Devrukh Shikshan Prasarak Mandal's

Nya. Tatyasaheb Athalye Arts, Ved. S.R. Sapre Commerce and Vid. Dadasaheb Pitre Science College

(Autonomous)

Late Kakasaheb Pandit Educational Campus,

Devrukh, Dist: Ratnagiri- 415 804, Maharashtra

NAAC Accredited 'A' Grade (Third Cycle), Mumbai University Best College Award 2009-10

Syllabus

Programme: T. Y. B. Sc.

Course- Inorganic Chemistry

w.e.f. Academic Year 2021-22

Choice Based Credit System
T. Y. B. Sc.
Chemistry Syllabus
To be implemented from the Academic year 2021-22

Course Content
Semester V

Course Code	Unit	Topics	Credits	L/Week
USCHT51	I	Molecular Spectroscopy		
	II	Electrochemistry		
	III	Nuclear Chemistry		
	IV	Surface Chemistry & Colloidal State		
USCHT52	I	Molecular Symmetry and Chemical Bonding		
	II	Solid State Chemistry		
	III	Chemistry of Inner Transition Elements		
	IV	Some Selected Topics		
USCHT53	I	Mechanism of Organic Reactions; Pericyclic Reactions & Photochemistry		
	II	Stereochemistry & Heterocyclic Chemistry		
	III	IUPAC & Synthesis of Organic Compounds		
	IV	Spectroscopy-I & Natural Products		
USCHT54	I	Statistical Treatment of Analytical Data-II		
	II	Classical Methods of Analysis (Titrimetry)		
	III	Optical Methods		
	IV	Methods of Separation–I		
USCHP51		Chemistry Practicals I		
USCHP52		Chemistry Practicals II		
USCHP53		Chemistry Practicals III		
USCHP54		Chemistry Practicals IV		

T.Y.B.Sc. Syllabus Chemistry Paper-II
Inorganic Chemistry

Semester V

Unit I: MOLECULAR SYMMETRY AND CHEMICAL BONDING (15L)

1.1 Molecular Symmetry (6L)

1.1.1 Introduction and Importance of Symmetry in Chemistry.
1.1.2 Symmetry elements and Symmetry operations.
1.1.3 Concept of a Point Group with illustrations using the following point groups: (i) $C_{\infty v}$ (ii) $D_{\infty h}$ (iii) C_{2v} (iv) C_{3v} (v) C_{2h} and (vi) D_{3h}

1.2 Molecular Orbital Theory for heteronuclear diatomic molecules and polyatomic species (9L)

1.2.1 Comparison between homonuclear and heteronuclear diatomic molecules.
1.2.2. Heteronuclear diatomic molecules like CO, NO and HCl, application of modified MO diagram for CO.
1.2.3 Molecular orbital theory for H_3 and H_3^+ (correlation diagram expected).
1.2.4. Molecular shape to molecular orbital approach in AB_2 molecules. Application of symmetry concepts for linear and angular species considering σ- bonding only. (Examples like: i) BeH_2, ii) H_2O).

Unit-II: SOLID STATE CHEMISTRY (15L)

2.1 Structures of Solids (11L)

2.1.1 Explanation of terms viz. crystal lattice, lattice point, unit cell and lattice constants.
2.1.2 Closest packing of rigid spheres (hcp, ccp), packing density in simple cubic, bcc and fcc lattices. Relationship between density, radius of unit cell and lattice parameters. (Numerical problems expected).
2.1.3 Stoichiometric Point defects in solids (discussion on Frenkel and Schottky defects expected).

2.2 Superconductivity (4L)

2.2.1 Discovery of superconductivity.
2.2.2 Explanation of terms like superconductivity, transition temperature, Meissner effect.
2.2.3 Different types of super conductors viz. conventional superconductors, alkali metal fullerides, high temperature super conductors.
2.2.4 Brief application of superconductors.

Unit III: CHEMISTRY OF INNER TRANSITION ELEMENTS (15L)

3.1 Introduction (1L)
Position in periodic table and electronic configuration of lanthanides and actinides.

3.2 Chemistry of Lanthanides (11L)
3.2.1 Lanthanide contraction and its consequences.
3.2.2 Oxidation states.
3.2.3 Ability to form complexes
3.2.4 Magnetic and spectral properties.
3.2.5 Occurrence, extraction and separation of lanthanides by Solvent extraction.
3.2.6 Applications of lanthanides.

3.3 Chemistry of Actinides (3L)
3.3.1 Comparison between lanthanides and actinides.
3.3.2 Chemistry of Uranium with reference to occurrence and isolation (solvent extraction method)
3.3.2 Properties and applications of Uranium.)

Unit IV: SOME SELECTED TOPICS (15L)

4.1 Chemistry of Non-aqueous Solvents (5L)
4.1.1 Classification of solvents and importance of non-aqueous solvents.
4.1.2 Characteristics and study of liquid ammonia, dinitrogen tetra oxide as non-aqueous solvents with respect to: (i) acid-base reactions and (ii) redox reactions.

4.2 Comparative Chemistry of Group 16 (5L)
4.2.1 Electronic configurations, trends in physical properties, allotropy
4.2.2 Manufacture of sulphuric acid by Contact process.

4.3 Comparative Chemistry of Group 17 (5L)
4.3.1 Electronic configuration, General characteristics, anomalous properties of fluorine, comparative study of acidity of oxyacids of chlorine w.r.t acidity, oxidizing properties and structures (on the basis of VSEPR theory)
4.3.2 Chemistry of interhalogens with reference to preparations, properties and structures (on the basis of VSEPR theory).

Reference Books:

Inorganic Chemistry

1. D. Banerjea, Coordination chemistry, Tata McGraw Hill, New Delhi, (1993).
2. D. F. Shriver and P. W. Atkins, Inorganic chemistry, 3rd Ed., Oxford University Press, (1999).
3. N. N. Greenwood and E. Earnshaw, Chemistry of elements,Pergamon Press, Singapore, (1989).
4. W. L. Jolly, Modern inorganic chemistry, 2nd Ed. McGraw Hill Book Co., (1991).
5. B. E. Douglas and H. McDaniel, Concepts and models in inorganic chemistry, 3rd Ed., John Wiley & Sons, Inc., New York, (1994).
6. G. N. Mukherjee and A. Das, Elements of bioinorganic chemistry, Dhuri and Sons, Calcutta, (1988).
7. R. W. Hay, Bioinorganic chemistry, Ellis Harwood, England, (1984).
8. R. C. Mehrotra and A. Singh, Organometallic chemistry: A unified approach, Wiley Eastern, New Delhi, (1991)