

Analysis of Equilibrium Systems
CHEM 2011
Winter Quarter, 2004

Instructor Asst. Professor Keith Miller
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Class Time: MWThF 9:00 – 9:50
Class Location: Olin 205
Office Hours: MWTh 10:00 – 11:00; other times by arrangement

REQUIRE COURSE ITEMS

Textbook: *Exploring Equilibrium Analysis*, 2nd ed., by Daniel C. Harris (available at the DU Bookstore).
Calculator: An inexpensive calculator is required. It should have the capabilities for square roots, logarithms, and exponential (scientific) notation operations. The calculator will be used for problem sets, quizzes, and exams. You are responsible for understanding how to perform each of the operations on your calculator. **Remember to bring your calculator (or laptop) with you to every class.**

SUPPLEMENTAL COURSE ITEMS

Textbook: *Chemistry*, 2nd or 3rd eds., by Martin S. Silberberg (textbook used for CHEM 1010).
Solutions Manual: *Solutions Manual for Exploring Chemical Analysis*, 2nd ed., by Daniel C. Harris (available at the DU Bookstore).

COURSE DESCRIPTION

Analysis of Equilibrium Systems is the fifth course in the six quarter freshman/sophomore chemistry sequence. The course is an introduction to chemical equilibria and kinetics. Chemical equilibria will focus on aqueous systems, starting first with simple systems. Discussions will progress to advanced applications of complex equilibria, including examples from biological and environmental systems.

LECTURE

The format of class meetings will follow traditional lecture format on MWF with occasional group activities. During lecture, I will summarize new material and present illustrations and examples. In lecture, I WILL NOT identify and describe every detail you will read in the text and any supplemental materials. I will, however, emphasize the important topics covered in the reading as well as problem solving strategies when appropriate. You should stop me at any time if you have questions about the material being covered.

The Thursday (Th) class meetings will be devoted to Quizzes, Problem solving, and Review (QPR). No new lecture material will be covered on these days. A quiz will be administered at each meeting. We will go over any questions you have on the material covered in lecture or homework problems. In addition, we will work on specific “challenge problems” in small groups, go over spreadsheet applications, and after the midterm, review the exam.

Four Marsico Undergraduate Teaching Assistants, who have taken the course in previous years, will be available to help answer questions regarding calculations, assigned problems and course material. These individuals are in addition to the Graduate Teaching Assistants that are also assigned to the courses. Help will be provided in or outside of the Kauver Reading Room, Olin 206, at times to be posted at a later date. The intent is to have this “help desk” staffed a few hours per day, Monday through Friday.

QUIZZES and EXAMS

Quizzes will be administered weekly on Thursday, with the exception of the class meeting following the midterm exam. The quizzes will be short (10 – 15 minutes), and will cover material from the preceding 3 – 4 lectures. A significant portion of each quiz will cover material that I have covered in lecture, and that you have had at least one class meeting (including a QPR session) to ask questions. The quizzes will be similar in nature to assigned and suggested homework problems. An estimated eight (8) quizzes will be given throughout the course. Your lowest three quiz scores will be dropped, and only the highest scores on the remaining five (5) quizzes will comprise the “Quiz” portion of your final grade. Two (2) exams will be given during the quarter: a midterm and cumulative final exam. Exam problems will be similar to the problems given in the weekly quizzes.

If you will be out of town for a University sanctioned function (e.g., athletic team or music group), you are responsible for making arrangements with Dr. Miller at least one week in advance to take the quiz or midterm exam early. **THERE WILL BE NO MAKE-UP QUIZZES. Only in extremely extenuating circumstances will a make-up midterm exam be given. This will require documentation that justifies the need for the make-up (e.g., a letter from Student Health).**

GRADES

At the end of the quarter, you will be graded according to your performance on the assigned homework, quizzes, and examinations. Your final grade will be determined by the following scale:

Graded exercises	15%
Quizzes (five highest scores)	25%
Midterm exam	30%
Final exam	30%
Total	100%

CELLULAR PHONE AND PAGER POLICY

I respect the need for each individual to stay in contact with family and friends. The use of cellular phones and pagers, however, is disrupting to the learning environment. Thus, I request that the ringers of all cellular phones and pagers be muted during class. If an emergency arises, and you need to make a call on your phone, I request that you quietly leave the room and conduct your conversation out in the hallway.

LECTURE AND TESTING ACCOMODATIONS

I will make every effort to accommodate students diagnosed with a learning disability. I will do this in complete confidence. I do, however, request that any student requiring these accommodations

TENTATIVE SCHEDULE

Meeting	Date	Topic	Reading	Suggested Problems
1	Jan 5	Introduction; Units; Solutions	H: 13 – 23	Chapter 1: 5, 7 – 10
2	Jan 7	Solutions cont.; Preparing solutions	H: 23 – 26	Chapter 1: 12 – 15, 21, 22
3	Jan 8	QPR*		Quiz
4	Jan 9	Equilibrium	H: 26 – 30	Chapter 1: 25, 27 – 29
5	Jan 12	Equilibrium cont.		Handout
6	Jan 14	Error; Statistics	H: 57 – 60, 73 – 87	Chapter 3: 7, 8 Chapter 4: 1, 3, 8, 12
7	Jan 15	QPR	H: 65 – 69, 88	Quiz
8	Jan 16	Volumetric analysis (a.k.a. - Titrations!)	H: 93 - 102	Chapter 5: 1, 2, 3, 6, 10
--	Jan 19	MLK Holiday	DU Holiday – No Class	
9	Jan 21	Solubility product	H: 103 – 109	Chapter 5: 15, 17, 18, 19
10	Jan 22	QPR		Quiz
11	Jan 23	Acids and bases	H: 139 – 143	Chapter 7: 1, 3, 4, 6
12	Jan 26	Acids and bases cont.	H: 143 – 149	Chapter 7: 7 – 11
13	Jan 28	Weak acid / weak base equilibria	H: 149 – 158	Chapter 7: 16 - 18, 20, 23
14	Jan 29	QPR		Quiz
15	Jan 30	Weak acid / weak base Equilibria cont.	H: 149 – 158	Chapter 7: 15, 27 – 29, 34
16	Feb 2	Buffers	H: 163 – 169	Chapter 8: 1, 3, 5 – 7
17	Feb 4	Midterm Exam		Material from meetings 1- 15
18	Feb 5	QPR		Midterm Review
19	Feb 6	Preparing buffers	H: 169 – 175	Chapter 8: 8, 10, 13 – 15
20	Feb 9	Indicators	H: 175 – 178	Chapter 8: 12, 17, 19, 21
21	Feb 11	Strong acid/base titrations	H: 183 – 187	Chapter 9: 1, 5, 6, 24