

Chemistry 2: Organic Structure & Bonding

Spring 2014

Faculty: John P. Bullock, (x 4472, Dickinson 203, jbullock@bennington.edu)
Office Hours: Monday 9:30 – 11:00, Wednesday 9:00 – 10:30

Description. Integrated Chemistry is a four-term sequence that covers General Chemistry and Organic Chemistry. It provides a rigorous introduction to chemical principles for those students preparing for more advanced study in chemistry or for those who need a strong background in the field to pursue related disciplines such as biology, geology, physics or environmental science. It will also provide a good background for students preparing for careers in medicine.

This class is the second term in the sequence and will focus on the modern theories of chemical bonding and the physical laws that govern chemical change, chiefly thermodynamics. The class will have lecture/discussion meetings at which we will cover the major concepts of your reading assignments. Come prepared to ask questions and otherwise fully participate in these meetings. The laboratory will aim to develop your ability to think about how chemistry is actually practiced in the lab and to develop your laboratory skills, especially with respect to the techniques of organic chemistry. As such, we will occasionally perform labs not directly to the material being discussed in lecture.

The topics we will cover in this class are:

- Electronic Structure of Atoms & Periodic Trends (K&T – 6 & 7)
- Valence Bond & Molecular Orbital Theory (K&T – 9)
- Reactions Controlled by Symmetry (Jones – 20)
- Addition Reactions of Alkenes (selections from Jones – 9 & 12)
- Chemical Kinetics (K&T – 15)
- Substitution & Elimination Reactions (Jones – 7)

Assessment. The assessment of your performance in the class will be based on the following criteria:

attendance and class participation - participation in the lecture/discussions and labs is absolutely mandatory. If you will not be able to attend you need to let me know ahead of time and make arrangements to make up the missed material

review assignments - there will be review assignments covering the material discussed in class or in the assigned readings. These will be collected and may (or may not) be rigorously graded. They are intended to help you by reinforcing key concepts and to make you aware of topics that you may be struggling with.

article reviews - we will have several articles from the chemical literature to examine during the term. These will be chosen to illustrate some of the topics we are covering and to put them into a larger scientific context. You will be responsible for short reviews of these articles, in which you will discuss the experimental data presented by the authors, its interpretation, and how the data relates to the larger question(s) driving the work.

unit examinations, final exam - these will cover major points emphasized in class and may include essay questions or quantitative problems.

lab performance - completion of all labs is required, as is the maintenance of an acceptable laboratory notebook. Lab reports will not be required but substantive discussions need to be written in your lab notebooks for all experiments.

Textbooks & Materials:

Chemistry & Chemical Reactivity, 7th ed., J. C. Kotz & P. Treichel, Brooks/Cole, 2009

Organic Chemistry, 4th ed., M. Jones & S. Fleming, Norton, 2010

Scientific Calculator - you will need a calculator that is capable of scientific notation, logarithms, exponential functions, etc. While you don't need a graphing calculator, if you plan to take calculus it may be a good idea to get one. If not, a much cheaper calculator will suffice.

Laboratory Notebook - a dedicated notebook, preferably a bound composition notebook, is required in laboratory. We will talk more about the keeping the lab notebook at our first lab meeting.

Safety Goggles - these are required at all times in lab. We have a few available in lab but you are encouraged to buy your own pair (get a comfortable pair) and bring them with you.

Calendar. A tentative weekly schedule is provided below.

Week of:	Topic
February 17	The Bohr Model & Atomic Orbitals (K&T – Chapters 6 , 7)
February 24	Periodic Trends (K&T – Chapter 7)
March 3	Hybridization & Valence Bond Theory (K&T – Chapter 9)
March 10	Molecular Orbital Theory (K&T – Chapter 9)
March 17	Molecular Orbital Theory (K&T – Chapter 9)
March 24	Reactions Controlled by Orbital Symmetry (Jones – Chapt. 20) Exam #1 (March 25)
March 31	Introduction to Reaction Mechanisms – Addition Reactions (Jones – Chapter 3)
April 7	More Addition Reactions (Jones Chapters 3, 9, 12)
April 14	More Addition Reactions (Jones Chapters 3, 9, 12)
April 21	Chemical Kinetics (K&T – Chapter 15) Exam #2 (April 29)
April 28	Chemical Kinetics (K&T – Chapter 15)
May 5	Substitution Reactions (Jones Chapter 7)
May 12	Substitution & Elimination Reactions (Jones Chapter 7)
May 19	Substitution & Elimination Reactions (Jones Chapter 7)
May 26	Review & Final Exam (May 29)