

# Minnesota State University Moorhead

## CHEM 465: Physical Chemistry Laboratory II

### A. COURSE DESCRIPTION

Credits: 1

Lecture Hours/Week: 0

Lab Hours/Week: 3

OJT Hours/Week: \*.\*

Prerequisites:

CHEM 455 - Physical Chemistry I Lab

Corequisites: CHEM 460

MnTC Goals: None

A continuation of physical chemistry laboratory 455. Chemical kinetics, spectroscopy and molecular orbital calculations.

**B. COURSE EFFECTIVE DATES:** 05/19/1999 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. Methods of Initial Rates - Iodine Clock
2. NMR - Determination of Keto-enol Equilibrium
3. NMR Study of a Reversible Hydrolysis Reaction
4. Absorption Spectrum of a Conjugational Dye
5. CdSe Quantum Dot Synthesis and their Crystal Growth Rates
6. Vibrational- Rotational Spectrum of HCl and DCl.
7. Hartree-Fock Calculations.

### D. LEARNING OUTCOMES (General)

1. Assemble the required apparatus to carry out experiments in chemical kinetics.
2. Determine molecular parameters of diatomic polar molecules from vibration-rotation spectra.
3. Estimate the errors associated with the results of an experiment based on the mathematical expressions involved in the experiment. Produce standard laboratory reports.
4. Select, plan, modify, improvise and perform an experiment of interest to the student, with a relevance to the material covered in CHEM460 course content.
5. Use commercially available quantum mechanical software package(s) to calculate the molecular geometries, thermodynamic and kinetic parameters of reactions.
6. Use simple quantum mechanical models to interpret spectra from quantum dots. Use data from the experiment to refine synthesise quantum dots of controlled size.
7. Use the available specialized equipment, make accurate measurements to determine the kinetic parameters of chemical reactions.

### E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

### F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

**G. SPECIAL INFORMATION**

None noted