

Chem 4:170 - Advanced Inorganic Chemistry (Fall 2007)
(Tuesday/Thursday 10:55 - 12:10 pm in 112 MH)

Instructor: Prof. Edward Gillan **Phone (email):** 335-1308 (edward-gillan@uiowa.edu)

Office hours (481 CB): Mon. 10 - 11 am, Wed. 9-10 am, and by appointment

Required text (available in the bookstore): *Inorganic Chemistry: Principles of Structure and Reactivity 4th ed.*, by J. E. Huheey, E. A. Keiter, and R. L. Keiter

Other references (on reserve in Geoscience Library): *Inorganic Chemistry* (Housecroft & Sharpe), *Inorganic Chemistry* (Miessler & Tarr), *Inorganic Chemistry* (Schriver), *Chemical Applications of Group Theory* (Cotton)

Class info on the web: icon.uiowa.edu

Announcements, copies of handouts, and problem set/exam solutions will be made available.

Grading:	1) 10 problem sets (10 pts each)	= 100 points (10 x 2 % = 20 %)
	2) 2 in-class exams (100 pts each)	= 200 points (2 x 20 % = 40 %)
	4) journal article critique (end of semester)	= 50 points (10 %)
	5) cumulative final exam	= 150 points (30 %)
	total possible points	= 500 points

<u>Approx. dates</u>	<u>Topics covered</u>	<u>Huheey Chp. (approx. pages)</u>
Aug. 28, 30	Atomic orbitals & properties, periodic trends	2(all), 5(182-197)
Sept. 4, 6	Covalent bonding, valence bond theory, VSEPR	5(138-153), 6(203-230, 240-243)
Sept. 11 - 18	MO theory, molec. symmetry, point groups	5(153-175), 3(46-59)
Sept. 20 - Oct. 2	Group theory and uses, MO with group theory	3(59-74), 6(218-220), 5(175-182)
Oct. 4	Ionic bonding and energetics	4(92-99)

Tuesday, October 9th: first in-class exam

Oct. 11, 16	Solid-state structures, thermodynamics	4(99-134)
Oct. 18, 23	Properties of solids and band theory	7(252-255, 269-276, 263-265)
Oct. 25	Acid/base chemistry, solvation, halides	9(318-355), 10(360-364), 17(824-832)
Oct. 30, Nov. 1	Molecular rings, cages, and clusters	16(749-755, 765-802)
Nov. 6, 8	Transition metal complexes	12(472-524), 15(623-639)
Nov. 13	Coordination chem., mechanisms	16(802-807), 11(387-408)

Thursday, November 15th: second in-class exam

Nov. 27, 29	Spectroscopy: Orgel and TS diagrams	11(409-459)
Dec. 4	Magnetism in complexes and spinels	11(459-468)
Dec. 6	Kinetics of ligand substitution	13(537-567)
Dec. 11	Organometallic reactions	15(686-705, 641-649)
Dec. 13	Catalytic processes	15(705-723)

Final exam (exam group 13): Wednesday, December 19th, 730 - 930 am in 112 MH

While a grader will be grading the problem sets, any questions or issues with scores received for course assignments should be directed to Prof. Gillan. General class distributions will be periodically posted on the class website and individual cumulative scores and estimated midterm grades may be obtained from Prof. Gillan. The final grade distribution for this advanced undergraduate/graduate level course will be approximately A (25 %), B (45 %), C (25 %), D/F (5 %). Within each grade level, +/- letter grades will be given.

Notes on independent work and grading

General discussion with classmates on the inorganic concepts being tested in problem set exercises is encouraged, but all problem set answers **must be independently determined and in your own words!**

The College of Liberal Arts and Sciences Policy and Procedures

Your responsibilities to this class, and to your education as a whole, include attendance and participation. You are also expected to be honest and honorable in your fulfillment of assignments and in test-taking situations. You have a responsibility to the rest of the class and to the instructor to help create a classroom environment where all may learn. At the most basic level, this means that you will respect the other members of the class and the instructor, and treat them with the courtesy you hope to receive in turn. All students in the College have specific rights and responsibilities. You have the right to adjudication of any complaints you have about classroom activities or instructor actions.

Academic Fraud. Plagiarism and any other activities that result in a student presenting work that is not his or her own are academic fraud. *Academic fraud is reported to the departmental DEO and then to the Associate Dean for Academic Programs and Services in the College of Liberal Arts and Sciences.*

www.clas.uiowa.edu/students/academic_handbook/ix.shtml

Accommodations for Disabilities. I would like to hear from anyone who has a disability, which may require some modification of seating, testing, or other class requirements so that appropriate arrangements may be made. Please contact me during my office hours. A student seeking academic accommodations first must register with Student Disability Services and then meet with a SDS counselor who determines eligibility for services. A student approved for accommodations should meet privately with the course instructor to arrange particular accommodations. www.uiowa.edu/~sds/

Making a Suggestion or a Complaint. Students have the right to make suggestions or complaints and should first visit with the instructor and next with the departmental DEO. All complaints must be made within six months of the incident. Any complaints with the operation of this course should be initially directed to Prof. Gillan.

Department of Chemistry Contact Information: Students in need of additional information may contact staff in the Chemistry Center (231 CB or at 335-1341) during normal business hours.

www.clas.uiowa.edu/students/academic_handbook/ix.shtml#5

Understanding Sexual Harassment. Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. Visit www.sexualharassment.uiowa.edu/ for definitions, assistance, and the full policy.

Administrative Home of the Course. The administrative home of this course is the College of Liberal Arts and Sciences, which governs academic matters relating to the course such as the add / drop deadlines, the second-grade-only option, issues concerning academic fraud or academic probation, and how credits are applied for various CLAS requirements. Please keep in mind that different colleges might have different policies. If you have questions about these or other CLAS policies, visit your academic advisor or 120 Schaeffer Hall and speak with the staff. The CLAS Academic Handbook is another useful source of information on CLAS academic policy:

www.clas.uiowa.edu/students/academic_handbook/index.shtml

Information for ordering inorganic/organometallic molecular model kits

This is an optional course item that is a useful alternative to organic model kits.

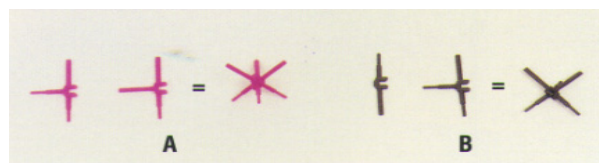
Darling Models (www.darlingmodels.com)

Go to Individual Orders category and order Kit #4 ISBN 0-9648837-5-9.

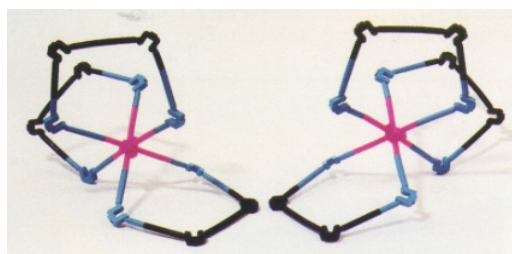
MOLECULAR VISIONS™ INORGANIC-ORGANOMETALLIC model set of 132 pieces with a 9"x4.5"x4" corrugated box.

If you place a web order with 3 other students there is a discounted price:

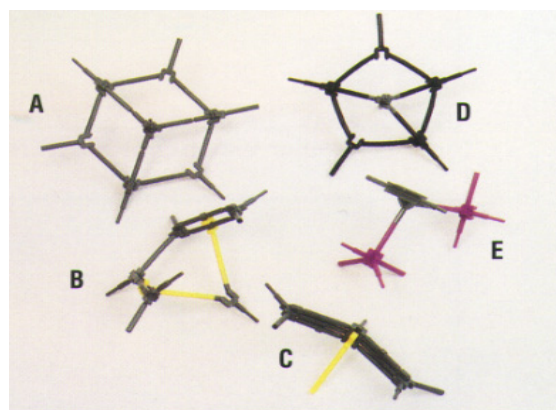
1 kit = \$23.50 total versus 3 kits = \$55 (\$18.33 each).



Atom centers incorporating the octahedral piece.



Optical isomers of a tris-ethylenediamine complex



Modeling organometallic ligands:

- Benzene ligand;
- Tetrahapto ligand;
- Allyl ligand;
- Cyclopentadienyl ligand
- Biscobalt alkyne