

CHEMISTRY 503
SYLLABUS SPRING 2014
Lecture MWF 10:10-11 Fulmer 225

Practical Solution Kinetics and Inorganic Reaction Mechanisms

The first 10 weeks of this course will treat the theory and practice of kinetics for reactions in solution. Methods of acquiring and analyzing data, establishing rate laws, the relationship between the rate law and proposed mechanisms, temperature and pressure dependences, and transition state theory will be included. The last third of the class will be devoted to a survey of inorganic, bioinorganic, and organometallic reaction mechanisms **or** the student may choose to write a term paper and make a short presentation on an approved topic related to their individual interests.

Instructor: Prof. Scot Wherland
Email: scot_wherland@wsu.edu
Web Site: Angel: <http://lms.wsu.edu>

Office: Fulmer 151
Office Hours: Tu 9-10, W, 4-5 and by arrangement
Phone: 335-3360

Textbook: (Recommended) "Chemical Kinetics and Reaction Mechanisms" by J. H. Espenson, McGraw Hill, 2nd Ed. (1995)

Grading:	2 "hour" exams on kinetics	200
	Kinetics homework	200 (normalized)
	Homework & Exam on Mechanisms or a Term Paper and Presentation	200
	Total	600

Grades (no lower than): A: 100-90% B: 80-90% C: 70-80% D: 60-70% F: <60%

Midterm Exams: Approximately Weeks 6 and 11

Scheduled Final (Mechanism) Exam: Tuesday, May 6, 2014 from 8:00 – 10:00 AM

Homework: Homework is typically due by 5 PM on Monday following the assignment. Several of the homework assignments will involve computer applications, primarily with Excel and with software distributed on the web site. The homework assignments will involve problems that are too long to be included in exams, and thus contribute as much to the final grade as do the exams.

Term Paper This paper should be no more than 10 pages, excluding figures and references. The topic will be developed through meetings with me, starting in the 10th week (week of March 24). It will typically be based on some current work in the literature that relies on kinetic measurements and techniques to develop conclusions regarding the mechanism of a reaction. It will include a detailed background supporting all of the methods, derivations, and assumptions involved in the kinetic treatment and conclusions regarding mechanism. Students taking the course to satisfy the requirement for an inorganic graduate core course should choose as a topic a class of reaction and present a broader topic, such as isomerization or solvent exchange. The work should go beyond the presentation in class. Students will meet weekly with me to discuss their progress. The paper will be summarized with a ~20 minute oral report during the last week of classes.

Learning Outcomes

Students who successfully complete this course should

Be able to design a variety of types of kinetic experiments and data analysis methods that will lead to an experimental rate law.

Be able to derive a rate law from a chemical mechanism.

Be able to suggest mechanisms that are consistent with a particular rate law, and the mechanistic ambiguities that remain.

Be able to derive activation parameters from temperature and pressure dependence data and be able to understand the possible interpretations of such values within transition state theory.

Be able to evaluate other experimental results related to stoichiometry, thermodynamics, or rate constants that may contribute to mechanistic proposals, such as solvent and ionic strength effects, product ratios in reactions that do not lead to a unique product, the influence of reactant structure on rate constants, and variations with thermodynamic driving force.

Be familiar with the standard mechanisms of transition metal substitution and electron transfer reactions and the experimental results that support or eliminate a particular mechanism.

Syllabus Statements

Reasonable Accommodations

Students with Disabilities: Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations **MUST** be approved through the Access Center. For more information contact a Disability Specialist, <http://accesscenter.wsu.edu>.

Academic Integrity

You are encouraged to work with classmates on assignments. However, each student must turn in original work. No copying will be accepted. First offenses on homework will result in a zero for that assignment, with later offenses resulting in greater penalties. Students who allow their work to be copied are as much at fault as the student who copies. Repeat offenses, or particularly egregious offenses as determined by the instructor, will result in an F as a final grade in this course, and the student may not have the option to withdraw from the course and may be reported to the Office Student Standards and Accountability. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3). It is strongly suggested that you read and understand these definitions.”

Safety and Emergency Notification

Washington State University is committed to enhancing the safety of the students, faculty, staff, and visitors. It is highly recommended that you review the Campus Safety Plan (<http://safetyplan.wsu.edu/>) and visit the Office of Emergency Management web site (<http://oem.wsu.edu/>) for a comprehensive listing of university policies, procedures, statistics, and information related to campus safety, emergency management, and the health and welfare of the campus community.