

**K.T.S.P Mandal's**  
**Hutatma Rajguru Mahavidyala**

**Rajgurunagar, Tal. Khed Dist. Pune**  
**Syllabus Completion Report Year 2022-23**

**Class: F. Y. B. Sc. Sem.-I**

**Name of Paper:** Organic Chemistry

**No. of Lectures allotted per week:** 03 T

**Name of Teacher:** Prof. N.D. Dongare  
(upto 24<sup>th</sup> November 2022)

**Total No. of Lectures Taken:** 40 (Lectures

| Sr. No. | Month     | No. of Lect. Taken | Name of Chapter                      | Topic Covered  |
|---------|-----------|--------------------|--------------------------------------|--|
| 1.      | Aug-22    | 08                 | 1. Fundamentals of Organic Chemistry | Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles.   |
| 2       | Sept - 22 | 13                 | 1. Fundamentals of Organic Chemistry | Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values.   |
| 3.      | Oct-22    | 08                 |                                      | Aromaticity: Benzenoids and Hückel's rule.   |
|         |           |                    | 2. Stereochemistry                   | Introduction, classification, Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations.   |
| 4.      | Nov-22    | 11                 |                                      | Conformations with respect to ethane, butane and cyclohexane. Configuration: Geometrical - cis - trans, and E / Z Nomenclature (for upto two C=C systems). Optical isomerism Enantiomerism, Diastereomerism and Meso compounds). Concept of chirality (upto two carbon atoms). Threo and erythro; D and L; nomenclature; |

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*(Signature)*

Dr. Shirish S. Pingale  
Principal

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Syllabus Completion Report 2022-23 Class: F. Y. B. Sc. Chemistry, Sem.-II

**Name of Paper:** Analytical Chemistry


No. of Lectures allotted per week: 03 **Name of Teacher** : Prof. Dongare N.D.

| Sr.No. | Month            | Name of Chapter   | Topic Covered  |
|--------|------------------|---|--|
| 1.     | Mar-23           | Introduction to Analytical Chemistry                            | What is analytical Chemistry, the analytical perspectives, Common analytical problems.   |
| 2      | Apr-23           | Calculations used in Analytical Chemistry                       | Some important units of measurements-SI units, distinction between mass and weight, mole, millimole and Calculations, significant figures. Solution and their concentrations- Molar concentrations, Molar analytical Concentrations, Molar equilibrium concentration, percent Concentration, part per million, part per billion, part per thousand, Solution –dilutant volume ration, functions , density and specific gravity of solutions, problems. Chemical Stoichiometry – Empirical and Molecular Formulas, Stoichiometric Calculations, Problems. |
| 3.     | Apr-23<br>May-23 | Qualitative Analysis of Organic Compounds                       | Types of organic compounds, characteristic tests and classifications, reactions of different functional groups, analysis of binary mixtures.<br>Analysis – Detection of nitrogen, sulfur, halogen and phosphorous by Lassaigne's test.<br>Purification of organic compounds- Introduction, recrystallization, distillation, sublimation  |
| 4.     | May-23           | pH meter  | Introduction, pH meter, Glass pH electrode, combination of pH electrode-Complete Cell, Standard Buffer –reference for pH measurement, Accuracy of pH measurement, Using pH meter –How does it work? Applications of pH meter.  |
| 5.     | May-23           | Chromatographic Techniques –Paper and Thin Layer Chromatography | Introduction- Introduction to chromatography, IUPAC definition of chromatography.<br>History of Chromatography- paper chromatography, Thin Layer Chromatography, Ion exchange Chromatography, Gas permeation Chromatography, affinity chromatography, Gas chromatography, Supercritical fluid chromatography, High   |

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|--|--|--|
|  |  | <p>Performance Liquid Chromatography, Capillary electrophoresis, Classification of chromatographic methods – according to separation methods, according to development procedures.</p> <p>Thin Layer Chromatography: Theory and principles, outline of the method, surface adsorption and spot shape, Comparison of TLC with other forms of chromatography, adsorbents, preparation of plates, application of samples, development.</p> <p>Paper Chromatography- Origin, overview of technique, sample preparation, types of paper, solvents, equilibrium, development, sample application and detection, Identification, Quantitative methods, applications of paper chromatography</p> |
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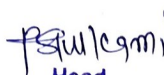
**Class: T. Y. B. Sc. Sem.-V**

**Name of Paper:** Inorganic Chemistry-INO. of Lectures allotted per week: 03 T


**Name of Teacher:** Prof. N.D. Dongare **Total No. of Lectures Taken:** 28 (Lectures upto 24<sup>th</sup> November 2022)

| Sr. No. | Month     | No. of Lect. Taken | Name of Chapter  | Topic Covered   |
|---------|-----------|--------------------|--|---|
| 1.      | Aug-22    | 05                 | 1. Molecular Orbital Theory of Co-ordination compounds | Electroneutrality principle, multiple bonding( $d\pi-p\pi$ , $d\pi-d\pi$ ), Nephelauxetic effect and series.  |
| 2       | Sept - 22 | 07                 |  | M.O. energy level diagram, metal orbitals and their symmetry symbol, assumptions of MOT, Formation of $[\text{CoF}_6]^{2-}$ , $[\text{Co}(\text{CN})_6]^{2-}$ & $[\text{Ni}(\text{NH}_3)_6]^{2+}$ without $\pi$ bonding, recapitulation of IUPAC nomenclature, effect of $\pi$ -bonding on complex, charge transfer spectra, advantages of MOT.                                       |
| 3.      | Oct-22    | 07                 | 2. Inorganic reaction mechanism                        | Introduction, stability constant, thermodynamics of reaction, basic concept of stability & lability, ligand exchange reaction, factors affecting lability, chelate effect, str.of some imp. Ni-dentate ligand, classification of coordination compounds,substitution, dissociative,addition, oxidation-reduction, ligand substitution reaction, trans effect and trans effect series. |
| 4.      | Nov-22    | 09                 | 3. Chemistry of transition element                     | Position in periodic table, electronic configuration, trends in properties w.r.t.(a) size of atoms and ions (b) reactivity (c) catalytic activity (d) oxidation state (e) complex formation ability (f) colour (g) magnetic properties (h) non-stoichiometry (i) density, melting & boiling points  |

|  |  |                                  |  |
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|  |  | 4. Chemistry of F-block elements | 1. Lanthanides: Position in periodic table, Name and electronic configuration of lanthanides, O.S, atomic and ionic radii, Lanthanide contraction, its causes and consequences on chemistry of Lanthanides and post lanthanide elements, Occurrence and separation: Bulk separation, Individual separation by modern methods viz., Ion exchange and solvent extraction method, applications of lanthanides |
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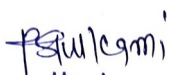
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Class: T. Y. B. Sc., Sem.-V

Name of Paper: Inorganic Chemistry Practical      No. of Lectures allotted per week: 05  
Name of Teacher: Prof. N.D. Dongare      Total No. of Lectures Taken: 25 (Lectures upto 24<sup>th</sup> November 2022)

| Sr. No. | Name of Practical                        | Batch D    |
|---------|--|------------|
| 1       | Inorganic Qualitative Analysis Mixture-I | 30/09/2022 |
| 2       | Mixture-II                               | 07/09/2022 |
| 3       | Mixture-III                              | 14/10/2022 |
| 4       | Mixture-IV                               | 04/11/2022 |
| 5       | Mixture-V                                | 18/11/2022 |

  
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**Class: T. Y. B. Sc., Sem.-V**

**Name of Paper: Organic Chemistry Practical**

**No. of Lectures allotted per week: 05**

**Name of Teacher: Prof. N.D. Dongare**

**Total No. of Lectures Taken:20 (Lectures**

**upto 24<sup>th</sup> November 2022)**

| <b>Sr. No.</b> | <b>Name of Practical</b>               | <b>Batch D</b> |
|----------------|--|----------------|
| 1              | Organic Qualitative Analysis Mixture-I | 02/11/2022     |
| 2              | Mixture-II                             | 17/11/2022     |
| 3              | Mixture-III                            | 19/10/2022     |
| 4              | Mixture-IV                             | 24/11/2022     |
|                |  |                |

**Subject Teacher**  
**Prof. N.D. Dongare**

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**Syllabus Completion Report 2022-23 Class: T. Y. B. Sc. Chemistry, Sem.-VI**

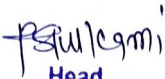
**Name of Paper: Inorganic Chemistry-II No. of Lectures allotted per week: 03**

**Name of Teacher: Prof. Dongare N.D.**


| <b>Sr. No.</b> | <b>Month</b>      | <b>Name of Chapter</b>                                     | <b>Topic Covered</b>   |
|----------------|-------------------|--|--|
| 1              | Feb-23<br>Mar-23  | Organometallic Chemistry                                   | Definition of Organometallic compounds and Organometallic chemistry, CO as a $\pi$ -acid donor ligand, binary metal carbonyls, classification of metal carbonyls, synthesis of metal carbonyls; (a) Direct reaction (b) Reductive carbonylation (c) Photolysis and thermolysis. Hepticity, Molecular and electronic structures of binary metal carbonyls, Electron count in complexes (18 electron rule). Applications of organometallic compounds in industrial catalysis (list of examples). Chemistry of ferrocene; Introduction, synthesis and physical properties of ferrocene. Reactions of ferrocene such as Friedel-Craft Acylation, Friedel-Craft Alkylation, Mannich reaction, Nitration and Halogenation.   |
| 2              | Mar-23,<br>Apr-23 | Homogeneous and Heterogeneous catalysis                    | Introduction to Catalysis, basic principles, activity and selectivity in catalysis, Types of catalysis, homogeneous vs. heterogeneous catalysis. <b>Homogeneous catalysis:</b> catalytic cycles for following reactions: a) Hydrogenation of olefins using Wilkinson complex, b) Hydroformylation of olefins using Cobalt and Rhodium complexes, c) Carbonylation reaction: methanol to acetic acid process i.e. Monsanto processes and d) C-C coupling reactions: Heck reaction. <b>Heterogeneous catalysis:</b> Classification of heterogeneous catalysts, supported metal catalyst, Role of support, Promoters and Poisons. Catalytic processes viz., a) Hydrogenation of olefins using Raney Nickel catalyst, b) Zeolites in catalysis: Catalytic cracking, c) Biodiesel synthesis using Heteropolyacids (HPAs) d) Automotive Exhaust catalysts: The catalytic converters. |
| 3.             | Apr-23            | Inorganic Polymers   | Introduction, Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicates, silicones, siloxanes, borazines, and phosphazenes.   |
| 4.             | May-23            | Inorganic solids/ionic liquids of technological importance | Inorganic solids, Preparation of inorganic solids: Conventional heat and beat methods, Coprecipitation method, Sol-gel method and Hydro-thermal method. Introduction to Solid electrolytes, inorganic liquid crystals and their examples. Ionic liquids, synthesis and application of imidazolium and phosphonium based ionic liquids.   |



|    |        |                        |  |
|----|--------|------------------------|--|
| 5. | May-23 | Bioinorganic Chemistry | Role of metals in bioinorganic chemistry, Classification as enzymatic and non-enzymatic metals, enzymatic redox metals such as Cu (SOD) and enzymatic non-redox metals such as Zn (Hydrolase). Role of metal ions in non-enzymatic processes-Na, K, Ca, Mg. Role of metals in enzymatic processes.II. Metalloproteins-Iron proteins. Introduction of Fe-S proteins, Electron transfer proteins (Fe-S, Fe <sub>2</sub> S <sub>2</sub> , Fe <sub>3</sub> S <sub>4</sub> , Fe <sub>4</sub> S <sub>4</sub> ). Transport protein (transferrin) and Storage protein (ferritin) III. Bioinorganic Chemistry of Fe: Hemoglobin and myoglobin, its structure and functions and IV. Bioinorganic Chemistry of Co: Vitamin-B12, its structure and function. |
|----|--------|------------------------|--|

  
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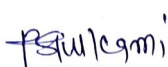
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Class: F. Y. B. Sc., Sem.-I


Name of Paper: Chemistry Practical No. of Lectures allotted per week: 04

Name of Teacher: Prof. N.D. Dongare Total No. of Lectures Taken: 44 (Lectures upto 24<sup>th</sup> November 2022)

| Sr. No. | Name of Practical  | Batch B3   | Batch B4                       |
|---------|--|------------|--------------------------------|
| 1       | Introduction, Determination of heat capacity of calorimeter for different volumes.   | 1/09/2022  | 7/09/2022                      |
| 2       | Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.  | 08/09/2022 | 21/09/2022                     |
| 3       | Determination of integral enthalpy of solution of salts (KNO <sub>3</sub> )  | 22/09/2022 | 21/09/2022                     |
| 4       | Measurement of the pH of buffer solutions and comparison of the values with theoretical values.                                  | 22/09/2022 | 28/09/2022                     |
| 5       | Preparation of buffer solutions Sodium acetate-acetic acid and determine its buffer capacity                                     | 29/09/2022 | 28/09/2022                     |
| 6       | To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Thiourea)                              | 29/09/2022 | 12/10/2022                     |
| 7       | To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Chloroform)                            | 06/10/2022 | <b>Batch handover to other</b> |
| 8       | To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Aniline)                               | 06/10/2022 |                                |
| 9       | Separation of constituents of mixtures by Paper Chromatography: Measure the R <sub>f</sub> value in each case <b>Amino acids</b> | 19/10/2022 |                                |
| 10      | Identify and separate the <b>sugars</b> present in the given mixture by paper chromatography.                                    | 16/11/2022 |                                |
| 11      | Repetition Physical Chemistry practical for late admitted students   | 24/11/2022 |                                |

  
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