

Practical Plan

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| Name of the college: Government College of Arts, Science & Commerce, Sanquelim, Goa | | |
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| Name of Faculty: Mr. Sujay S.Sawant | Subject: Physical Chemistry I | |
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| Paper code: CHC-204 | Program: S.Y.BSc. | Division: |
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| Academic year: 2024 - 2025 | Semester: IV | Total Practical/Labs: 08 (30 Hours) |
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| Credits: 1 | | |
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| Course Objectives: <ul style="list-style-type: none">• To acquire knowledge on the various types of reactions and their order.• To understand the thermodynamic parameters used in laboratory techniques.• To study complex formation and determination of stability constant colorimetrically. | | |
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| Expected Course Outcome: <p>At the end of the course students will be able to:</p> <p>CO1 : Calculate and explain various thermodynamic parameters of chemical reactions.</p> <p>CO2 : Differentiate between different nuclear counters.</p> <p>CO3 : Estimate quantum yields of photochemical reactions.</p> <p>CO4 : Compare the strength of the acids.</p> <p>CO5 : Determine graphically order of reaction and estimate the energy of activation.</p> <p>CO6 : Estimate the stability constant of various complexes.</p> | | |
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| Student Learning Outcome: <p>At the end of the course students will be able to:</p> <ol style="list-style-type: none">1. calculate and articulate key thermodynamic parameters associated with chemical reactions.2. distinguish among various types of nuclear counters and understand their operational differences.3. estimate quantum yields in photochemical reactions and understand their significance.4. evaluate and compare the relative strengths of acids based on scientific principles.5. analyze reaction kinetics, graphically determine the order of reactions, and estimate activation energies.6. calculate and interpret stability constants for various chemical complexes. | | |

| Month | Practical/Labs Scheduled Date | No. of Practical /Labs planned | List of Experiments | Reference books |
|----------|-------------------------------|--------------------------------|--|-----------------|
| December | 09/12/24 | 1 (Batch III) | 1. Determination of energy of activation for ethyl acetate and NaOH using equal concentration. | [1-5] |
| | 16/12/24 | 1 (Batch III) | 1. Determination of energy of activation for ethyl acetate and NaOH using equal concentration. | [1-5] |
| January | 06/01/25 | 1 (Batch III) | 2. Compare the strengths of HCl and H ₂ SO ₄ by studying kinetics of hydrolysis of methyl acetate. | [1-5] |
| | 13/01/25 | 1 (Batch III) | 2. Compare the strengths of HCl and H ₂ SO ₄ by studying kinetics of hydrolysis of methyl acetate. | [1-5] |
| | 20/01/25 | 1 (Batch III) | 3. To determine the rate constant and order of reaction between KI and K ₂ S ₂ O ₈ | [1-5] |
| | 27/01/25 | 1 (Batch III) | 3. To determine the rate constant and order of reaction between KI and K ₂ S ₂ O ₈ | [1-5] |
| February | 03/02/25 | 1 (Batch III) | 4. Determination of enthalpy of ionization of Acetic acid and NaOH. | [1-5] |
| | 10/02/25 | 1 (Batch III) | 4. Determination of enthalpy of ionization of Acetic acid and NaOH. | [1-5] |
| | 17/02/25 | 1 (Batch III) | 5. Determination of enthalpy of neutralization of Acetic acid and NaOH. | [1-5] |

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| | 24/02/25 | 1 (Batch III) | 5. Determination of enthalpy of neutralization of Acetic acid and NaOH. | [1-5] |
| March | 03/03/25 | 1 (Batch III) | 6. To study complex formation between Ni(II) and O-phenanthroline by Job's method. (Colorimetry) | [1-5] |
| | 10/03/25 | 1 (Batch III) | 7. To study the complex formation between Fe(III) ions and Salicylic acid and to find the formula and stability constant of the complex using colorimetry. | [1-5] |
| | 17/03/25 | 1 (Batch III) | 7. To study the complex formation between Fe(III) ions and Salicylic acid and to find the formula and stability constant of the complex using colorimetry. | [1-5] |
| | 24/03/25 | 1 (Batch III) | 8. To measure the Combustion Enthalpies of Coal via Bomb Calorimetry. | [6] |
| | 31/03/25 | 1 (Batch III) | Repeat practicals | - |
| April | 07/04/25 | 1 (Batch III) | Semester End Practical Examination | - |

References:

1. S. W. Rajbhoj and T. K. Chondhekar, Systematic Experimental Physical Chemistry, Anjali Publication, 2nd Edition, 2000, Aurangabad.
2. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi, 2018, 18 th edition.
3. O. P. Pandey, D. N. Bajpai, S. Giri, Practical Chemistry, S. Chand Publication, 2013, New Delhi, Revised Edition.
4. B. Viswanathan, P. S. Raghavan, Practical Physical Chemistry, Viva Books Private limited, 2012, Mumbai.

5. J. N. Gurtu and A. Gurtu, Advanced Physical Chemistry Experiments, Pragati Prakashan, 2008, Meerut, Revised Edition.
6. A. M. Ranjika and P. Bopegedera, Evaluating the heats of combustion of coals using Bomb calorimetry in the general chemistry laboratory, J. Chem. Educ. 2023, 100, 1, 298 305

| * Assessment Rubrics | |
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| Component | Max Marks |
| ISA | 15 |
| Semester End Exam | 60 |
| Practical | 25 |
| Total | 100 |