

SARDAR PATEL UNIVERSITY
SYLLABUS OF S.Y.B.Sc. (Effective from June –2007)
C-201
INORGANIC CHEMISTRY

Total Marks 80:

No. of Questions: 6

- UNIT I** **Chemistry of Elements of First, Second and Third Transition Series:** Definition and Electronic Configuration of Elements, General Characteristic of Transition Elements, Comparison of Elements of First Transition Series (3d Series) with those of (4d Series) and Third (5d Series).
- UNIT II** **Coordination Chemistry:** Postulates of Werner's Coordination Theory, To Explain the Structure of Co (III) Ammines on the Basis of Werner's Coordination Theory, Experimental Evidence in Favour of Werner's Theory. Explain the Structure of Pt (IV) Ammines on the Basis of Werner's Coordination Theory, Sidgwick's Electronic Concept of Coordinate Bond, Limitations of Sidgwick's Electronic Concept of Coordinate Bond, Sidgwick's Effective Atomic Number (EAN) Rule, Calculation of EAN of the Central Metal Atom in Complex Ions, Applications of EAN Rule, Some Typical Problems With Solutions, Metallurgy of Ti, V, Cr, Mo, W and Mn.
- UNIT III** **Fertilizers:** Plant Nutrients, Nutrient Function, Types of Fertilizers, Need of Fertilizers, Essential Requirements, Fertility of the Soil, pH Value of the Soil, Classification of Fertilizer, Direct and Mixed Fertilizers, Source of Fertilizers, Natural Organic Fertilizers, Granulations, Bulk Blending, Natural Inorganic Fertilizers, Artificial Fertilizers, Nomenclature in Fertilizer Industry, Nitrogenous Fertilizers, Ammonium Nitrate, Important Points, Ammonium Sulfate, Ammonium Sulfate from Zypsum or Anhydride, Action of Ammonium Sulfate as Fertilizer, Urea, Raw Materials, Manufacture, Condition for a Good Yield, Important Points, Action of Urea as Fertilizer, Calcium Cynamide, Action of CaCN_2 as Fertilizer, Calcium Ammonium Nitrate, Sodium Nitrate, Ammonium Chloride, Organic Materials, Controlled Release Nitrogen Solution, Phosphate Fertilizer, Phosphate Rock, Normal Super Phosphate, Modification in Manufacturing Equipment, Properties, Triple Super Phosphate, Important Points, Ammonium Phosphate, Other Phosphates, Potassium Fertilizer, NPK Fertilizer, Important Fertilizers.
- UNIT IV** **Group Chemistry of III B, V B and VI B Elements:**
- [A] **Boron Family: B, Al, Ga, In, Tl (Group III B Elements):** Introduction, Occurrence, Isolation and Properties of Elements, Oxides, Halides, The Aqua Ions, Oxosalts and Aqueous Chemistry, Coordination Compounds, Hydrides, Lower Valence Compounds, Summary of Periodic Trends for the Elements of Group III B.
- [B] **Nitrogen Family: N, P, As, Sb and Bi (Group V B Elements):** Introduction, The Elements, Hydrides (EH_3), Halides (EX_3 , EX_5) and Oxohalides, Oxides, Sulfides, The Oxoacids, Complexes of Group V B Elements, Phosphorous - Nitrogen Compounds, Compounds with Element- Element Double Bonds, Summary of Group Trends for the Elements of Group V B.

- [C] **Oxygen Family: O, S, Se, Te And Po (Group VI B Elements):** Introduction, Occurrence and Reactions of the Elements, Halides and Oxohalides of Sulfur, Oxides and Oxoacids.

UNIT V

- [A] **Acids and Bases:** Arrhenius Concept, Lowry-Bronsted Acid-Base Concept, Solvent System Concept, Usanovich Concept, Luxflood Concept, Lewis Acid-Base Concept, Classification of Lewis Acids and Bases, Pearson's Soft and Hard Acid-Base Principle (HSAB), Applications of HSAB Principle, Leveling Effect, Strength of Hydraacids, Strength of Inorganic Oxyacids.
- [B] **Carbides and Nitrides of Main Group Elements:**
Carbides: General Methods of Preparation, General Properties, Ionic Carbides, Acetylides, Methanides, Allylides, Interstitial or Metallic Carbides, Borderline Carbides, Covalent Carbides, Calcium Carbides, Boron Carbides, Aluminum Carbides, Silicon Carbides or Silicon Silicides (Carborandum).
Nitrides: General Method of Preparation, General Properties, Ionic Nitrides, Covalent Nitrides, Interstitial Nitrides, Nitrides of Group I A Elements, Beryllium Nitrides, Magnesium Nitrides, Calcium Nitrides, Radium Nitrides, Boron Nitrides, Aluminum Nitrides, Silicon Nitrides, Nitrides of Sulphur.

UNIT VI

- [A] **Non Aqueous Solvents:** Classification of Solvents, General Properties of Ionizing Solvents, Liquid NH_3 as Nonaqueous Solvent, Cavity Model, Alkali Metals in Liquid NH_3 , Merits and Demerits of Liquid NH_3 as Solvent, Liquid SO_2 as a Solvent, Liquid Hydrogen Fluoride.
- [B] **Water and Hydrogen Peroxide:** Water and It's Properties, Hard and Soft Water, Potable Water, Heavy Water, Hydrogen Peroxide, Strength of Hydrogen Peroxide Solution, Properties of Hydrogen Peroxide, Uses, Tests, Estimation of H_2O_2 , Constitution of Hydrogen Peroxide, H_2O_2 as Propellant.

REFERENCE BOOKS:

UNIT	BOOK	PAGE NUMBER
Unit-I	Selected Topics In Inorganic Chemistry (7 th Edition), Wahid U. Malik, G. D. Tuli and R. D. Madan	250 –273
Unit-II	Advanced Inorganic Chemistry (18 th Edition), (Vol. II), Satya Prakash, G. D. Tuli, S.K. Basu and R. D. Madan	64-76 and 305-317
Unit-III	Industrial Chemistry, (9 th Edition), B.K.Sharma	486-516
Unit-IV	Basic Inorganic Chemistry, (3 rd Edition), F. A. Cotton, G. Wilkinson and P. L. Gaus.	357-368, 417-434, 451-463.
Unit-VA	Selected Topics in Inorganic Chemistry Wahid U. Malik, G. D. Tuli and R. D. Madan	200-217
Unit-VB	Advanced Inorganic Chemistry (18 th Edition), (Vol. II), Satya Prakash, G. D. Tuli, S.K. Basu and R. D. Madan	856-869
Unit-VI A	Selected Topic in Inorganic Chemistry Wahid U. Malik, G. D. Tuli and R. D. Madan	218-249
Unit-VI B	Text Book of Inorganic Chemistry (20 th Edition), P.L.Soni & Mohan Katyal.	Chapter 15 (2.60 to 2.83)

SARDAR PATEL UNIVERSITY

SYLLABUS FOR S.Y.B.Sc.

C-202

(Physical Chemistry)

(Effective from June 2007)

Unit-1: Ionic Equilibria in aqueous solutions (14 Marks)

- 1.1. Sparingly soluble salts
- 1.2. Selective precipitation
- 1.3. Acids and bases
- 1.4. The pH Scale
- 1.5. Weak acids and bases
- 1.6. Hydrolysis
- 1.7. Buffer solutions
- 1.8. Indicators
- 1.9. Numerical problems

Reference book

1. University Chemistry by Bruce H. Mahan (Page No. 204 to 234)

Unit-2: Solutions and colligative properties (13 Marks)

- 2.1. Solution
- 2.2. Ideal solution
- 2.3. Real solution
- 2.4. Colligative properties
- 2.5. Osmosis and Osmotic Pressure (with relative lowering of vapour pressure)
- 2.6. Elevation of Boiling Point and Depression of Freezing point
- 2.7. Real gases and some applications
- 2.8. Numerical problems

Reference book

1. Physical Chemistry Volume 1 by Dr. S. Pahari (Page No. 415 to 465)

Unit-3: Electrolytes in solution

(13 Marks)

- 3.1. Specific conductance**
- 3.2. Molar conductance**
- 3.3. Conductance and Electrolytic Dissociation**
- 3.4. Colligative properties and Electrolytic Dissociation**
- 3.5. Electrolysis**
- 3.6. Transference numbers**
- 3.7. Ionic Mobilities**
- 3.8. Applications**
- 3.9. Dielectric effect**
- 3.10. Ionic Strength**
- 3.11. Dissociation of weak Electrolysis**
- 3.12. Debye-Huckel Theory**
- 3.13. Numerical Problems**

Reference Books:

- 1. Physical Chemistry 5th Edition by Gordon M. Barrow (Page No. 303 to 332)**

Unit-4: Liquid State

(14 Marks)

- 4.1. Introduction**
- 4.2. Properties of Liquids**
- 4.3. Vapour Pressure of Liquids**
- 4.4. Surface Tension**
- 4.5. Viscosity**
- 4.6. Numerical Problems**

Reference book

- 1. Physical Chemistry Volume 1 by Dr. S. Pahari (Page No. 133 to 165)**

Unit-5: Electromotive Force of Electrochemical Cells

(13 Marks)

- 5.1. Electrodes**
- 5.2. Cell EMF**
- 5.3. EMF and Free Energy**
- 5.4. Standard Electrode Potentials**
- 5.5. EMF and Activities**
- 5.6. Activity Coefficients from EMF's**
- 5.7. Equilibrium Constants from EMF's**
- 5.8. Electrode-Concentration Cells**
- 5.9. Electrolyte-Concentration Cells**

- 5.10. Junction Potentials**
- 5.11. Salt Bridge**
- 5.12. Ion-Selective Electrodes**
- 5.13. Thermodynamic Properties from Cell EMF's**
- 5.14. Numerical Problems**

Reference Books:

- 1. Physical Chemistry 5th Edition by Gordon M. Barrow (Page No. 346 to 373)**

Unit-6: Entropy and Third Law of Thermodynamics

(13 Marks)

- 6.1. Third Law of Thermodynamics**
- 6.2. Molecular Basis of Entropy**
- 6.3. Translational Entropy**
- 6.4. Rotational Entropy**
- 6.5. Vibrational Entropy**
- 6.6. Molecular Basis of the Third Law**
- 6.7. Trouton's Rule**
- 6.8. Free Energy**
- 6.9. Standard Free Energies of Formation**
- 6.10. Free Energy and Pressure**
- 6.11. Free Energy and the Equilibrium Constant**
- 6.12. Free Energy and Temperature**
- 6.13. Free Energy Function**
- 6.14. Equilibria and Distributions**
- 6.15. Fugacity**
- 6.16. Free Energy of Real Gases**
- 6.17. Equilibria Involving Real Gases**
- 6.18. Numerical problems**

Reference Books:

- 1. Physical Chemistry 5th Edition by Gordon M. Barrow (Page No. 196 to 206 and 215 to 245)**

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SARDAR PATEL UNIVERSITY
S.Y.B.Sc.
ANALYTICAL CHEMISTRY (AC-201)
CLASSICAL METHODS OF ANALYSIS

**(3 hours- 80
Marks)**

Unit: 1

- Analytical Chemistry: Qualitative and Quantitative Analysis, Analytical Methodology, Applications of Chemical Analysis.
- Errors and Treatment of Analytical Data: Determinate error and indeterminate error, Accuracy and Precision, Distribution of Random Error.
- Statistical Treatment of Finite samples: Measures of Central Tendency, Student's t, Confidence Interval of the mean, Testing for significance criteria for Rejection of an observation, Propagation of errors, significant figures.
- Numericals.

Unit: II Chemical Equilibrium:

- Equilibrium constant, Le-Chatelier Braun Principle, Factor Affecting Chemical Equilibrium in solution, Activity and Activity coefficient, Debye-Huckel Equation for activity coefficient, strong and weak electrolyte, solubility Product, common ion effect and diverse ion effect.
- Numericals.

Unit: III: Titrimetric Methods of Analysis:

- Introduction to Titrimetric methods and basic terms involved, Types of chemical reactions used in titrimetric analysis, Requirements of a Reaction to be used in titration, Concentration units used in titration- Molarity, Molality, Normality, Formality, Primary and secondary standards.
- **Neutralization Titration:**
- Neutralization reaction and its equilibrium, Indicators: Phenolphthalein, Methyl Orange, Buffer solutions, color change pH range of an Indicator, Mixed Indicator, Universal Indicator, Neutralization curve for strong acid strong base.
- Applications:
Determination of Na_2CO_3 content of washing soda
Determination of purity of Boric Acid
Estimation of organic nitrogen by Kjeldahl procedure
Determination of saponification value of oils and fats
- Numericals.

Unit:IV Complexometric Titration:

- Complexometric reaction and its equilibrium, stability of complexes, Indicators, Requirements of indicator, Titration curves, EDTA and its significance as complexing agent, Types of EDTA titrations, EDTA titration with (a) Individual metal ion (b) mixture of metal ions.
- Applications:
Determinations of calcium in calcium Gluconate
Determinations of Total Hardness of water
Determination of Cr (III) and Fe(III) in a mixture by kinetic masking.
- Numericals.

Unit-V: Oxidation – Reduction Titration.

- Oxidation-Reduction reaction and its Equilibrium, Standard Electrode Potential & Formal Potential, The Nernst Equation, Change of electrode potential during Oxidation-Reduction titration of Ce^{+4} with Fe^{+2} solution, Internal Oxidation-Reduction indicators.
- Oxidation-Reduction titration with $KMnO_4$, $K_2Cr_2O_7$ and iodine, Iodometric and Iodimetric titration.
- Applications:
Analysis of H_2O_2 sample with $KMnO_4$.
Determination of COD of wastewater samples.
Determination of dissolved oxygen in water sample

- **Precipitation Titration**

Precipitation reaction and its equilibrium, Argentometric Titration and methods of end point determinations : (a) Mohr's method (b) Volhard method (c) Adsorption Indicator method, (d) Turbidity method

- Applications:
Determination of Ag in silver alloy,
Determination of Chloride and Bromide in the water samples.

Unit: VI Gravimetry

- General Principle, Precipitation reaction and steps involved in Gravimetry, Mechanism of formation of precipitates.
- Organic Precipitants: Dimethyl Glyoxime, Cupferron, 8-Hydroxy quinoline, Antrhanilic acid, cupron.
- Applications.
- Numericals.

Reference Books:

1. Vogel's Text Book of Quantitative Chemical Analysis (5th Edition) ELBS Publications.
2. Quantitative Analysis: R.A. Day and A.L Underwood. Sixth Edition. Prentice Hall of India.
3. Analytical Chemistry: Principles. (Second Edition) John H Kennedy. Saunders College Publishing.

4. Analytical Chemistry: An Introduction. Skoog/West/Holler: 6th Edition
Saunders College Publishing.

SARDAR PATEL UNIVERSITY
S.Y.B.Sc.
ANALYTICAL CHEMISTRY (AC-202)
INSTRUMENTAL METHODS OF ANALYSIS

**(3 hours- 80
Marks)**

Unit-I

- Introduction to Instrumental Methods of analysis, Advantages and limitations of Instrumental method, Fundamentals of Electroanalytical techniques.
- **Potentiometry:**
Standard and Formal Potential, Nernst Equation for the cell potential, Electrode system in Potentiometric titration, Types of Potentiometric titration: Acid- Base Titration, Redox Titration, Complexometric titration, Precipitation Titration, Advantage of potentiometric titration over other indicator methods, Applications.
- Numericals.

Unit: 2 Conductometric Titration

- Conductance and its measurements, Effect of Dilution on conductance, Types of conductometric titration, Applications of conductance measurement, Advantages and limitations of conductometric titration.
- Numericals.

Unit-3: Chromatography:

- Introduction to chromatographic techniques, principle and classification.
- **Paper chromatography-**
Principle, Migration parameter, types of paper chromatography, experimental details for qualitative and quantitative analysis, applications.
- **Thin layer chromatography-**
Introduction, principle, superiority of TLC over other chromatographic method, experimental technique, applications of TLC.
- **Column chromatography-**
Introduction, principle, experimental details, theory of development, factors affecting column efficiency, applications.

Unit-4: High Performance Liquid Chromatography (HPLC):

Introduction, apparatus, solvent delivery system, pumps, sample injection system, column, detectors, advantages, effect of temperature on HPLC, applications.

Unit:5 UV and visible spectroscopy

Fundamentals of Absorption Spectroscopy, Electromagnetic radiation and its properties, Lambert- Beer's law, Principle, Instrumentation:- Spectrophotometer and Photometer, advantages and limitations, Applications.

- Numericals.

Unit: 6

- **Flurometry and Phosphorimetry**

Principle and Theory, Instrumentation and Applications.

- **Nephelometry and Turbidimetry**

Principle and Theory, Instrumentation and Applications.

Reference Books:

1. Instrumental methods of chemical analysis. – Chatwal-Anand, Himalaya Publishing House.
2. Instrumental Methods of Chemical Analysis- B.K. Sharma, Goel Publishing House.
3. Principles of Instrumental Analysis- 5th Edition Skoog/Holler/Nieman Saunders Golden Sunburst Series.
4. Instrumental Methods of Analysis Willard. Meritt and Dean. 6th Edition CBS Publishers & Distributors-.

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SARDAR PATEL UNIVERSITY
S. Y. B. Sc. (ORGANIC CHEMISTRY)
Syllabus of OC—211
NEW COURSE (Effective From JUNE 2007)

Unit-I : STEREOCHEMISTRY

- 4.1 Stereochemistry and stereoisomerism
- 4.3 Optical activity. Plane-polarized light
- 4.4 The polarimeter
- 4.5 Specific rotation
- 4.6 Enantiomerism. The discovery
- 4.7 Enantiomerism and tetrahedral carbon
- 4.8 Enantiomerism and optical activity
- 4.9 Production of Enantiomerism. Chirality.
- 4.10 The chiral centre.
- 4.11 Enantiomers.
- 4.12 The Racemic modification.
- 4.13 Optical activity. A closer look
- 4.14 Configuration
- 4.15 Specification of configuration. R & S

- 4.16 Sequence rules
 - 4.17 Diastereomers
 - 4.18 Meso structures
 - 4.19 Specification of configuration. More than one chiral center.
 - 4.20 Conformational isomers
 - 4.21 Reaction involving stereoisomers
 - 4.22 Generation of a chiral center. Synthesis and optical activity.
 - 4.23 Reaction of chiral molecules. Bond-breaking
 - 4.24 Reaction of chiral molecules. Relating configuration.
 - 4.25 Optical purity
 - 4.26 Reaction of chiral molecules. Generation of second chiral center.
 - 4.27 Reaction of chiral molecules with optically active reagent. Resolution.
 - 4.28 Reaction of chiral molecules. Mechanism of free radical chlorination.
- Problem: Chapter-4 : 4.3,4.4,4.11,4.12,4.13,4.17(a to c),4.19(a to d),4.20,1,2(a to c,f),7.

Stereochemistry of nitrogen compounds: topic 2f, page No. 249. From organic chemistry vol. II, by I.L.Finar 5th ed.

Ref. book: Organic chemistry by Morrison and Boyd, 6th ed.

Multiple-choice questions from A text book of organic chemistry by Arun Bahl and B.S.Bahl, 16th addition, page No.127 to 130.

Unit-II ALCOHOLS, ETHERS AND EPOXIDES.

- 6.2 Structure of alcohols
- 6.3 Classification of alcohols
- 6.4 Nomenclature of alcohols
- 6.5 Physical properties of alcohols
- 6.6 Industrial sources of alcohols
- 6.10 Preparation of alcohols
- 9.17 Oxymercuration-demercuration
- 9.18 Hydroboration-oxydation
- 18.15 Product of the Grignard synthesis
- 18.16 Planning a Grignard synthesis.
- 18.17 Synthesis using alcohol
- 18.18 Limitation of Grignard synthesis
- 9.25 Hydroxylation. Formation of 1,2-diols
- 6.11 Reaction of alcohols.
- 6.12 Alcohols as acids and bases.
- 6.15 Oxidation of alcohols.
- 18.22 Analysis of 1,2-diols. Periodic acid oxidation.
- 18.7 Pinacol-rearrangement (from 4th edition Morrison and Boyd)
- 21.4D Oxidation cleavage of polyhydroxy compounds by $\text{Pb}(\text{OAc})_2$ and HIO_4 . (From T.W.G.Solomon, P.867 3rd edition.)
- Oxidation involving C-C bond fusion. (a) and (b). From organic chemistry by S.M.Mukherji, S.P.Singh and R.P.Kapur, Vol. II. P.507.

Ref. book: Organic chemistry by Morrison and Boyd, 6th ed.

Trihydriol alcohols.

Method of preparation: From Propene and other alternate methods. Chemical reactions: reaction with sodium, carboxylic acid, HCl, HNO₃, HI, Oxalic acids, acetyl chlorides, Oxidation.

Ref. Book (for trihydric alcohols): Organic chemistry by B.S. Bahal and Arun Bahal.

● Ethers and epoxide

6.16 Structure and nomenclature of ethers

6.17 Physical properties of ethers

6.19 Preparation of ethers

6.20 Preparation of ethers. Williamson synthesis.

24.14 Formation of aryl ethers

24.15 Reaction of aryl ethers

6.21 Reaction of ethers. Cleavage by acids

13.20 Epoxide. Structure and preparation.

13.21 Reaction of epoxide

13.22 Acid-catalyzed cleavage of epoxide

13.23 Base-catalyzed cleavage of epoxide

13.24 Orientation of cleavage of epoxide

Problem: Chapter-6: 6.5, Chap.9: 9.9(a to c), Chap.18: 18.19, 18.20, 28, 29

Chap.13: 13.25, 16(e, f).

Ref. book: Organic chemistry by Morrison and Boyd, 6th ed.

Multiple-choice questions from A text book of organic chemistry by Arun Bahl and B.S. Bahl, 16th addition. page No. 312 to 315, 328 to 329 and 341 to 343.

Unit-III-A: ALDEHYDES AND KETONS

18.1 Structure

18.2 Nomenclature

18.4 Preparation (from acid chlorides) of aldehydes

18.6 Preparation of ketons by use of organocopper compounds.

18.7 Reaction. Nucleophilic addition.

18.8 Oxidation

18.9 Reduction

18.1 Addition of cyanide

18.11 Addition of derivatives of ammonia

18.12 Addition of alcohols. Acetal formation

18.14 Addition of Grignard reagent

18.20 Analysis of aldehyde and ketons.

18.21 Iodoform test

21.1 Acidity of α -hydrogen

21.2 Reaction involving carbanions

21.3 Base-promoted halogenation of ketones

21.4 Acid-catalyzed halogenation of ketones. Enolization.

- 21.5 Aldol condensation
- 21.6 Dehydration of aldol products
- 21.7 Use of aldol condensation in synthesis
- 21.8 Crossed aldol condensation
- 21.10 Wittig reaction
- 21.11 Claisen condensation. Formation of β -keto ester.
- 21.12 Crossed Claisen condensation
- 21.13 Preparation of β -hydroxy esters.(4th ed.).
- 25.8 Alkylation of carbonyl compounds via enamines
- 7.13 LiAlH_4 From reaction mechanism in organic chemistry by S. M. Mukherji and S.P. Singh, page No.164.

Ref. book : Organic chemistry by Morrison and Boyd, 6th ed.

Multiple-choice questions from A text book of organic chemistry by Arun Bahl and B.S.Bahl, 16th addition, page No.384 to 387.

Unit-III-B REACTION MECHANISM

- (i) Benzoin condensation (page No. 479)
 - (ii) Perkin condensation (page No. 478)
 - (iii) Knoevenagel condensation (page No. 475)
 - (iv) Mannich reaction (page No. 225)
 - (v) Clemmenson reduction (page No.. 182)
 - (vi) Wolff-Kishner reduction (page No.184)
- Ref. book : 1) Organic chemistry by R.K.Bansal, 3rd ed. (for (i) to (iii))
 2) Organic reaction mechanism by R.K.Bansal, 3rd ed. (for (iv) to (vi))
- (vii) Cannizzaro reaction and crossed Cannizzaro reaction.(page No. 165-167)
 - (viii) Reformatsky reaction (page No. 177)
 - (ix) Meerwein-Ponndorf reduction. (page No.164).
 - (xii) Beckmann rearrangement. From organic chemistry vol. II, by I.L.Finar 5th ed.2g page No.249.
- Ref. book : Reaction mechanism in organic chemistry by S.M.Mukherji and S.P.Singh

Unit-IV CYCLIC ALIPHATIC COMPOUNDS AND STEREOCHEMISTRY OF ELIMINATION-ADDITION REACTION

- 3.3 Free rotation about C-C single bond. Conformation. Torsional strain
- 3.5 Conformation of n-butane Vander Waals repulsion
- 13.10 Factors affecting stability of conformation
- 13.11 Conformation of cycloalkanes
- 13.12 Equatorial and axial bond in cyclohexane
- 13.13 Stereoisomerism of cyclic compound: cis and trans isomers
- 13.14 Conformational analysis
- 13.15 Stereochemistry of elimination from alicyclic compounds
- 10.1 Organic chemistry in three dimensions

- 10.2 Stereochemistry of addition of halogen to alkene. Syn- and anti-addtion
- 10.3 Mechanism of addition of halogen to alkene
- 10.4 Stereochemistry of E2 reaction
- 10.5 Stereospecific reaction
- 10.6 Stereoselectivity Vs. streospecificity.

Ref. book : Organic chemistry by morrison and boyd, 6th ed.

Multiple-choice questions from A text book of organic chemistry by Arun Bahl and B.S.Bahl, 16th addition,page No. 546 to 547.

Unit-V CARBOXYLIC ACIDS AND DERIVATIVES

- 19.1 Structure
- 19.2 Nomenclature
- 19.3 Physical properties
- 19.4 Salts of carboxylic acids
- 19.5 Industrial source
- 19.6 Preparation
- 19.7 Grignard synthesis
- 19.8 Nitrile synthesis
- 19.9 Reactions
- 19.12 Acidity of carboxylic acids
- 19.13 Structure of carboxylate ions
- 19.14 Effect of substituents on acidity
- 19.15 Conversion into acid chlorides
- 19.16 Conversion into esters
- 19.17 Conversion into amides
- 19.18 Reduction of acids to alcohols
- 19.19 Halogenation of aliphatic acids. Substituted acids
- 19.20 Dicarboxylic acids
- 20.1 Structure
- 20.4 Nucleophilic acyl substitution. Role of carbonyl group.
- 20.5 Nucleophilic substitution. Alkyl Vs. Acyl
- 20.7 Reaction of acid chlorides
- 20.8 Conversion of acid chlorides in to acid derivatives
- 20.9 Preparation of acid anhydrides
- 20.10 Reaction of acid anhydrides
- 20.12 Reaction of amides
- 20.13 Hydrolysis of amides
- 20.14 Imides
- 20.15 Preparation of esters
- 20.16 Reaction of esters
- 20.17 Alkaline hydrolysis of esters
- 20.18. Acidic hydrolysis of esters
- 20.19. Ammonolysis of esters
- 20.20 Transesterification
- 20.21 Reaction of ester with Grignard reagent

20.22 Reduction of esters

20.23 Functional derivatives of carbonic acid

25.2 Malonic ester synthesis of carboxylic acid

25.3 Acetoacetic ester synthesis of ketones

25.6 .Synthesis of acids and esters via 2-oxazoline

Problem : Chap.19 : 20,Chap.20:20.4,20.10,20.23,17(c),Chap.25:25.8(a to g),25.16(a to d), 25.20(a and b), 5, 17, 20.

Ref. book: Organic chemistry by Morrison and Boyd,6th ed.

HYDROXY AND HALOACIDS.

Method of preparation:

By hydrolysis of cyanohydrins, by hydrolysis of halo acids with diluted acid, by reduction of β -ketoacids or esters, by reformatsky reaction.

Preparation of malic acid :

From maleic acid, from succinic acid, action of heat and HI on malic acid.

Preparation of tartaric acid :

From grape juice, from maleic acid, action of heat, HBr, reduction by HI, HNO₃, Fe⁺³/H₂O₂.

Preparation of citric acid:

From molasses and lemon juice, action of acetyl chloride, HI, Heat, H₂SO₄, the synthesis of citric acid from glycerol, amination and alkaline hydrolysis of halo acids, the synthesis of tartaric acid from ethylene.

Ref.Book : Text book of organic chemistry by B.S.Bahal and Arun Bahal.

Multiple-choice questions from A text book of organic

chemistry by Arun Bahl and B.S.Bahl, 16th addition.page No. 408 to 411.

Unit:VI-A DIENES AND MACROMOLECULES

11.17 Dienes: structure and properties

11.18 Stability of conjugated dienes

11.19 Resonance in conjugated dienes

11.20 Resonance in alkene. Hyperconjugation

11.21 Ease of formation of conjugated dienes.

11.22 Electrophilic addition to conjugated dienes .1,4-addition

11.23. 1,2-Vs 1,4-addition.Rate Vs.Equilibrium

11.24 Free radical polymerization of dienes

11.25 Isoprene and the isoprene rule

11.26 Analysis of dienes.

Problem : Chap.11: 11.17, 11.18, 14.

Ref. book : Organic chemistry by morrison and boyd, 6th ed.

31.1 Macromolecules

31.2 Polymer and polymerization

31.3 Free-radical vinyl polymerization

31.4 Copolymerization

31.5 Ionic polymerization. Leaving group

31.6 Coordination polymerization

31.7 Step-reaction polymerization

31.8 Structure and properties of macromolecules

Problem: Chap.31: 31.1, 31.2, 31.7, 31.11 ,12, 17,19(a to c).

Ref. book : Organic chemistry by Morrison and Boyd, 6th ed.

Physical properties of the polymers.

Distinguishing features of addition and condensation polymerization copolymers.

Phase system for polymerization like bulk, solution, emulsion and suspension polymerization.

Lederer-Manasse reaction(Organic chemistry by S.M.Mukherji, S.P.Singh and R.P.Kapoor. P.549,vol. II).

Classification of polymers (1 to 3).

Plastics and resins.

Ref.Book:Synthetic Organic Chemistry by Gurudeep R.Chatwal.

Multiple-choice questions from A text book of organic chemistry by Arun Bahl and B.S.Bahl, 16th addition.page No. 824.

Unit-VI-B:PHENOLS

24.1 Structure and nomenclature

24.2 Physical properties

24.3 Salts of phenols

24.4 Industrial sources

24.5 Rearrangement of hydroperoxides.

24.6 Rearrangement of hydroperoxides. Migratory aptitude

24.7 Preparation

24.8 Reactions

24.9 Acidity of phenols

24.11 Ring substitution

24.10 Ester formation

24.12 Kolbe reaction. Synthesis of phenolic acids.

24.13 Reimer-Tiemann reaction.

Ref. Book :From organic chemistry by Morrison and Boyd, 6th ed.

8.3 Mechanism of Fries rearrangement(Organic reaction mechanism by R.K.Bansal, 3rd ed.)

•Gatterman synthesis(Organic chemistry by S.M.Mukherji, S.P.Singh and R.P.Kapoor. P.546, Vol. II)

•Hauben-Hoesch reaction(Organic chemistry by S.M.Mukherji, S.P.Singh and R.P.Kapoor. P.547,vol. II)

•Prob.: 29, 31(page No.620) and multiple-choice questions(1 to 29, page No. 621). From A text book of organic chemistry by Arun Bahl and B.S.Bahl, 16th addition.

Prob.: 24.12, 24.13, 24.15 (a, c and e),12,13(b, f, h, i, j, k)

14(a, c), 19 (a, d and e), 22, 23, 28c , 30 From organic chemistry by Morrison and Boyd, 6th ed.