



बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Munda Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

School of Science

B.Sc. (Chemistry) Programme

Subject Code & Name: - BS05MJCHE2 & Inorganic Chemistry-III

Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
4	-	-	4	50	-	50	-

Programme Name	B.Sc.
Semester	V
Course Code	BS05MJCHE2
Course Title	Inorganic Chemistry-III
Course Content Type (Th./Pr.)	Theory
Course Credit	4
Sessions+ Lab. Per Week	4
Total Teaching/Lab. Hours	60 Hours
* 2 Laboratory = 1 Session	

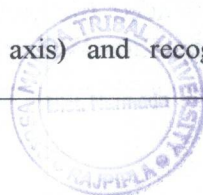
Learning Objectives

1. Understand the fundamental theories of bonding (Lewis, VSEPR, VB theory, MOT) to predict molecular geometry, shape, and stability.
2. Master the 18-electron rule and Effective Atomic Number (EAN) rule to predict the stability of metal carbonyls and organometallic complexes.
3. Understand the synergic bonding mechanism (σ -donor, π -acceptor) in metal-ligand complexes, particularly in metal carbonyls.
4. Identify symmetry elements (axis, plane, center, improper axis) and assign point groups to molecules systematically.

Prerequisites (if any)

Learning Outcomes

1. Predict geometries using Valence Shell Electron Pair Repulsion (VSEPR) theory.
2. Apply the 18-electron rule (EAN rule) to evaluate the stability of metal carbonyl complexes.
3. Identify structures of mononuclear and polynuclear carbonyls (e.g., $[\text{Ni}(\text{CO})_4]$, $[\text{Fe}(\text{CO})_5]$, $[\text{Cr}(\text{CO})_6]$).
4. Identify and classify compounds containing direct metal-carbon bonds (e.g., Grignard reagents, metal carbonyls, ferrocene).
5. Identify symmetry elements (axis, plane, center, improper axis) and recognize symmetry operations for molecules.





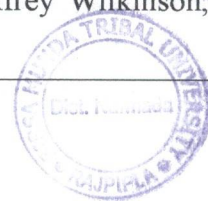
बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Mūṇḁā Drāyabala Yūnīvārsīṭī

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Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	The covalent bond Introduction, Lewis theory, Lewis dot structure and its limitations Characteristics and covalent compounds, Formal charge and Lewis structure, Balance bond theory and its limitations, Applications of VSEPR theory and its limitations, Bent rule, Fajan's rule, Application of hybridization for determination of structure geometry and shape.	15
II	Metal carbonyls Introduction, Classification of metal carbonyls, Bonding in metal carbonyls, Synergistic effect, 18 electron rule, Wade's rule, Synthesis of metal carbonyls, Structure and bonding of $\text{Ni}(\text{CO})_4$, $\text{Fe}(\text{CO})_5$, $\text{Cr}(\text{CO})_6$, $\text{Fe}_2(\text{CO})_9$, $\text{Mn}_2(\text{CO})_{10}$, $\text{CO}_2(\text{CO})_8$	15
III	Organometallic compounds Introduction and classification, Organic ligands and nomenclature Topicity, 18 electron rule in complexes, 16 electron rule, exception to 18/16 electron rule, reactions of ferrocene, synthesis of ferrocene carboxylic acid, synthesis of ferrocene boronic acid, synthesis of ferrocene organoamines, applications of ferrocene.	15
IV	Symmetry and group theory Introduction, Symmetry operations and symmetry elements, Law of symmetry, Point group and their symmetry elements.	15
Text Book(s)		
Reference Books		
1. Principles of Inorganic chemistry- B. R. Puri, L. R. Sharma and K. C. Kalia; Vallabh publications, Delhi. 2. Concise Inorganic Chemistry - J. D. Lee 3. Selected Topic in Inorganic Chemistry, 8th edition, by Wahid U. Malik, G.D. Tuli and R.D. Madan 4. Basic Inorganic Chemistry by Ajai Kumar, Aaryush Education 5. Advanced Inorganic Chemistry by F. Albert Cotton, Geoffrey Wilkinson, An Indian Adaptation Willey.		





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Web Resources	
1. Google books, INFLIBNET, Google Web	
Required Software(s) (if any)	
Practical(s) (if any)	

L:: Lecture, **T::** Tutorial , **P::**Practical

CCE:: Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/ surprised), attendance etc. or any combination of these)

PWE:: Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

SEE:: Semester End Evaluation

