课程代码（Coursenumber）   
Chemistry 2900 (290)   
  
课程对象（Audience）   
Primarily for Undergraduates   
  
开课教师（Teacher）   
Prof. John Marohn   
  
学期（Semester）   
Spring   
  
课程描述（Description）  
It contains Radiochemistry and Statistics，Bomb Calorimetry，pKa of Methyl Red Kinetics: Bromination of Acetone，Introduction to Vacuum Lines，Infrared Spectrum of Methane and Deuterated Methane，and Infrared Spectrum of Carbon Dioxide   
  
课程提纲（Syllabus）   
Radiochemistry and Statistics   
The concepts of error analysis are applied to a series of laboratory measurements in a workshop format. Experimental data will be obtained by groups of students using gieger counters. This data will be analyzed by the instructor/TA to demonstrate how experimental design can be improved using the traditional statistical tools that will be required in this course. The concluding exercise requires designing and executing an experiment to measure the radioactivity of a commercial product (Morton Lite Salt).   
Bomb Calorimetry   
The concepts of error analysis are applied to a measurement of the resonance energy of benzene by oxygen bomb calorimetry. Major emphasis of the experiment is aimed at propagation of error as a tool for identifying strengths and weaknesses in the experimental design.   
pKa of Methyl Red   
The spectra of acid and base forms of an indicator dye are measured and analyzed by Beer’s Law for linearity and used to obtain molar absorptivities that are then used, along with a pH meter, to determine the pKa of the dye. Spectral deconvolution, and analysis of the experimental design are emphasized.   
Kinetics: Bromination of Acetone   
A proposed mechanism for the halogination of a ketone under acid catalysis is evaluated in light of the experimentally determined rate law. Both the integrated and differential methods are used to determine orders of the reaction with regard to each of the reactants. A kinetic isotope study is used to differentiate likely candidates for the   
rate-limiting step.   
Introduction to Vacuum Lines   
The operation of a vacuum line will be examined by measuring the pumping   
speeds and volumes of the various parts of the system. The final objective is to use the lines to manufacture and purify a sample of hydrogen chloride gas, and practice taking its infrared spectrum.   
Infrared Spectrum of Methane and Deuterated Methane   
A Sample of natural gas is collected from the building supply and purified on a vacuum line. Then the gas is transferred to a 5 cm gas cell, and the FTIR spectrum is taken. This rovibrational spectrum is then analyzed using a more detailed model of rotational and vibration energy states to obtain several fundamental constants for the system, including the bond lengths for the first two vibrational levels, as well as the equilibrium bond length. The process is them repeated for a sample of D4-Methane.   
Infrared Spectrum of Carbon Dioxide   
A samples of carbon dioxide is collected from dry ice is purified on a vacuum line. Then the gas is transferred to a 5 cm gas cell, and the FTIR spectrum is taken. This rovibrational spectrum is then analyzed using a simple model of rotational and vibration energy states to obtain several fundamental constants for the system, including the equilibrium bond length.   
  
课时信息（Totalhours）   
16430 LEC 002 R   
12:20PM - 01:10PM   
BKL 119   
Marohn,J (jam99)   
Students Enrolling in Lecture 001 must enroll in labs 401-406; Lecture 002 must enroll in Labs 407-412. If you are unable to register for a lab section, you need to sign-up on the Chemistry waiting list accessible only at http://chemlabs.arts.cornell.edu. Further information about the waiting list is available at the following link: <http://www.chem.cornell.edu/courses/WaitListFAQS.pd>   
  
教参信息（Textbookinfo）  
Schaum's Outline of College Chemistry, Ninth Edition (Schaum's Outlines) by Jerome Rosenberg, Lawrence Epstein, and Peter Krieger (Paperback - Aug. 20, 2009)  
1 Experimental Physical Chemistry: A Laboratory Textbook by Arthur Halpern and George McBane (Hardcover - June 30, 2006)  
ISBN-13: 978-0716717355  
世界各地拥有馆藏的图书馆（OCLC）:68  
2 Experimental Physical Chemistry: A Laboratory Textbook (2nd Edition) by Arthur M. Halpern (Spiral-bound - Apr. 29, 1997)  
ISBN-13: 978-0136542032  
3 Physical Chemistry, Explorations in Physical Chemistry 2.0 Access Card, Experimental Physical Chemistry & Student Solutions Manual by Peter Atkins, Arthur Halpern, Julio de Paula, and Valerie Walters (Hardcover - July 15, 2006)  
ISBN-13: 978-0716789970  
世界各地拥有馆藏的图书馆（OCLC）:2  
4 Physical Chemistry, Explorations in Physical Chemistry 2.0 Access Card & Experimental Physical Chemistry by Peter Atkins, Valerie Walters, Arthur Halpern, and George P. McCabe (Hardcover - June 30, 2006)  
ISBN-13: 978-0716794745  
世界各地拥有馆藏的图书馆（OCLC）:3  
5 Experimental Inorganic/Physical Chemistry: An Investigative, Integrated Approach to Practical Project Work (Horwood Series in Chemical Science) by M. A. Malati (Paperback - Aug. 1999)  
ISBN-13: 978-1898563471  
6 Charge Injection Systems: Physical Principles, Experimental and Theoretical Work (Heat and Mass Transfer) by Dr. John Shrimpton (Hardcover - June 9, 2009)  
ISBN-13: 978-3642002939  
世界各地拥有馆藏的图书馆（OCLC）:31  
7 Experimental Design: A Chemometric Approach, Volume 11, Second Edition (Data Handling in Science and Technology) by S.N. Deming and S.L. Morgan (Hardcover - June 18, 1993)  
ISBN-13: 978-0444891112  
8 Advances in Surface Science, Volume 38 (Experimental Methods in the Physical Sciences) by Marc De Graef and Thomas Lucatorto (Hardcover - Oct. 29, 2001)  
ISBN-13: 978-0124759855  
世界各地拥有馆藏的图书馆（OCLC）:256  
9 Enantioselective Organocatalysis: Reactions and Experimental Procedures by Peter I. Dalko (Hardcover - Apr. 20, 2007)  
ISBN-13: 978-3527315222  
世界各地拥有馆藏的图书馆（OCLC）:148  
10 Chemistry of Structure - Function Relationships in Cheese (Advances in Experimental Medicine and Biology) by Edyth L. Malin and Michael H. Tunick (Hardcover - June 30, 1995)  
ISBN-13: 978-0306449826  
11 Measurement of the Thermodynamic Properties of Single Phases, Volume VI (Experimental Thermodynamics) by Anthony Goodwin, KN Marsh, and WA Wakeham (Hardcover - July 17, 2003)  
ISBN-13: 978-0444509314  
世界各地拥有馆藏的图书馆（OCLC）:90  
12 Experimental Results for Dippr 1990-91 Projects on Phase Equilibria and Pure Components Properties (Dippr Data Series, No. 2, 1994) by John R. Cunningham and Dennis K. Jones (Hardcover - Sept. 1994) - Illustrated  
ISBN-13: 978-0816906574