K.T.S.P. MANDAL'S

HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR

Syllabus Completion Report: 2022-2023 **Class: F. Y. B.Sc. Sem. I**

Name of Paper: **Physical chemistry CH-101** **No. of Lectures allotted per week: 03**

Name of Teacher: Dr. S. P. Jadhav

Month	Chapter	Topic Name	No. of lectures
Aug.- Sept. 2022	Chemical Energetics	Review of thermodynamics and the Laws of Thermodynamics. Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff's equation. Statement of Third Law of thermodynamics and calculation of absolute entropies of substances, problems. **Assignment No. 1** **Unit Test - 1**	11 L
Sept.- Oct. 2022	Chemical Equilibrium	Introduction: Free Energy and equilibrium - Concept, Definition and significance The reaction Gibbs Energy, Exergonic and endergonic reaction. The perfect gas equilibrium, the general case of equilibrium, the relation between equilibrium constants, Molecular interpretation of equilibrium constant. The response of equilibria to conditions- response to pressure, response to temperature, Van't Haff equation, Value of K at different temperature, Problems **Assignment No. 2** **Unit Test - 2**	11 L
Oct. – Nov. 2022	Ionic Equilibria	Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Salt hydrolysis- calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts– applications of solubility product principle. **Assignment No.3** **Unit Test - 3** **Internal-1**	14 L

Head
Department of Chemistry
Hutatma Rajguru Mahavidyalaya,
Rajgurunagar

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RAJGURU NAGAR

Dr. Shirish S. Pingale
Principal
Hutatma Rajguru Mahavidyalaya
Rajgurunagar, Tal.Khed, Dist.Pune

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Syllabus Completion Report: 2022-2023 **Class: T. Y. B.Sc. Sem. V**

Name of Paper: **Physical chemistry CH-501** **No. of Lectures allotted per week: 03**

Month	Chapter	Topic Name	No. of lectures
Aug.- Sept. 2022	Quantum Chemistry	Introduction, de Broglie hypothesis, The Heisenberg's uncertainty principle, quantisation of energy, Operators. Schrodinger wave equation, well behaved function, Particle in a one-, two and three-dimensional box (no derivation), Physical interpretation of the ψ and ψ2, sketching of wave function and probability densities for 1D box, degeneracy, applications to conjugated systems, zero-point energy and quantum tunnelling, Numerical. **Assignment No. 1** **Unit Test - 1**	10L
Sept.- Oct. 2022	Investigation of Molecular structure	Molar refraction and molecular structure, Dipole moment and molecular structure, electromagnetic spectrum, energy of molecules, Types of molecular spectra. Microwave Spectroscopy, Infrared Spectroscopy, Raman Spectroscopy. **Assignment No. 2** **Unit Test - 2**	16L
Oct.- Nov. 2022	Photochemistry	Introduction, Difference between thermal and photochemical processes, Laws of photochemistry: i) Grothus - Draper law ii) Stark-Einstein law, Quantum yield, Reasons for high and low quantum yield., Factors affecting Quantum yield, Experimental method for the determination of quantum yield, types of photochemical reactions - photosynthesis, photolysis, photocatalysis, photosensitization, Jablonski diagram depicting various processes occurring in the excited state: Qualitative description of fluorescence and phosphorescence, Chemiluminescence, Problems. **Assignment No. 3** **Unit Test - 3**	10L

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Syllabus Completion Report Year 2022-23 **Class:** T. Y. B. Sc., **Sem.**-V
Name of Paper: Physical Chemistry Practical - I **No. of Lectures allotted per week:** 05
Name of Teacher: Dr. S. P. Jadhav
Name of Paper : Physical Chemistry Practical - I [Batch-D]

Month	No. of Lect. Taken	Name of Chapter	Topic Covered
Sept.-Oct. 2022	**05L**	Refractometry	1. To determine the specific refractivity's of the given liquids A and B and their mixture and hence determine the percentage composition their mixture C. 2. To determine the molecular refractivity of the given liquids A, B, C and D.
Oct. 2022	**20L**	Spectrophotometry and Colorimetry	1. To titrate Cu2+ ions with EDTA photometrically. 2. To determine the indicator constant of methyl red indicator 3.Simultaneous determination of Cu2+ and Ni2+ ions by colorimetry/spectrophotometry method
Oct. 2022	**05L**	Viscosity	1. Determine the radius of glycerol molecule from viscosity measurement.
Nov. 2022	**20L**	Conductometry	1.Titration of a mixture of weak acid and strong acid with strong alkali. 2.To determine the velocity constant of hydrolysis of ethyl acetate by NaOH solution by conduct metric method. 3.To determine the normality of citric acid in given fruit by titrating it against standard NaOH solution by conductometric method. 4.To determine $\lambda\infty$ of strong electrolyte (NaCl or KCl) and to verify Onsager equation.

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HutatmaRajguruMahavidyala

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Syllabus Completion Report Year 2022-23

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

Name of Paper: Chemistry Practical CH-103 **No. of Lectures allotted per week:** 04

Name of Teacher: Dr. S. P. Jadhav

Sr. No.	Name of Practical	Batch A1	Batch A2	Batch B4	Batch B2
1	Introduction, Determination of heat capacity of calorimeter for different volumes.	29/08/22	30/08/22	27/08/22	25/08/2022
2	Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.	12/09/22	30/08/22	27/08/22	15/09/22
3	Determination of integral enthalpy of solution of salts (KNO3)	12/09/22	13/09/22	14/09/22	Batch handover to other
4	Measurement of the pH of buffer solutions and comparison of the values with theoretical values	31/09/22	13/09/22	14/09/22	
5	Preparation of buffer solutions Sodium acetate-acetic acid and determine its buffer capacity	31/09/22	4/10/22	28/09/22	
6	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Thiourea)	10/10/22	4/10/22	28/09/22	
7	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Chloroform)	10/10/22	11/10/22	31/10/22	
8	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Aniline)	1/11/22	11/10/22	31/10/22	
9	Separation of constituents of mixtures by Paper Chromatography: Measure the Rf value in each case **Amino acids**	1/11/22	2/11/22	4/11/22	
10	Identify and separate the **sugars** present in the given mixture by paper chromatography.	1/11/22	2/11/22	4/11/22	
11	Repetition Physical Chemistry practical for late admitted students	5/11/22	5/11/22	5/11/22	

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Syllabus Completion Report Year 2022-23

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

Name of Paper: Chemistry Practical CH-103 **No. of Lectures allotted per week:** 04

Name of Teacher: Dr. S. P. Jadhav

Sr. No.	Name of Practical	Batch A1	Batch A2	Batch B4	Batch B2
1	Introduction, Determination of heat capacity of calorimeter for different volumes.	29/08/22	30/08/22	27/08/22	25/08/2022
2	Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.	12/09/22	30/08/22	27/08/22	15/09/22
3	Determination of integral enthalpy of solution of salts (KNO3)	12/09/22	13/09/22	14/09/22	Batch handover to other
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5	Preparation of buffer solutions Sodium acetate-acetic acid and determine its buffer capacity	31/09/22	4/10/22	28/09/22	
6	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Thiourea)	10/10/22	4/10/22	28/09/22	
7	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Chloroform)	10/10/22	11/10/22	31/10/22	
8	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Aniline)	1/11/22	11/10/22	31/10/22	
9	Separation of constituents of mixtures by Paper Chromatography: Measure the Rf value in each case **Amino acids**	1/11/22	2/11/22	4/11/22	
10	Identify and separate the **sugars** present in the given mixture by paper chromatography.	1/11/22	2/11/22	4/11/22	
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