

WATER CHEMISTRY

EOHS 542 / CEMM 524, 4 Credits

- Lecture:** Tuesday and Thursday 4:00-6:00pm, SPHW 121
- Instructor:** Dr. An Li.
Office: Rm 304, SPHW. 2121 W. Taylor Street.
Phone: 6-9597. Fax: 3-9898. Email: anli@uic.edu
Office Hours: Tuesday and Thursday 1:30 - 3:00pm
- Website:** <http://blackboard.uic.edu> (for registered students)
<http://tigger.uic.edu/~anli/teaching.htm#542> (for everyone)
- Objective:** This course provides a comprehensive coverage of chemistry in natural waters and engineered aqueous systems. Chemical equilibrium and kinetic principles will be introduced for the acid-base reactions, complex formation, precipitation/dissolution, redox reactions, etc., in dilute aqueous solutions. Computer models will be used, and quantitative calculations will be emphasized.
- Textbook:** Mark M Benjamin. *Water Chemistry*. McGraw Hill. 2001.
- Prerequisite:** EOHS 440 / CEMM 441, or consent of the instructor
- Homework:** A homework set will be given each Thursday. It will be due on following Thursday. Each set will count for 20 pts. Two points will be deducted if handed in late.
- Grading:**
- | | | |
|----------------|-----|----------------------|
| Homework: | 100 | (20 x 10) |
| In-class Quiz: | 50 | (5 x 10) |
| Exam-1: | 100 | (Chapter 1, 3, 4, 5) |
| Exam-2: | 100 | (Chapter 7, 8, 9) |
| Class Project: | 50 | |
| Total: | 500 | |
- A: $\geq 90\%$; B: 75-89%; C: 60-74%; D: $< 60\%$. (tentative)
- Suggested Readings**
- V. L. Snoeyink and D. Jenkins. *Water Chemistry*. John Wiley & Sons, Inc. 1980
- W. Stumm and J. J. Morgan. *Aquatic Chemistry*, 3rd Ed. John Wiley & Sons, Inc. 1996.
- F. M. M. Morel and J. G. Hering. *Principles and Applications of Aquatic Chemistry*. John Wiley & Sons, Inc. 1993
- J. F. Pankow. *Aquatic Chemistry Concepts*. Lewis Publisher, 1991.
- E. J. Billo. *EXCEL for Chemists: A Comprehensive Guide*. Wiley-VCH. 1997.
- Softwares**
- MINTEQA2: <http://www.epa.gov/ceampubl/mmedia/minteq/index.htm>
- MINEQL+: <http://www.mineql.com/index.html> (optional)

Student Responsibilities and Resources

Academic Integrity Statement

Academic dishonesty is an offense against the University and I am obligated to report any incident to the Associate Dean for Academic Affairs. Academic dishonesty includes (but is not limited to): cheating or assisting someone else in academic dishonesty, plagiarism, unauthorized possession of class materials (e.g., tests, reserve materials), and unauthorized changing of one's grade. Students are encouraged to consult their instructor on rules for proper citation, or website sources such as <http://www.library.uiuc.edu/learn/handouts/researchprocess.html#citing%20sources>. Two excellent sources which define plagiarism and how to avoid it may be found at: <http://www.indiana.edu/~wts/pamphlets/plagiarism.shtml> and <http://owl.english.purdue.edu/owl/resource/589/01/>. Students are also strongly encouraged to review UIC's Guidelines on Academic Integrity at http://www.vcsa.uic.edu/MainSite/departments/dean_of_students/Our+Services/Student+Judicial+Affairs.htm and the School of Public Health's Student Honor Code at http://www.uic.edu/sph/shandbook_sphpolicies.htm#honorcode

Disability Statement

If you need accommodations because of a disability and are registered with the Office of Disability Services at UIC, if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately. Please see me privately after class, at my office, or email me.

Mutual Tolerance and Respect Statement

Public health deals with controversial issues from multiple perspectives and consideration of these issues may cause disagreements among us or may evoke strong personal feelings, depending on our individual experience, histories, identities and worldviews. Therefore, in all of our interactions and communications, it is important that we strive to have mutual respect and tolerance for one another and for any course guests and members of the community with whom we come into contact. If you feel you have been offended by any content or interactions, you are encouraged to discuss this with the instructor or another faculty member.

Tentative Outline of Lectures

Week 1	-	
Week 2	Chemical nature of water, concentration units, Basic thermodynamics and kinetics	Chap. 1
Week 3	Acid/base chemistry – 1	Chap.3
Week 4	Acid/base chemistry – 2	Chap. 4
Week 5	Titrations and buffers	Chap. 5
Week 6	Gas liquid equilibrium	Chap. 7
Week 7	Computer programs for chemical equilibria computations	Chap. 6
Week 8	Exam-1	
Week 9	Metals in aqueous systems	Chap. 8
Week 10	Metals in aqueous systems	Chap. 8
Week 11	Spring Break	
Week 12	Metals in aqueous systems	Chap. 8
Week 13	Redox Chemistry	Chap. 9
Week 14	Redox Chemistry	Chap. 9
Week 15	Introduction to Adsorption	Chap. 10
Week 16	Exam-3	

Please tell me about yourself (please write clearly):

Last Name _____

First Name _____

Call Name _____

Email _____

College level (check one):

Junior _____ Senior _____ MPH _____ MS _____ Ph.D. _____

Are you a full time _____ or part time _____ student?

Your major / department _____

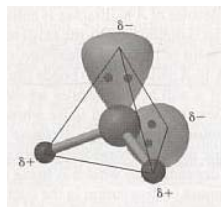
Are you currently working, or have worked before, for any environmental company or government agency? What is your expertise? _____

Have you taken any course in the following chemistry? (Y or N)

General Chemistry _____, Physical Chemistry _____, Organic Chemistry _____.

MiniQuiz (No point, just give your best guesses. This is for background survey)

1. What is the unit of this physical constant 6.022×10^{23} ? (Circle one)
A. pg/mole B. m/s C. inch/mile D. molecule/mole
2. What is the pH of 0.001 M solution of H_2SO_4 ?
3. What is this?



- A. an bacterium
- B. sketch of a methane molecule
- C. element carbon
- D. sketch of a water molecule

4. What is the valence of S in (a) molecule H_2SO_4 and (b) ion HSO_4^- ?