

Instructors: H. S. Biswal and U. Lourderaj

Lab hours: F M 14:30 hrs to 17:30 hrs

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C343: Physical Chemistry Lab II

List of proposed experiments

1. Synthesis and characterization of fluorescein.
2. Quantum Yield Calculation for Anthracene.
3. An Experiment to determine the Energy of Activation (E_a)
4. Determination of viscosity - average molecular weight of polyvinyl alcohol, and the fractions of head-to-head monomer linkages in the polymer.
5. Static and Dynamic Fluorescence quenching and verification of the Stern-Volmer relationship. Effect of KI on Pyrenesulfonic acid's quantum yield.
6. Changes in the absorption and emission spectrum of NBD-octylamine in different solvents.
7. Study of the excited state properties of 2-Naphthol : (a) excited state acidity constant; (b) deprotonation and protonation rate constants in the excited state.
8. Visualization of atomic orbitals and molecular orbitals.
9. Modeling of elimination/migration reaction of Isopropylazide.
10. Computation of the transition state for simple reactions.
11. Structure and vibrational frequency analysis of hydrogen bonded clusters: Water dimer and water trimer structures, naphthal-water hetero clusters.
12. Computation of potential energy profile for the isomerization of n-butane.
13. Calculation of thermodynamic parameters (ΔG° , ΔH° , ΔS°) for the equilibrium $\text{N}_2\text{O}_4 \rightleftharpoons 2\text{NO}_2$.
14. Computational studies on the ground state and excited state properties of some simple molecules.
15. Chemical Dynamics Simulations of simple reactions.

Recommend Books:

1. Experimental Physical Chemistry, R. C. Das and B. Behera, Tata McGraw Hill, 1983.
2. A Collection of Interesting General Chemistry Experiments, A. J. Elias, Universities Press, 2007.
3. Experimental Physical Chemistry, V. D. Athawale, P. Mathur, New Age International Publishers, 2001.
4. Experimental Physical Chemistry: A Laboratory Textbook, A. M. Halpern, Prentice Hall, 2nd edition, 1997.
5. G. C. McBane, 3rd edition., W. H. Freeman and Company, New York, 2006.
6. <http://cdssim.chem.ttu.edu>

Evaluation/Grading

You will have to try very hard to fail in this course.

- Quiz: ONE (10%)
- Viva: TWO (20%)
- Continuous evaluation of experiments : 10-12 (40%)
- End-semester exam: ONE (30%)