

Analysis of Equilibrium Systems I
Chem 2010 1
Winter Quarter, 2001
GENERAL INFORMATION

Instructor: Professor Sandra S. Eaton

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office hours	M 4-5 pm, T 5-6 pm, W 1-2 pm, Th 5-6 pm

Text: *Exploring Chemical Analysis*, D. C. Harris, W. H. Freeman, 2nd ed., 2001.

Analysis of Equilibrium Systems (Chem 2010/2040) has been designed as a two-quarter sequence providing an introduction to chemical equilibria and their analysis. The emphasis is on aqueous solutions because of their importance in living systems and in environmental science. CHEM 2040, Analysis of Equilibrium Systems Laboratory, is a corequisite for CHEM 2010 and students who register for 2010 are also expected to register for 2040.

Assignments: The tentative lecture schedule, that is given on the following pages, lists the lecture topic and reading assignment for each class meeting. You should read the assignment for each date before coming to class. Working problems is a key part of learning the material for this course - working a problem asks you to apply the principles that we are discussing to concrete examples. It is best to work relevant problems following each lecture to help reinforce what you have read and heard.

- You are expected to work each of the "Ask Yourself" questions in the assigned chapters. Detailed answers to these questions are given at the back of the book. These problems will not be collected.
- You are expected to do the end-of-chapter problems that are listed in the following course outline. These problems will not be collected. Short answers to these problems are given at the back of the book and detailed solutions are given in the Solutions Manual. You will learn more from a problem if you endeavor to work through it before looking at the detailed solutions. If you have difficulty working an assigned problem it is a good idea to work another related problem to ensure that you understand the material.
- A few problems will be assigned each week that are to be turned in for grading. These problems are due at the beginning of class on Wednesdays. Late homework will not be accepted. Use 8½ x 11 inch paper, do not fold, label clearly with your name, and assignment due date. Detailed answers to these problems will be posted on Blackboard after class on the day that the assignment is due.

The class meetings on Thursdays (8-9 am) will be devoted entirely to answering your questions concerning material covered in lecture or practice problems. Problems to be turned in for grading will be discussed only after the assignment is due. Dr. S. Eaton will be available to provide additional help, during the office hours listed above, as well as by appointment in the event of schedule conflicts. Additional help/review sessions will be held prior to each exam.

As shown on the following lecture schedule, there will be two hour-exams and a final exam. The final exam will be comprehensive. In addition, there will be 4 or 5 brief unannounced in-class quizzes during the quarter. There will be no make-up quizzes.

Blackboard

Class handouts and assignments will be available through the web on Blackboard. Please sign up for Chem2010 using Blackboard. The Blackboard password to allow you to register for this class in chem2010 (note that the software is case sensitive.) Since Blackboard does not handle Mathcad files properly, those files will be available on a web site and the link to that web site will be given in Blackboard.

Grading

2 hour exams	50% total (25% each)
problems turned in for grading	10%
quizzes	10%
final exam	30%

Tentative Course Outline

Date	Topic	Reading	Practice problems
1/3	Units, Species in Solutions	13-23 + handout	1-7, 1-8, 1-10
1/5	Preparing Solutions	23-26	1-12, 1-13, 1-14, 1-17, 1-21
1/8	Equilibrium Constants	27-30	1-25, 1-28, 1-29
1/10	Statistics	73-87	4-3, 4-6, 4-11
1/12	Volumetric Analysis	93-102	5-1, 5-2, 5-3, 5-8
1/15	Holiday		
1/17	Solubility Product	103-109	5-16, 5-17, 5-19
1/19	Acids and Bases	139-143	7-1, 7-3, 7-6
1/22	Strengths of Acids/Bases	143-149	7-7, 7-8, 7-10, 7-11
1/24	Weak acid Equilibria	149-155	7-15, 7-17, 7-20, 7-23
1/26	Exam I	covering material through 1/22	
1/29	Weak Base Equilibria	156-158	7-26, 7-27, 7-28, 7-32, 7-34
1/31	Buffers	163-169	8-2, 8-4, 8-7, 8-8
2/2	Preparing Buffers	169-174	8-10, 8-11, 8-15
2/5	Indicators	175-178	8-19, 8-21

2/7	Strong acid/base titrations	183-187	9-5, 9-6, 9-24
2/9	Weak acid titrations	187-191	9-7, 9-10, 9-11, 9-13
2/12	Weak base titrations, endpoints	191-197	9-14, 9-18, 9-21
2/14	Polyprotic acids and bases	209-219	10-2, 10-5, 10-7
2/16	Identifying principal species	219-222	10-9, 10-11, 10-15, 10-18
2/19	Polyprotic titrations	222-227	10-22, 10-24, 10-25
2/21	Effect of ionic strength	233-241	11-2, 11-8, 11-13, 11-20
2/23	Exam II	Covering material from 1/24 to 2/19	
2/26	Charge and mass balance	242-251	11-24, 11-28, 11-33
2/28	EDTA titrations	255-262	12-1, 12-8, 12-9
3/2	"	263-272	12-12, 12-13
3/5	Chemical kinetics, rate laws	handout	handout
3/7	Chemical kinetics, mechanism	handout	handout
3/9	Chemical kinetics, temperature dependence	handout	handout
3/12	review/catch-up	1-10	
3/14	Final exam 8:00 - 9:45 am	Comprehensive	