

**SARDAR PATEL UNIVERSITY**  
**Programme: MSC (Integrated Biotechnology)**  
**Semester: III**  
**Syllabus with effect from: June 2011**

<b>Paper Code:</b> PS03CIGB01	<b>Total Credits: 3</b>
<b>Title Of Paper:</b> Physico-inorganic chemistry	

Unit	Description in detail	Weightage (%)
<b>1</b>	<p><b>Chemical Bonding:</b> Ionic bond, lattice energy, Born-Haber Cycle, Covalent compound and their characteristics. Co-ordinate compound-Werner's Theory, Isomerism in coordinate compounds. Various types of hybridization and shape of simple inorganic molecule, VSEPR theory. Discussion of structures of H<sub>2</sub>O, NH<sub>3</sub>, H<sub>3</sub>O<sup>+</sup>, ClF<sub>3</sub>, ICl<sub>2</sub><sup>-</sup> and SF<sub>4</sub>, ICl<sub>4</sub>, SF<sub>6</sub>. Molecular orbital theory, Linear combination of atomic orbital (LCAO) method. Structure of simple homo-nuclear and hetero-nuclear diatomic molecules like N<sub>2</sub>, O<sub>2</sub>, F<sub>2</sub>, CO, NO.</p>	
<b>2</b>	<p><b>Chemical Kinetics and Catalysis:</b> Significance of rate law and rate equations, order and molecularity. Determination of order of simple reactions-experimental method. Equilibrium constant and reaction rates. Mathematical characteristics of simple chemical reactions -zero order, first order, second order. Theories of reaction rate –Lindemann, collision and activated complex theories, complex reactions - consecutive reaction and opposing or reversible reactions.</p> <p><b>Catalysis:</b> Criteria for Catalysis - Homogeneous Catalysis. acid-base. Enzymatic catalysis. Heterogeneous catalysis, concepts of promoters, inhibitors and poisoning.</p>	
<b>3</b>	<p><b>Thermochemistry and Bioinorganic chemistry:</b> Hess's Law, heat of a reaction, effect of temperature on heat of reaction at constant pressure (Kirchoff's Equation) heat of dilution, heat of hydration, heat of neutralization and heat of combustion. Bond dissociation energy and its calculation using thermo-chemical data.</p> <p><b>Bio-inorganic Chemistry :</b> The role of metal system. Alkali and alkaline earth metal, Iron-porphyrins, Iron-sulphur, proteins, hemerythrin, Iron-supply and transport. The Bioinorganic chemistry of Cobalt, Vitamin-B12, Metalloenzymes, Nitrogen fixation.</p>	
<b>4</b>	<p><b>Colloids and Polymers:</b> Type of colloidal state. Classification of colloids. lyophilic and lyophobic sols. Preparations of colloidal solutions. Properties of colloids system, purification of colloidal system: dialysis, electro-dialysis, ultra filtration and electrophoresis, coagulation of colloidal solution, emulsion; type of emulsion, emulsifier, general properties, gels, preparation of gels, elastic and non-elastic gels, importance and application of colloids.</p> <p><b>Polymers:</b> Basic concepts &amp; terminology, such as monomers. Polymers, functionality. Classification of polymer, linear, branched cross-linked polymers. Addition, condensation and Ionic-polymerizations, Industrial applications of polymers.</p>	
	<b>Practical:</b>	
	<ul style="list-style-type: none"> <li>• To determine the amount of Mg<sup>2+</sup> by EDTA using Eriochrome black –T as an indicator from the given solution of MgSO<sub>4</sub>.7H<sub>2</sub>O.</li> <li>• To determine the amount of Zn<sup>2+</sup> by EDTA using Eriochrome black –T as an indicator from the given solution of ZnCl<sub>2</sub>.2H<sub>2</sub>O.</li> <li>• To determine the amount of Ni<sup>2+</sup> by EDTA using murexide as an</li> </ul>	



	<p>indicator from the given solution of <math>\text{NiSO}_4 \cdot 7\text{H}_2\text{O}</math>.</p> <ul style="list-style-type: none"> <li>• To determine the amount of <math>\text{Cu}^{2+}</math> by EDTA using Fast sulphone-F/muroxide as an indicator from the given solution of <math>\text{CuSO}_4 \cdot 5\text{H}_2\text{O}</math>.</li> <li>• To determine the molarity and grams/liter of the given x M <math>\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}</math> solution by titrating against 0.016 M <math>\text{K}_2\text{Cr}_2\text{O}_7</math> using internal indicator Diphenylamine sulphate.</li> <li>• To determine the amount of carbonate and bi carbonate in given mixture.</li> <li>• Quantitative analysis of inorganic substances: <math>\text{Pb}(\text{NO}_3)_2</math>, <math>\text{CuSO}_4</math>, <math>\text{CuCO}_3</math>, <math>\text{CdSO}_4</math>, <math>\text{AlPO}_4</math>, <math>\text{Bi}(\text{NO}_3)_3</math>, <math>\text{Al}(\text{NO}_3)_3</math>, <math>\text{Al}_2(\text{CO}_3)_3</math>, <math>\text{ZnCO}_3</math>, <math>\text{BaCl}_2</math>, <math>\text{SrCl}_2</math>, <math>\text{CaCO}_3</math>, <math>\text{MgSO}_4</math>, <math>\text{NiCO}_3</math>, <math>\text{CuSO}_4</math>, <math>\text{ZnS}</math>, <math>\text{NH}_4\text{Br}</math>, <math>(\text{NH}_4)_2\text{CO}_3</math>, <math>(\text{NH}_4)_3\text{PO}_4</math>, <math>\text{K}_3\text{PO}_4</math>, <math>\text{ZnPO}_4</math>, <math>\text{CdS}</math>.</li> </ul>	
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#### Basic Text & Reference Books:

- **Concise Inorganic Chemistry 5<sup>th</sup> Edition by J. D. Lee.**  
Black well Science. ISBN-0-632-05459-X.
- **Essentials of Physical Chemistry by B.S. Bahl, Arun Bahl and G.D. Tuli.**  
S. Chand & Company Ltd. New Delhi. ISBN-81-219-0546-X.
- **Advance Inorganic Chemistry by Satyaprakash, G.D. Tuli, S. K. Basu and R.D. Madan**  
S. Chand & Company Ltd. New Delhi. ISBN-81-219-0263-0.
- **Principles of physical chemistry by B.R.Puri, L.R. Sharma, M.S. Pathania**  
Vishal Publishing Company. ISBN-81-88646-88-8.
- **Basic Inorganic Chemistry 3<sup>rd</sup> Edition By F.A. Cotton, G. Willinkinson, P.L. Gauss**  
John Willey & Sons Inc. New York Isbn-9971-51-175-4.
- **Selected Topic In Inorganic Chemistry By W. U. Malik, G.D.Tuli, R. D. Madan**  
S. Chand & Company Ltd. New Delhi. ISBN-81-219-0600-8.
- **Polymer Science & Technology 2<sup>nd</sup> Edititon By J.L. Fried**  
Prentice Hall of India, New Delhi. ISBN-81-203-2770-5.
- **University Chemistry 3<sup>rd</sup> Edition By Bruce H. Mahan.**  
Narosa Publication, New Delhi. ISBN-81-85015-80-5.

