

**Govt. T. R. S. (Autonomous) College Rewa (M.P.)**  
**(Affiliated to A.P.S. University Rewa)**  
**Department of Chemistry**  
**Syllabus for B.Sc. (Hons.) Chemistry on CBCS**  
**Session 2023-24**

Part A - Introduction			
Program-Diploma	Class- ALL	Semester III	Session: 2023-24
Subject : Chemistry (Honours)			
1	Course code	CHGT-03	
2	Course title	ORGANOMETALLICS & BIOINORGANIC CHEMISTRY	
3	Course type	Generic Elective (GE)	
4	Pre-requisite (if any)	This course is Open for all	
5	Course Objective	Elements in periodic table; physical and chemical characteristics, periodicity. To predict the atomic structure, chemical bonding, and molecular geometry based on accepted models. To understand atomic theory of matter, composition of atom. Identity of given element, relative size, charges of proton, neutron and electrons, and their assembly to form different atoms. Defining isotopes, isobar and isotone.	
6	Course Learning Outcomes (CLO)	<b>By the end of the this paper Students will be able to</b> <ul style="list-style-type: none"> <li>• Physical and chemical characteristics of elements in various groups and periods according to ionic size, charge, etc. and position in periodic table.</li> <li>• Characterize bonding between atoms, molecules, interaction and energetics hybridization and shapes of atomic, molecular orbitals, bond parameters, bond- distances and energies.</li> <li>• Valence bond theory incorporating concepts of hybridization predicting geometry of molecules.</li> </ul>	
7	Credit Value	3	
8	Total Marks	<b>Maximum Marks:</b> <b>University Exam (UE)- 60, CCE-40</b>	<b>Min. Passing Marks: 33</b>
Part B – Content of the Course			
<b>Total No. of Lectures-Tutorials-Practical (02 hours per week):</b>			
<b>L-T-P: 45-0-0 (Total Hours)</b>			
Unit	Topic	No. of Lectures	
1	Chemistry of 3d metals Oxidation states displayed by Cr, Fe, Co, Ni and Co. A study of the following compounds (including preparation and important properties); Peroxo compounds of Cr, K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> , KMnO <sub>4</sub> , K <sub>4</sub> [Fe(CN) <sub>6</sub> ], sodium nitroprusside, [Co(NH <sub>3</sub> ) <sub>6</sub> ]Cl <sub>3</sub> , Na <sub>3</sub> [Co(NO <sub>2</sub> ) <sub>6</sub> ].	<b>06</b>	
2	Organometallic Compounds Definition and Classification with appropriate examples based on nature of metal-carbon bond (ionic, s, p and multicentre bonds). Structures of methyl lithium, Zeiss salt and ferrocene. EAN rule as applied to carbonyls. Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals. p-acceptor behaviour of carbon monoxide. Synergic effects (VB approach)- (MO diagram of CO can be referred to for synergic effect to IR frequencies).	<b>12</b>	

<b>3</b>	<p><b>Bio-Inorganic Chemistry</b>  A brief introduction to bio-inorganic chemistry. Role of metal ions present in biological systems with special reference to Na<sup>+</sup>, K<sup>+</sup> and Mg<sup>2+</sup> ions: Na/K pump; Role of Mg<sup>2+</sup> ions in energy production and chlorophyll. Role of Ca<sup>2+</sup> in blood clotting, stabilization of protein structures and structural role (bones).</p>	<b>12</b>
<b>Part C – Learning Resource</b>		
<b>Text Books, Reference Books, Other resources</b>		
<p><b>Suggested Reading:</b>  <b>Text &amp; Reference Books:</b>  James E. Huheey, Ellen Keiter &amp; Richard Keiter: Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Publication. • G.L. Miessler &amp; Donald A. Tarr: Inorganic Chemistry, Pearson Publication. • J.D. Lee: A New Concise Inorganic Chemistry, E.L.B.S. • F.A. Cotton &amp; G. Wilkinson: Basic Inorganic Chemistry, John Wiley &amp; Sons.</p> <p><b>Suggested equivalent online courses:</b>  (all URLs accessed in May 2021)</p> <p>MOOCs</p> <ul style="list-style-type: none"> <li>•</li> </ul>		

**Keywords:**

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Part A - Introduction			
Program-CERTIFICATE	Class- UG	Semester- III	Session: 2023-24
Subject : Chemistry (Honours)			
1	Course code	CHGP 03	
2	Course title	ORGANOMETALLICS & BIOINORGANIC CHEMISTRY (Practical)	
3	Course type	Generic Elective (GE)	
4	Pre-requisite (if any)	This course is Open for all	
5	Course Objective	To aware about the various easy experiments of chemistry.	
6	Course Learning Outcomes(CLO)	<b>By the end of the this paper Students will be able to:</b> <ul style="list-style-type: none"> <li>• Electronic configuration of various elements in periodic table</li> <li>• Predicting structure of molecules</li> <li>• How hydrogen bonding, metallic bonding is important in common materials' scientific applications to material fabrication</li> </ul>	
7	Credit Value	1	
8	Total Marks	Maximum Marks: Total - 100 University Exam (UE)- 60, CCE-40	Min. Passing Marks: 33
Part B – Content of the Course			
<b>Total No. of Lectures-Tutorials-Practical (04 hours per week):</b>			
<b>L-T-P: 15-0-0 (Total hours)</b>			
Unit	Topic		No. of Lectures
1	1. Separation of mixtures by chromatography: Measure the Rf value in each case. (Combination of two ions to be given) Paper chromatographic separation of Fe <sup>3+</sup> , Al <sup>3+</sup> and Cr <sup>3+</sup> or Paper chromatographic separation of Ni <sup>2+</sup> , Co <sup>2+</sup> , Mn <sup>2+</sup> and Zn <sup>2+</sup> 2. Preparation of any two of the following complexes and measurement of their conductivity: a. tetraamminecarbonatocobalt (III) nitrate b.		12

	<p>tetraamminecopper (II) sulphate c. potassium trioxalatoferrate (III) trihydrate Compare the conductance of the complexes with that of M/1000 solution of NaCl, MgCl<sub>2</sub> and LiCl<sub>3</sub>.</p>	
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## Part C – Learning Resource

### Text Books, Reference Books, Other Resources

#### Suggested Reading:

#### Text & Reference Books:

1. A.I. Vogel: Qualitative Inorganic Analysis, Prentice Hall, 7th Edn.
2. A.I. Vogel: Quantitative Chemical Analysis, Prentice Hall, 6th Edn.
3. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., Textbook of Practical Organic Chemistry, Prentice-Hall, 5th edition, 1996.
4. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry Orient-Longman, 1960.

#### Suggested equivalent online courses: (all URLs accessed in May 2021)

MOOCs

