

Koyana Education Society's
Balasaheb Desai College, Patan
Department of Chemistry
Semester Teaching Plan

Academic Year 2023-2024 Semester I, III and V

Class: B.Sc. I, B.Sc.-II & B.Sc.-III

Paper No.: VI, XII (Theory & Practical)


Name of the Teacher- Prof. Dr. M. R. Kadam

Month	No. of Teaching Days	Periods allotted	Topic/Unit	Sub units planned
July	25	B.Sc.-II Theory		
		7	Unit I: Gravimetric Analysis	Introduction Gravimetric analysis by precipitation: nucleation, crystal growth, Digestion/ageing, filtration, drying, ignition, weighing, Optimum condition for good precipitation, Physical nature of precipitate, Purity of precipitate: co-precipitation, post-precipitation Organic precipitates and their applications
		B.Sc.-III Theory		
		6	Unit 1. Theory of Gravimetric Analysis	Introduction. Gravimetric analysis by precipitation Nucleation, crystal growth, Digestion/ageing, filtration, drying, ignition, weighing. Optimum conditions for good precipitation. Physical nature of precipitate. Purity of precipitate: co-precipitation, post-precipitation, Organic precipitants and their applications
		B.Sc.-III Practical		
		30	Inorganic Chemistry	1. Gravimetric estimation of iron as ferric oxide (Fe_2O_3) from the given solution containing ferrous ammonium sulphate, copper sulphate and free Sulphuric acid. 2. Preparation of potassium trioxalato aluminate (III). 3. Preparation of Tetra ammine copper (II) chloride.
		B.Sc.-I Practical		
		12	Inorganic Chemistry	1. Information and handling of apparatus available in laboratory 2. Estimation of amount of Acetic acid from the given vinegar sample by titrimetric method 3. Quality control-To determine percentage purity of the given sample of soda ash (Na_2CO_3) by titrimetric method.
		B.Sc.-II Practical		
		12	Inorganic Chemistry	1. Gravimetric estimation of iron as Fe_2O_3 from a solution containing Ferrous ammonium sulphate and free Sulphuric acid. 2. Preparations of sodium cuprous thiosulphate 3. Preparation of tetramine copper (II) sulphate.

Month	No. of Teaching Days	Periods allotted	Topic/Unit	Sub units planned
August	25	B.Sc.-II Theory		
		4	Unit II: Water Analysis	Physical analysis of water: pH, Conductance, Color, Odor, Turbidity and taste, Chemical Analysis: TDS, Hardness and its determination, Salinity, Alkalinity, Acidity Sulphates, Nitrates, DO, COD, BOD
		3	Unit III: Corrosion	Corrosion: Introduction of corrosion, Electrochemical theory of corrosion, Factors affecting on corrosion Methods of protections of metals from corrosion
		B.Sc.-III Theory		
		8	Unit 2. Flame Photometry	Introduction. General principles of flame photometry. Instrumentation: Block diagram, Burners (Premix and Lundergraph burners), mirror, slits, filters, detector (Photomultiplier tube). Effect of solvent in flame photometry. Experimental procedure of analysis (Standard addition and internal standard). Interferences and Factors that influence the intensity of emitted radiation in a flame photometer. Applications of flame photometry in real sample analysis. Limitations of flame photometry.
		B.Sc.-III Practical		
		40	Inorganic Chemistry	1. Determination of percentage purity of ferrous ammonium sulphate. 2. Determination of amount of aluminum in the given solution of potash alum. 3. Determination of amount of sodium present in the given solution of common salt using cation exchange resin (By Acid Base titration). 4.Preparation of tris(thiourea) copper (I) sulphate
		B.Sc.-I Practical		
		12	Inorganic Chemistry	To prepare standard 0.1N KMnO ₄ solution and to determine the strength of given oxalic acid solution. To determine quantity of Fe (II) ions from the given solutions by titrating it with 0.1N K ₂ Cr ₂ O ₇ solution by using internal indicator Chromatography: Separation and identification of cations by Paper Chromatography technique from the following mixtures: Ni ²⁺ + Cu ²⁺
		B.Sc.-II Practical		
		16	Inorganic Chemistry	1. Fertilizer (analysis: To determine percentage of nitrogen in the given sample of a nitrogenous fertilizer ammonium sulphate). 2. Determination of alkali content from antacid tablet using HCl solution. 3. Estimation of Calcium from chalk: To estimate amount of calcium from the chalk by titrimetric method. 4. Determination of total hardness of water using 0.01M EDTA solution

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September	18	B.Sc.-II Theory		
		5	Unit III: Electroplating	Electroplating: Electrolysis, Faraday's laws, Cathode current Efficiency, Basic principles of electroplating, cleaning of articles, Electroplating of chromium, Anodizing
		B.Sc.-III Theory		
		5	Unit 3. Colorimetry and Spectrophotometry	Theory, Lambert Beer's law, deviation from Beer's law. Terms used, Classification of methods of 'colour' measurement or comparison. Photoelectric colorimeter method–Single beam photo-electric colorimeter. Spectrophotometer method–Single beam direct reading spectrophotometer. Determination of unknown concentration by using concentration-absorbance plot, Applications
		B.Sc.-III Practical		
		30	Organic Chemistry	1. Estimation of sucrose 2. Saponification value of oil. 3. Picrate derivative (naphthalene and α -naphthol).
		B.Sc.-I Practical		
		8	Inorganic Chemistry	1. Spot Test: Identify the following metal ions by spot test method. Cu^{2+} , Ni^{2+} , Co^{2+} , Fe^{3+} , Al^{3+} , Pb^{2+} , Zn^{2+} , Hg^{+2} , Mg^{+2} , Mn^{+2} 2. To standardize supplied EDTA solution by titrating with 0.01M ZnSO_4 solution and to estimate amount of calcium from given solution by using Erio - T as an indicator
		B.Sc.-II Practical		
		12	Organic Chemistry	1. Estimation of acetone 2. Estimation of vitamin C 3. Estimation of Phenol by Bromination method

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October	24	B.Sc.-II Theory		
		7	Unit IV. Chromatographic techniques	Introduction, classification. Column chromatography: Introduction, types, Principle of adsorption column chromatography, solvent system, stationary phases, Column chromatography: Methodology-Column packing, applications of sample, development, detection methods, recovery of components, Applications. Ion exchange chromatography: Introduction, Principle, Ion exchange chromatography: Types and properties of ion exchangers, Methodology - Column packing, application of sample, elution, detection/analysis, Applications.
		B.Sc.-III Theory		
		6	Unit 4. Potentiometric titrations	Introduction, Determination of pH. Study of Quinhydrone and glass electrodes and their use in determination of pH Potentiometric titrations: Classical and analytical methods for locating end points. Acids- Bases titration with suitable example. Redox titration with suitable example. Precipitation titration with suitable example. Basic circuit of direct reading potentiometer. Advantages of potentiometric titrations
		B.Sc.-III Practical		
		35	Organic Chemistry	1. Oxalate and Nitrate derivative (of Urea). 2. To determine the amount of acid and amide present in the given mixture of acid and amide. 3. Qualitative analysis: Benzoic acid + Alpha Naphthol
		B.Sc.-I Practical		
		16	Inorganic and Physical Chemistry	1. To estimate amount of Cu (II) ions by Iodometric titration by using $\text{Na}_2\text{S}_2\text{O}_3$ solution. 2. Determination of equivalent weight of Mg by eudiometer 3. Determination of heat of ionization of weak acid by using polythene bottle. 4. To study the velocity constant of hydrolysis of methyl acetate in presence HCl.
		B.Sc.-II Practical		
		12	Organic Chemistry	1. Organic preparations: p-nitro acetanilide from acetanilide 2. Organic preparations: Acetanilide from aniline using anhydrous ZnCl_2 and Zn dust 3. Organic preparations: Phthalimide from phthalic anhydride


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Academic Year 2023-2024 Semester II, IV and VI

Class: B.Sc. I, B.Sc.-II & B.Sc.-III

Paper No.: IV, XVI (Theory & Practical)

Name of the Teacher- Prof. Dr. M. R. Kadam

Month	No. of Teaching Days	Periods allotted	Topic/Unit	Sub units planned
December	25	B.Sc.-I Theory		
		6	Unit I: Introduction to analytical Chemistry	Introduction, Importance of analysis, Analytical processes (Qualitative and Quantitative), Methods of analysis (Only classification), Sampling of solids, liquids and gases, Errors, types of errors, Significant figures, mean, median, standard deviation (Numerical problems expected)
		2	Unit II: Fund. of Ind. Chemistry	Difference between classical and industrial chemistry, Raw materials for chemical industry, Material safety data sheets (MSDS)
		B.Sc.-III Theory		
		6	Unit I. Sugar Industry	Introduction. Manufacture of cane sugar in India: Extraction of juice, Clarification, Manufacture of cane sugar in India: Concentration, crystallization, Manufacture of cane sugar in India: Centrifugation and other details of industrial process. Byproducts of sugar industry, Manufacture of Ethyl Alcohol from Molasses: by Fermentation.
		B.Sc.-III Practical		
		35	Organic Chemistry	Qualitative analysis: Cinnamic acid + P-Nitroaniline, Phthalic acid + Naphthalene, m - Nitroaniline + Acetanilide Acetone + Aniline
		B.Sc.-II Practical		
		16	Organic Chemistry	Organic Qualitative Analysis: Aspirin, Alpha Naphthol, M - nitroaniline, Urea
		B.Sc.-I Practical		
		16	Physical and Organic Chemistry	1. To study the reaction between Potassium persulphate and Potassium iodide kinetically (equal concentration). 2. Preparation and standardization of HCl solution from the bulk 3. Estimation of Aniline. (by Bromination method) 4. Estimation of Acetamide

Month	No. of Teaching Days	Periods allotted	Topic/Unit	Sub units planned
January	25	B.Sc.-I Theory		
		5	Unit II: Fundamentals of Industrial Chemistry and IPR	Definition and Explanation of terms - Molecular weight, Equivalent weight, Molarity, Normality, Molality, Molarity of mixed solution, Acidity of base, Basicity of acid, ppt, ppm, ppb solutions, Mole Fraction, Weight fraction, Percentage composition by W/W, W/V, V/V, Problems based on Normality, Molarity, mole fraction, mixed solution, etc. IPR- Introduction to IPR and its significance in presence scenario
		4	Unit III: Chromatography	Introduction, Basic Principle, Basic terms, Classification. Paper Chromatography: Principle, Methodology: types of papers and treatment, sample loading, choice of solvent, development-ascending, descending, circular, location of spots, determination of R _f value, Applications, advantages and disadvantages Thin layer chromatography- Principle, Solvent system, stationary phases, preparation of TLC plate, Detecting reagents, methodology-sample loading, development, detection of spot
		B.Sc.-III Theory		
		6	Unit II. Manufacture of Industrial Heavy Chemicals	Introduction: Manufacture of Ammonia (NH ₃) Physico-chemical principles, Plant and process by Haber's process. Manufacture of Sulphuric acid (H ₂ SO ₄): Physico-chemical principles, Plant and process by Contact process. Manufacture of Nitric acid (HNO ₃) Physico-chemical principles, Plant and process by Ostwald's process (Ammonia oxidation process).
		B.Sc.-III Practical		
		40	Inorganic Chemistry	1. Determination of amount of zinc in the given solution containing (Mg ²⁺ and Zn ²⁺) using anion exchange resin and standard solution of EDTA. 2. Determination of titratable acidity in the given sample of milk 3. Determination of percentage of Calcium in the given sample of milk powder. 4. Determination of percentage purity of potassium (trioxalatoaluminate) (III).
		B.Sc.-II Practical		
		12	Organic Chemistry	Organic Qualitative Analysis: Acetanilide, Carbon tetrachloride, Naphthalene
		B.Sc.-I Practical		
		20	Organic Chemistry	Organic Qualitative Analysis: Benzoic acid, Beta-Naphthol, Aniline, Bromobenzene, Acetanilide

Month	No. of Teaching Days	Periods allotted	Topic/Unit	Sub units planned
February	24	B.Sc.-I Theory		
		2	Unit III: Chromatography	Thin layer chromatography: Rf value, Applications, advantages and disadvantages, Comparison of paper chromatography and TLC
		6	Unit IV: Theory of Titrimetric Analysis	Introduction, Acid-base indicators, Theory of indicators w. r. t. Ostwald's ionization theory and quinoid theory Neutralization curves and choice of indicators for Strong acid-strong base, Strong acid-weak base and Strong base-weak acid Complexometric titrations: Introduction, Types EDTA titrations, Metallochromic indicators-Eriochrome black- T Indicator, Action of Eriochrome black- T
		B.Sc.-III Theory		
		2	Unit II. Manuf. of Indus. Heavy Chemicals	Manufacture of Sodium carbonate (Na_2CO_3) (Washing soda). Physico-chemical principles, and plant and process by Solvay process
		B.Sc.-III Practical		
		30	Inorganic Chemistry	1. Preparation of tris(thiourea) copper (I) sulphate 2. Preparation of ammonium diamminetetrahydroxychromate (III) (Reineck's salt). 3. Gravimetric estimation of barium as barium sulphate (BaSO_4) from the given solution containing barium chloride, ferric chloride and free hydrochloric acid.
		B.Sc.-II Practical		
		16	Physical Chemistry	1. To study the hydrolysis of methyl acetate in presence of HCl and H_2SO_4 and to determine the relative strength of acids. 2. To study the effect of acid strength on hydrolysis of an ester by using 0.5M HCl and 0.25M HCl. 3. To study the reaction between potassium persulphate and Potassium iodide in Solution with unequal concentration of the reactants. 4. To determine the percentage composition of a given liquid mixture by viscosity method
		B.Sc.-I Practical		
		16	Organic Chemistry	Organic Qualitative Analysis: Cinnamic acid, Chloroform, Thiourea, Discussion on practical examination

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