-137  
Assignment Code: BCHCT-137/TMA/2025  
Maximum Marks: 100

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

#### PART A: COORDINATION CHEMISTRY

1. What is the general electronic configuration of elements of the second transition series? Which *d* orbitals are filled up here? (5)
2. In  $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$  the observed magnetic moment is higher than the spin-only value. Explain the reason. (5)
3. Give the most common oxidation states of the lanthanoids. Give their configurations. (5)
4. What is meant by coordination entity and coordination sphere? (5)
5. Give the rules of IUPAC nomenclature for naming complexes (give any five points). (5)
6. According to valence bond theory, how do you account for the indicated molecular geometry for the following compounds: (5)  
(i)  $[\text{Fe}(\text{CN})_6]^{3-}$  - Octahedral and (ii)  $[\text{GaCl}_4]^-$  - Tetrahedral
7. Explain ligand isomerism with suitable example. (5)
8. Compare the CFSE of an octahedral complex with that of a tetrahedral complex for four electrons in the *d* orbitals. (5)
9. What is meant by tetragonal distortion in octahedral geometry? (5)
10. Calculate the spin-only magnetic moment for low-spin octahedral complex of  $d^5$  and  $d^6$  ions. (5)

#### PART B: STATES OF MATTER & CHEMICAL KINETICS

11. State the assumptions of kinetic theory of gases and derive the following expression for the pressure of a gas. (5)  
$$p = \frac{mN\bar{u}^2}{3V}$$
12. a) State the Dalton's law of partial pressure and give its significance. (2)  
b) Define critical constants and give their expressions in terms of van der Waals constants. (3)
13. Explain the London or dispersion forces. Compare it with dipole-dipole forces. (5)
14. With suitable diagrams, explain the axes of symmetry in a cubic system. (5)
15. Explain the Bravais Lattices in orthorhombic crystals. Give suitable diagrams. (5)
16. The density and cell-edge length of sodium chloride are  $2.163 \times 10^3 \text{ kg m}^{-3}$  and  $5.63 \times 10^{-10} \text{ m}$ , respectively. Using these data, arrive at the number of formula units per unit cell of sodium chloride crystal. (5)

17. a) List different factors affecting the rates of chemical reactions. (2)
- b) Derive the integrated rate equation for a second order reaction in which a single reactant forms the product and the reaction rate depends on the second power of the reactant concentration. (3)
18. What is meant by rate of a reaction? List and explain different types of rates used in chemical kinetics. (5)
19. If the half-life of a first order reaction in A is 15 min, how long will it take for [A] to reach 10 percent of the initial concentration? (5)
20. Compare the collision theory with Arrhenius theory. (5)