

Widener University
Science Division - Chemistry

Chemistry 475

Advanced Inorganic Chemistry

Spring 2007

Dr. Andrea E. Martin
Office KH 466B

Email: martin@pop1.science.widener.edu
610-499-4515

Scope of Course: This course will survey the structures, bonding models, reactivity and applications of the inorganic elements and compounds.

Lecture: Monday, Wednesday and Friday, 10:00 – 10:50AM; KB 471

Textbook: **(Required)** *Inorganic Chemistry*, Catherine E. Housecroft and Alan D. Sharpe, 2nd Edition, Prentice Hall (2005) ISBN 0130-39913-2.
(Optional) *Inorganic Chemistry Solutions Manual*, Catherine Housecroft, 2nd Edition, Pearson Prentice Hall (2005) ISBN 0-13-139926-8.

Supplementary Reading: The following books will also be required for supplementary reading. Copies are available on loan from the instructor or Professor Bradley. ***You do not need to purchase your own copies.***

- 1) *The Sordid Tale of Murder, Fire and Phosphorous, The 13th Element*, John Emsley, John Wiley and Sons (2000)
- 2) *The Periodic Kingdom*, Peter W. Atkins, Basic Books (1995)
- 3) *Mauve: How One Man Invented a Color That Changed the World*, Simon Garfield, W.W. Norton and Co (2001)
- 4) *Mendeleev's Dream: The Quest for the Elements*, Paul Strathem, St. Martin's Press (2001)
- 5) *Adventures in the Atomic Age*, Glenn Seaborg, Farrar Straus & Giroux (2001)
- 6) *Linus Pauling: Scientist and Peacemaker*, Clifford Mead and Thomas Hager, Oregon University Press (2001)
- 7) *Uncle Tungsten, Memories of a Chemical Boyhood*, Oliver Sacks, Vintage Books (2001)
- 8) *Madam Curie, A Biography*, Eve Curie, D A Capo Press, (1937)
- 9) *Oxygen, The Molecule that made the World*, Nick Lane, Oxford University Press (2002)
- 10) *Salt, A World History*, Mark Kurlansky, Penquin Books (2002)
- 11) *Prometheans in the Lab: Chemistry and the Making of the Modern World*, Sharon Bertsch McGrayne, McGraw-Hill (2001)
- 12) *Deadly Sunshine: The Historical and Fatal Legacy of Radium*, David I. Harvie, Tempus Publishing Limited (2005)
- 13) *Absolute Zero and the Conquest of Cold*, Tom Shachtman, Houghton Mifflin Company (1999)
- 14) *A World on Fire: A Heretic, an Aristocrat, and the Race to Discover Oxygen*, Joe Jackson, Penguin Books (2005)
- 15) *Poisons: From Hemlock to Botox and the Killer Bean of Calabar*, Peter Macinnis, Arcade Publishing (2004)

Nature's Building Blocks: An A-Z Guide to the Elements, John Emsley, Oxford University Press (2001) (This text will be used as a basis for the weekly quizzes on the elements, and to dispense general information about the discovery, history and utility of the elements.) One copy will be loaned to each student for the duration of the semester.

Other Reference Materials: These texts are available in the library, and can be used to supplement the textbook.

Chemistry of the Elements, second edition, N. N. Greenwood and A. Earnshaw, Buitenworth and Heinemann, New York, New York (1997)

Advanced Inorganic Chemistry, sixth edition, F. A. Cotton, G Wilkinson, C. A. Murillo and M. Bochmann, John Wiley and Sons, New York, New York (1999)
(Each of these is also available in other editions.)

Course Grading:

Your final grade will be determined based on your performance on two hour-exams (100 points each), twelve weekly quizzes on the elements (10 points each, lowest 2 will be dropped), two presentations on the common elements (25 points each), three reports on supplemental reading (50 points each) and the final exam (100 points). (**Total: 600 points**)

The two 100 point hour exams will be given in class on the following dates:

Exam 1: Monday, February 19

Exam 2: Monday, March 26

The final exam is scheduled by the registrar: **Final Exam: May 3-9 during Finals period.**

Quizzes: Quizzes will be given on Mondays throughout the semester. The topic will be 5 natural elements, and one man-made element, all chosen at random at the beginning of the semester. Quizzes will be taken from “*Nature’s Building Blocks: An A-Z Guide to the Elements.*” The schedule of element quizzes will be posted by the instructor after the first class meeting. There will be 11 quizzes; the lowest score will be dropped.

Supplementary reading reports: The first supplementary reading assignment report is due on or before February 16, the second is due on or before March 23, and the third is due on or before April 27. Details of the assignment will be discussed in class, but you must write a 3 to 5 page "book report" on three of the supplementary reading texts listed above. All students will do their first report on “*The Sordid Tale of Murder, Fire and Phosphorous, The 13th Element*”; the subsequent books will be chosen by the students. Copies of this book are available for loan from the instructor.

Presentations on two of the most abundant elements: Two 10 minute presentations, using PowerPoint, will be given to the class on the two elements that you chose randomly to research. The dates of your presentations will be assigned in class. Presentation days will be:

Friday, Jan. 26

Friday, Feb. 2

Friday, Feb. 9

Friday, Feb. 23

Friday, March 2

Friday, March 16

Friday, March 30

Friday, April 13

The Science Division and the Chemistry Department strictly enforces the University policy on cheating and other forms of academic fraud. All work on examinations, quizzes, reports and other assignments is expected to be your own.

Major Sections of Course:

- 1 Basic Concepts, Electronic Configuration and Periodic Properties (Chapter 1)
- 2 Molecular Symmetry (Chapter 3)
- 3 Bonding (Chapter 4)
- 4 Solid State Chemistry (Chapter 5)
- 5 Acids and Bases (Chapter 6)
- 6 Main Group Chemistry (Chapters 9-17)
- 7 Coordination Chemistry and Bonding Models for Transition Metal Compounds (Chapters 18-22)
- 8 Organometallic Chemistry and Catalysis (Chapters 23, 25 and 26)
- 9 Lanthanide and Actinide Chemistry (Chapter 24)

Problems: Homework problems from the text and possibly other sources will be assigned on a regular basis. These problems will not be graded, but will be discussed in class as needed. Problems will be discussed in class, at least on a weekly basis.