Course Code	Course Name	Credits
26CH007	INORGANIC CHEMISTRY-I	04

Course Objectives

- Provide understanding of transition elements, including lanthanides and actinides, and key aspects of coordination chemistry such as metal–ligand bonding, equilibria, and electronic and magnetic properties.
- Introduce solvents and their properties along with their applications.
- Explain the ionic nature of liquids and its role in determining acidic and basic behavior.

Learning Outcomes

Upon successful completion of this course it is intended that a student will be able to:

- Ability to recall and recognize the position of d and f block elements in the periodic table.
- Explain metal–ligand bonding, equilibria in solution, and apply bonding theories to predict structures and properties of complexes.
- Understand electronic spectroscopy of transition metal complexes.
- Know the basic concept of solvents, acids and bases.

Unit-1 – Transition and Inner Transition Elements (12 Hrs.)

Group study of titanium, vanadium, chromium, manganese and iron groups; metallurgy of Ti, V and W; lanthanides and actinides – electronic configuration, oxidation states, magnetic properties and complexation behavior; lanthanide and actinide contraction; comparative study of lanthanides and actinides; chemistry of thorium and uranium.

Unit 2 – Coordination Chemistry – I (12 Hrs.)

Double salts; complex compounds; complex ions and coordination number; ligands and their classification; chelates and their uses; coordination number and stereochemistry of complexes; IUPAC nomenclature of coordination compounds; theories of coordination compounds – Werner, Sidgwick, valence bond, crystal field, molecular orbital and ligand field theory.

Unit 3 - Coordination Chemistry – II (12 Hrs.)

Isomerism; stability of complexes; factors affecting stability; unimolecular and bimolecular nucleophilic substitution reactions in octahedral and square planar complexes; trans effect; applications of coordination compounds – separation of copper and cadmium ions; estimation of nickel using DMG and aluminium using oxine; structure of EDTA and its complexes; complexometric titrations – principle and applications.

Unit 4 – Solvent (12 Hrs.)

Classification of solvents; characteristic properties of solvents; liquid ammonia – reactions and solutions of alkali metals; liquid hydrogen fluoride – reactions; sulphuric acid – reactions; liquid dinitrogen tetroxide; liquid sulphur dioxide – reactions.

Unit 5 - Acids and Bases (12 Hrs.)

Arrhenius concept; Lowry–Brønsted concept; Lux–Flood concept; solvent system concept; Lewis concept; hard and soft acids and bases; Pearson's HSAB principle – classification and applications; acid–base strength, hardness and symbiosis; theoretical basis of hardness and softness; applications; non-aqueous solvents – liquid ammonia and liquid HF.

Reference Books:

1. P. L. Soni, Mohan Katyal, "Textbook of Inorganic Chemistry", 20th Revised Ed., 2007, Sultan Chand & Sons, New Delhi.
2. R. D. Madan, "Modern Inorganic Chemistry", 2nd Ed., 2008, S. Chand and company Ltd., New Delhi.
3. J. D. Lee, A New Concise Inorganic Chemistry, 5th Ed., 2014 Oxford Publishers.
4. K.Okhil, Medhi, A Ellen Keiter, E. James Huheey, L. Richard Keiter, Dorling Kindersley, Inorganic Chemistry: Principles of Structure and Reactivity 4th Ed 2006. India,

Websites and eLearning Sources:

1. https://youtu.be/TFmlLNF7X98?si=DOP6PewCnAVZHH50
2. https://nptel.ac.in/courses/104105033
3. https://uen.pressbooks.pub/introductorychemistry/chapter/acids-and-bases/

COs and Bloom's Taxonomy Mapping – 26CH007		
Course Outcomes	**On completing U.G. program the students will be able to**	**BTL**
CO1	Explain the properties, behaviors, bonding and applications of periodic elements, solvent types and roles in different chemical processes, describe the fundamental concepts of acids and bases**.**	K1, K2
CO2	Apply their principles in practical chemical problems.	K3
CO3	Analyze the properties and behaviors of elements, solvents, acids and bases to interpret and solve complex chemical problems.	K4
CO4	Investigate and assess the practical applications and outcomes in various chemical contexts.	K5
CO5	Design novel chemical solutions using these concepts.	K6

BTL K1 and K2 – remembering and understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6- Create

Relationship Matrix – 26CH007													
Course Outcomes	**Programme Outcomes (POs)**						**Programme Specific Outcomes (PSOs)**						**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	
CO1	3	2	3	1	1	2	3	2	2	1	2	1	1.91
CO2	3	3	3	1	1	1	3	2	2	3	2	1	2.08
CO3	3	3	3	1	1	2	3	2	3	3	2	1	2.25
CO4	2	3	2	1	1	1	3	2	2	3	3	1	2
CO5	2	2	3	1	1	2	3	2	3	2	3	3	2.25
												Total	2.09

Mean Score: 3- High, 2- Medium/Moderate, 1-Low