Course Code	Course Name	Credits
26CH010	INORGANIC CHEMISTRY-II	04

Course Objectives

- To provide understanding of the basic concepts of Inorganic Chemistry.
- To explain the nature of ionic and organometallic compounds.
- To develop knowledge of polymeric inorganic compounds and noble gases.
- To understand the principles of nuclear chemistry and radioactivity.
- To gain knowledge of nuclear transformations.

Learning Outcomes

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

- Use electron counting to assess reactivity and stability, describe bonding, and explain mechanisms of organometallic reactions.
- Understand the importance of inorganic polymers compared to organic polymers.
- Explain trends, occurrence, and uses of noble gases (Group 18 elements).
- Understand nuclear chemistry, radioactivity, and nuclear transformations.

Unit 1 - Ionic and Organometallic Compounds (12 Hrs.)

Structure of crystal lattice- examples- NaCl, CsCl, Zinc blende, Wurtzite and fluorite. Layer structure compounds- examples CdI_2 and NiAs. Organometallic compounds of alkenes, alkynes and cyclopentadiene.

Unit 2 – Polymeric Inorganic Compounds (12 Hrs.)

Clathrates: examples and structures; interstitial compounds; silicones: composition, raw materials, manufacture, structure, properties, and uses; boron–phosphorus compounds; coordination polymers; phosphonitrilic polymers; silicates: classification into discrete anions; one-, two-, and three-dimensional structures with typical examples; composition, properties, and uses of beryl, asbestos, talc, mica, zeolites, and ultramarines.

Unit 3 - Nobel gases (12 Hrs.)

Occurrence and uses of noble gases; rationalization of inertness of noble gases; clathrates; preparation and properties of XeF_2, XeF_4, and XeF_6; nature of bonding in noble gas compounds by valence bond treatment and molecular orbital treatment for XeF_2; molecular shapes of noble gas compounds based on VSEPR theory.

Unit 4 – Nuclear Chemistry (12 Hrs.)

Introduction to nuclear chemistry; composition of nucleus and nuclear forces; nuclear stability; n/p ratio; mass defect; binding energy; packing fraction; magic numbers; nuclear shell model; liquid drop model; isotopes; detection and separation of isotopes; isotopic constitution of elements; whole number rule; isobars; isotones; nuclear isomers; nuclear fission and fusion; nuclear reactor.

Unit 5 - Radioactivity and Nuclear Transformations (12 Hrs.)

Radioactivity: discovery; detection and measurement using Wilson cloud chamber; radioactive emissions; disintegration theory; modes of decay; rate of disintegration; half-life; average life; radioactive series; nuclear transformations; projectiles; particle accelerators; cyclotron; nuclear reactions; Q values of nuclear reactions; applications of radioisotopes; carbon dating; radioactive waste disposal.

Reference Books:

1. P. L. Soni, Mohan Katyal, "Text book 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. Okhil K. Medhi, Ellen A. Keiter, James E. Huheey, Richard L. Keiter, Dorling Kindersley, Inorganic Chemistry: Principles of Structure and Reactivity, 4th Ed., 2006. India.

Websites and eLearning Sources:

1. nptel.ac.in/courses/104101090
2. Organometallic chemistry of alkenes and alkynes - ScienceDirect
3. https://youtu.be/JQ7k_QIbQEo?si=r4DTdcSf-736pocm

COs and Bloom's Taxonomy Mapping – 26CH010		
Course Outcomes	**On completing U.G. program the students will be able to**	**BTL**
CO1	Recall crystal lattices, layer compounds, and bonding in organometallic compounds.	K1, K2
CO2	Explain structures, properties, classifications, and uses of clathrates, interstitial compounds, silicones, and silicates.	K3
CO3	Analyze bonding, structure, preparation, and reactivity of noble gas compounds using bonding theories.	K4
CO4	Evaluate nuclear stability and reactions using models of the nucleus, fission, and fusion.	K5
CO5	Design applications using radioactive decay, nuclear reactions, and radioisotopes.	K6

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

Relationship Matrix – 26CH010													
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	3	3	1	1	1	3	3	2	1	1	2	2.00
CO2	3	3	3	3	1	1	3	3	2	2	1	3	2.33
CO3	3	3	3	2	1	1	3	3	3	3	2	2	2.41
CO4	3	3	3	2	2	1	3	3	3	3	3	3	2.66
CO5	3	3	3	3	3	2	3	3	3	3	3	3	3.00
												Total	2.48

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