

**Hemchandracharya North Gujarat University, Patan**  
**B. Sc. Chemistry**  
**Semester : V H}GvZ\_!# YL**  
**Inorganic Chemistry**  
**Paper : CC CH – 501**

**UNIT – I : Reaction Mechanism of Coordination Compounds**

- Substitution reaction of square planar complexes
- Reaction of Platinum II complexes, the trans effect, theories of trans effect, use of synthesis in trans effect and analysis
- Substitution reaction in octahedral complexes, Possible mechanism reactions, Ligand displacement reaction in octahedral complexes, acid hydrolysis, Base hydrolysis
- Electron transfer reaction, mechanism of redox reaction, mechanism of substitution in square planar complexes

**UNIT- II : Organo Metallic Compounds**

- Definition
- Types of O.M.C.
- Classification
- Nomenclature of O.M.C
- Structure and bonding in dihapto and metal olefines complexes. e.g. Ziese's salt complexes, ferrocene structure
- O.M.C. of Li and Al complexes

**UNIT- III : Corrosion**

- Principle of corrosion
- Types of corrosion
- (i) Wet corrosion
- (II) Galvanic corrosion
- (III) Atmospheric corrosion
- (IV) Pitting corrosion
- (V) Inner granular corrosion
- (VI) Dezincification
- Prevention of corrosion: Inhibitors- Definition, type and use of inhibitors.

**Books Suggested (Inorganic Chemistry):**

1. Valance and molecular structure by Cartmell and Flower.
2. Text book of Inorganic Chemistry by Durent and Durent.
3. Inorganic Chemistry by S. Chand. H}GvZ\_!# YL
4. Advance Inorganic Chemistry Vol-II Satya Prakash (S.Chand)
5. Concise Inorganic chemistry by J.D.Lee.
6. Metallic Corrosion By M.N. Desai
7. Advance Inorganic Chemistry J.E. Huhee.

### UNIT- I : Stereochemistry

- Conformational analysis of mono and di substituted cyclohexanes
- Molecular asymmetry as illustrated by allenes and diphenyls
- Isomerism of oximes.
- Determination of geometrical isomerism of Aldoxime.
- Determination of geometrical isomerism of Ketoxime(Beckmann's transformation)

### UNIT- II

#### (A) Carbohydrates

- Introduction of Disaccharides · Structure determination of  
(1) Sucrose (2) Maltose

#### (B) Isoprenoids

- Classification
- General methods of structure determination
- Isoprene rule
- Constitution of Citral and  $\alpha$ -Terpeneol and their synthesis

### UNIT- III : Nucleophilic substitution at saturated carbon atom

- The reaction mechanism
- Stereochemistry of nucleophilic substitution
- Scope of nucleophilic substitution
- Stereochemistry of SN1 and SN2 reaction
- Relative reactivity in substitution
- Solvent effect variation at carbon site
- Relative leaving group activity
- Neighboring group participation
- Competitive reactions. Elimination E1,E2 and E1cb mechanisms

### Books Suggested (Organic Chemistry): H}GvZ\_!# YL

1. Organic chemistry by Morrison & Boyd Vth Edition
2. Advance organic chemistry by R.K.Bansal.
3. Organic chemistry by I.L.Finar Vol I & II Vth Edition
4. Organic chemistry by pine, Hendrikson, Cram and Hammond IVth edition...
5. Outline of chemical technology by Dryden IIInd Edition
6. Synthetic organic chemistry by Gurdeep R Chatwal.
7. Advanced organic chemistry by Jerry March.
8. Organic reactions and their mechanisms IIInd edition by P.S. Kalsi.
9. Stereo chemistry: conformation and mechanism VIth edition by P.S.Kalsi.
10. Organic chemistry of natural product Vol: I & II by Gurdeep R.Chatwal.
11. Advanced organic chemistry by Arun Bahal and B.S. Bahal.
12. Organic chemistry Vol, I, II, III by S.M.Mukherjee, S.P.Singh, R.P.Kapoor.
13. Stereo Chemistry by Nasipuri.

### UNIT- I : Electro Motive Force

- Chemical Cell: Without Transference with Transference Verification of Concentration cell and it's EMF equation.
- Electrolyte concentration cell
- Concentration cell without transference, Concentration cell with transference
- Electrode concentration cell
- Amalgam concentration cell, Gas Concentration Cell
- Liquid –Liquid junction potential
- Application of EMF measurements Determination of
- Degree of hydrolysis of salt
- Solubility of sparingly soluble salt
- Stability constant of complex,
- Dissociation constant of weak acid,
- Numericals

### UNIT- II : Statistical Thermodynamics

- Introduction
- Combination and permutation
- Probability
- Sterling approximate formula (No Derivation)
- Type of Statistics
- Maxwell-Boltzmann
- Bose-Einstine Statistics
- Fermi-Dirac Statistics
- Partition Function
- Transnational Partition function
- Rotational Partition function
- Vibrantional Partition function
- Numericals

### UNIT- III : Macromolecules

- Classification of Polymers
- Tacticity of polymers. ( Optical Isomers)
- Polymerization reaction with example
- Addition Polymerization. ( Polyethylene, Polystyrene,PVC)
- Condensation Polymerization (Nylon-66, Dacron)
- Mechanisms of Polymerization
- Free radical chain Polymerization
- Anionic Polymerization
- Cationic Polymerization
- Kinetics of Free radical chain Polymerization
- Degree of Polymerization

- Molar masses of Polymer
- Number Average Molar Mass
- Weight Average Molar Mass
- Determination of Molar Masses of Macro Molecules
- Viscosity Method
- Light Scattering Method
- Numerical

**Books Suggested (Physical Chemistry):-**

1. Advance Physical Chemistry by Gurdeepraj.
2. Physical Chemistry (Question and Answer) by R. N. Madan, G.D. Tuli, S.Chand.
3. Principal of Physical Chemistry by Puri, Sharma, Pathania.
4. Chemical Thermodynamics by R.P. Rastogi and R.R.Mishra.
5. Physical chemistry by atkins.
6. Essentials of Physical Chemistry by B. S. Bahal, Arun Bahal, G.D.Tuli,
7. Physical Chemistry by P.W. Atkins, 5th edn, Oxford 1994 7th edn-2002.
8. Physical Chemistry by R.A. Albern and R.J.Silby, John Wiley 1995.
9. Physical Chemistry by G.H. Barrow, 5th edn, Mac Graw Hill, 1988,6th edn, 1996.
10. Physical Chemistry by W.J.Moore, 4th edn, Orient Longmans 1969.

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**B. Sc. Chemistry**  
**Semester : V**  
**Structural – Analytical Chemistry**  
**Paper : CC CH - 504**

**UNIT:- I : Symmetry of molecules**

- Symmetry elements & symmetry operations
- Multiplications of symmetry operations
- Multiplication table for C<sub>2v</sub>, C<sub>3v</sub>, C<sub>2h</sub> point groups only
- Classification of Schoenflies point groups
- Determination of Schoenflies point group notations
- Symmetry & optical activity
- Symmetry property of orbitals for C<sub>2v</sub>, C<sub>3v</sub>, C<sub>2h</sub> point groups

**UNIT- II : NMR spectroscopy**

- Introduction
- Proton magnetic resonance (<sup>1</sup>H NMR) spectroscopy
- Equivalent and non equivalent protons
- Nuclear shielding & de-shielding
- Chemical shift & molecular structure
- Spin-spin splitting and coupling constant
- Area of signals
- Interpretations of PMR spectra

Simple organic molecule such as ;

- (1) Ethyl bromide (2) Ethanol (3) Acetaldehyde (4) 1,1,2-Tri bromo ethane  
(5) Ethyl acetate (6) Toluene (7) Acetophenone (8) Iso propyl Benzene (9)  
Acetic acid (10) Phenitol

**UNIT:- III : Acid- base titration**

- Construction of titration curves
- Feasibility of titration of poly protic acid
- Analysis of mixture of acid & base
- Differential titration of alkalis
- Gran's plot
- Buffers , buffer level , buffer range & buffer capacity

**Suggested books: (structural chemistry)**

1. Chemical application of group theory by F.A.Cotton
2. Chemical bonding and introduction by K.C.Patel, R.D.Patel and Raval
3. Application of group theory to chemistry by Bhattacharya
4. Symmetry in chemistry by Jaffe and Orchin H}GvZ\_!# YL
5. Advance inorganic chemistry by Cotton & Wilkinson
6. Basic principles of spectroscopy by R.Chand
7. Organic chemistry Vol. 1 by S.M.Mukherji, S.P.Shingh, Kapoor
8. Spectroscopy organic compounds VIth edition by P.S.kalsi
9. Organic chemistry by Morrison and Boyd
10. Spectrometric identification of organic compounds IVth edition by Silverstein, Bassler and Morrill.
11. Application of absorption spectroscopy of organic compounds by John R. Dyer
12. Spectroscopic method in organic chemistry Vth edition by Dudley H.Williams & Ian Fleming