

KU7DSCCHE402: INORGANIC CHEMISTRY- IV

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
VII	DSC	400	KU7DSCCHE402	4	90

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
2	2	0	35	65	100	1.5

Course Description: This major paper describes the concepts of bonding in coordination compounds and spectral and magnetic properties of coordination compounds. Practical session deals with inorganic qualitative analysis including rare ions.

Course Prerequisite: NIL

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Apply the theories of bonding to predict the geometry of coordination compounds	A
2	Explain the spectroscopic features of complexes and interpret the spectra of complexes	A
3	Describe the magnetic behaviour of complexes and apply magnetic properties in the structural determination of complexes	A
4	Understand the various reaction mechanisms operative in inorganic complexes during substitution and electron transfer reactions.	U
5	Acquire skill in analysing inorganic mixtures containing rare earth elements and reporting	A

***Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)**

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
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CO 1	3	1	2	1	1	2	2
CO 2	3	1	2	1	2	2	2
CO 3	3	2	2	1	1	2	2
CO 4	3	1	2	1	1	2	2

Course Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
1		BONDING IN COORDINATION COMPOUNDS – II	8
	1	Coordination numbers 2 to 12 and geometry – Consequences of CFT- Crystal field effect on ionic radii, lattice energies and hydration energy	
	2	Jahn teller effect – evidence for ligand field splitting – spectrochemical series.	
2		BONDING IN COORDINATION COMPOUNDS – III	7
	1	MOT in coordination compounds – MO energy level diagrams for octahedral, tetrahedral and square planar configuration with and without π bonding. Effect of π bonding in stability – nephelauxetic series – experimental evidence for metal-ligand.	
	2	Covalent bonding in complex. Comparison of three theories as applied to metal complexes.	
3		SPECTRAL PROPERTIES OF COORDINATION COMPOUNDS	8

	1	Spectroscopic ground states – term symbols for d^n ion. selection rules for d-d transitions – nature of spectral bands – (band shapes, intensities, width and spin orbit coupling)	
	2	Orgel diagram of transition metal complexes (d1 to d9 configurations) Tanabe Sugano diagrams, interpretation of spectra of spin paired and spin free octahedral, distorted octahedral, tetrahedral and square planar complexes.	

4.	MAGNETIC PROPERTIES OF COORDINATION COMPOUNDS		7
	1	Magnetic behaviours – susceptibility, measurements – Gouy method diamagnetic corrections. Spin only value – orbital contributions – spin orbit coupling, ferro and antiferro magnetic coupling – spin cross over system.	
	2	Applications of magnetic measurements to structural determinations of transition metal complexes.	

5	TEACHER SPECIFIC MODULE - INORGANIC QUALITATIVE ANALYSIS- III PRACTICAL. Directions: (Minimum 8 mixtures are to be recorded) and any two other experiments in teacher's choice.		60
	1.	1. Separation and identification of four metal ions Separation and identification of four metal ions of which two are rare, less familiar such as Tl, W, V, Se, Te, Ti, Ce, Th, Zr, Th, Mo, and Li (interfering acid radicals not present). Confirmation by spot test. Open ended (suggestions) a) Cerimetry -Fe (II), nitrate b) Estimation of dissolved oxygen by Winkler's method	

Essential Readings:

1. R Gopalan and V N Ramalingam, Concise Coordination Chemistry, Vikas publishing house Pvt Ltd
2. S F A Kettle, Coordination Chemistry, Thomas Nelson and sons
3. J C Bailar, Chemistry of coordination compounds, Reinhold
4. F Basolo R Johnson Coordination Chemistry, Benjamin Inc
5. D Banerjee Coordination Chemistry Tata McGraw Hill
7. J E Huheey, E A Keiter, R L Keiter, O K Medhi, Inorganic Chemistry, Pearson.
8. A I Vogel, A Textbook of Qualitative Inorganic Analysis, Longman 5th edition, 1979.
9. V Ramanujam, Inorganic Semi micro-Qualitative analysis, 3rd edition, The National Publishing Company, Chennai 1974.

Assessment Rubrics:

Evaluation Type		Marks
End Semester Evaluation (ESE)		65 (35T+30P)
Continuous Evaluation (CCA)		35 (15T+20P)
Theory		15
a)	Test Paper*	6
b)	Assignment	3
c)	Viva-Voce	3
d)	Seminar	3
Practical		20
a)	Skill	8
b)	Record	8
c)	Punctuality	4
Total		100

*Average mark of the best two written tests may be considered for internal mark.