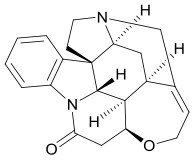
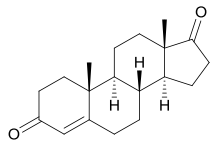
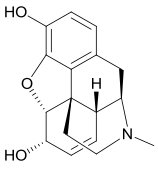


Strychnine (poison)

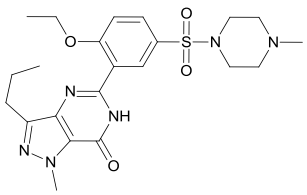


Androstenedione (estrogen and testosterone precursor)

Organic Chemistry
Chemistry 142
Spring 2015



Morphine (opiate analgesic drug)



Viagra (vasodilation by inhibition of PDE5)

Instructor: Matthias Brewer; Office: Cook A316; email: Matthias.Brewer@uvm.edu
BlackBoard Site: bb.uvm.edu
Lecture: 10:40am – 11:30am MWF, Angell B106
Review Sessions: 5:30pm Thur., Angell B106
Laboratory Check-in is week of Jan 26th.

Required text and course materials:
Organic Chemistry 2nd ed., David Klein, Wiley (ISBN: 978-1-118-45228-8)

Access to WileyPLUS: (URL: http://edugen.wileyplus.com/edugen/class/cls424566/)

Organic Chemistry Study Guide by David Klein

Chem. 142 Laboratory Manual (available from 1st floor stockroom, Cook A143)

Bound lab notebook with numbered pages (can continue to use that purchased for 141).

Safety glasses (available in the UVM Bookstore)

Useful materials on reserve in the library:
Organic Chemistry I as a Second Language: Translating the Basic Concepts 2nd ed., D. Klein; ISBN: (978-0470-12929-6)

Organic Chemistry II as a Second Language: Second Semester Topics 2nd ed., D. Klein; ISBN: (978-0-471-73808-4)

Other books in library that you may find useful:
The Art of Writing Reasonable Organic Reaction Mechanisms R.B. Grossman; ISBN:0-387-95468-6

Writing Reaction Mechanisms in Organic Chemistry A. Miller; ISBN: 0-12-496711-6

Course Prerequisite: Chemistry 141 or 143.

Office hours:

Mon. 2:00-3:00 pm
Thur. 10:00-11:00 am
TA Office hours are arranged according to lab section.
If you can't attend office hours, or you need to see the instructors or TAs outside office hours, please make an appointment. Email is the best way to get a quick answer to a question.

General Comments

In Chemistry 142 we continue to explore the basic principles of Organic Chemistry with a greater emphasis on the chemical reactivity of various functional groups (i.e. more similar to the last 1/3 of the first semester course). You will also learn about the analytical instrumentation used on a daily basis by chemists to determine the structure and composition of molecules.

By now you have probably noticed that Organic Chemistry involves many new concepts, a large number of rules and a very large number of reaction mechanisms. However, as the course progresses and your organic "repertoire" grows, you will also find that a relatively small subset of rules serves to tie together the vast amount of information contained in the text. A special effort made at the beginning of the course to review and master important concepts from the first semester will pay off as the course progresses. Topics that are especially important to review include:

Arrow Pushing (Chapter 3): Arrow pushing may be the most important "tool" of organic chemistry because it allows you to show a pictorial representation of a reaction mechanism. When done properly, arrow pushing will allow you to keep track of the bonds that are made and broken throughout the course of a reaction, as well as keep track of any formal charges that develop. Having a good grasp of arrow pushing will make learning the large number of reactions you will see in this course easier because you will then understand the underlying mechanism of the reaction rather than trying to memorize each reaction as an independent "fact". ***I can't overemphasize the importance of having a good working knowledge of arrow pushing.*** Be forewarned that arrow pushing will be used on a daily basis in class and you will be expected to write mechanisms using correct arrow pushing on exams.

Resonance (Chapter 2): This is a very important concept and you have already seen that resonance can help rationalize why carboxylic acids are acidic and alcohols are not. You will see resonance used over an over again to rationalize why molecules react the way they do, and a good understanding of the rules for writing proper contributing "structures" to resonance hybrids will make the understanding of reaction mechanisms considerably easier. In order to have a good understanding of resonance you must also have a good grasp of electronegativity and arrow pushing.

Electronegativity: An understanding of the relative electronegativity of atoms is essential to understanding why molecules react the way they do. For example, the concept of electronegativity allows you to rationalize why some atoms are good leaving groups and others are not.

Chemical Reactions: You will be expected to know all the chemical reactions you covered in Chem. 141.

Nomenclature: Particularly, the names of all the functional groups as well as the standard IUPAC rules for naming simple organic compounds. If you don't know the functional groups, you will not be able to follow the discussion in class.

Stereochemistry: Determining R/S designations as well as E/Z. Understanding the difference between different types of stereoisomers (enantiomers/diastereomers) and

being able to correctly identify the stereochemical relationship between compounds (i.e. are they diastereomers, enantiomers, constitutional isomers, different molecules, etc.).

Key's to success in Organic Chemistry:

- Do not try to cram!
- Work as many practice problems as possible. Solving problems reinforces the new concepts and is the only way to test your understanding of the material.
- You will see many new concepts in this course. Try to write out an explanation of the concepts in your own words as if explaining them to someone else.
- Do not look at a problem's answer until you have really tried the problem. After seeing the answer it often seems obvious and you may assume you understand.
- When you get a problem wrong try to understand where your thinking was in error and attempt to identify what concept you missed.
- Ask questions! Come to review sessions, office hours or make an appointment with me or your T.A. to resolve any questions early!
- Review the material frequently.
- Many people find that flash cards are a good way to learn this material.

For each chapter you should work as many of the suggested problems as possible. I strongly urge you to keep up with your reading and problem solving. Learning organic chemistry takes a combination of patience, practice, and repetition. Cramming does not work well in this subject!

Academic Conduct: Cheating will be considered grounds for failing the course. All graded assignments in the **lecture** and the **laboratory** must be your own work. Cases of cheating or plagiarism *will* lead to further disciplinary action which may include dismissal from the University according to the rules set forth in The University of Vermont's *Code of Academic Integrity*.

Policy of Electronic Device Usage on Exams: In short, you can't use them! The use of any electronic device (calculator, cell phone, ipod, or anything else with batteries or a solar cell) is strictly forbidden on exams and will be considered cheating.

Grading: 3 mid-terms = 55%; Final exam = 20%; Lab grade = 20%; On-line problem sets = 5% The course grade will be based on three mid-term exams, a compulsory cumulative final exam, a laboratory grade and on-line problem sets. The final exam score can be used to replace *one* mid-term exam score if the final exam score is higher. Final exam grades will not be dropped. Two alternative exam times will be offered for each midterm exam; these will occur before the actual exam time. No makeup exams will be offered; if you miss an exam for any reason, you will receive a grade of zero for that exam (this zero can count as your lowest exam grade that is substituted by the final exam score). A request to take the exam at one of the alternative times including a legitimate reason for the request **must be made in writing by the Friday before the normal exam**

time. No curves will be applied to mid-term exams. ***Please note that you must earn a passing grade in the laboratory to receive a passing grade for the course.*** *More than two laboratories missed for any reason will result in a failing grade for the course (unless you are granted an incomplete by your Dean).*

Exam Re-grades: If you have any questions concerning the grading of an exam, you must see me within one week after the day the exam is returned to the class.

Midterm Dates:

Thursday, February 12	5:30 P.M.-7:30 P.M.
Thursday, March 19	5:30 P.M.-7:30 P.M.
Thursday, April 16	5:30 P.M.-7:30 P.M.

Where to take your exams: Due to class size, the midterms will be held in two separate rooms as follows:
Last Name A-N will take exams in Angell B106
Last Name O-Z will take exams in Angell B112

Final Exam Date:
Monday, May 4th 7:30 A.M.-10:15 A.M. Place: TBA

Problem Sets:

WileyPLUS will be used to assign graded problem sets. Each student will receive a randomized subset of problems from a larger pool. These problem sets will become available Thursday night after the review session and must be completed by midnight the following Monday. All problems from the pool will become available after the due date and these problems will serve as a basis for the subsequent Thursday night review session. No problem sets will be assigned the week preceding an exam.

This course will address learning goals 1,2,3, and 5 below for chemistry majors:

1. Students will demonstrate general knowledge in chemistry and will be able to apply chemical and physical principles in the solution of qualitative and quantitative chemical problems.
2. Students will understand the interplay of observational data, hypotheses, and hypothesis-driven experimentation through application of the scientific method.
3. Students will become proficient in chemical laboratory techniques and be able to apply these to practical and current problems in research.
4. Students will be able to read and critically evaluate the chemical and scientific literature.
5. The students will learn to present scientific data clearly and effectively through both written and verbal communication.

Religious Holidays: Students have the right to practice the religion of their choice. Each semester students should submit in writing to their instructors by the end of the second full week of classes their documented religious holiday schedule for the semester. Faculty must permit students who miss work for the purpose of religious observance to make up this work.

Tentative Outline of Course

Chapter 15. Infrared Spectroscopy and Mass Spectrometry

Chapter 16. Nuclear Magnetic Resonance Spectroscopy

Chapter 12. Synthesis

Chapter 13. Alcohols and Phenols

Chapter 14. Ethers and Epoxides; Thiols and Sulfides

Chapter 11. Radical Reactions

Chapter 17. Conjugated Pi Systems and Pericyclic Reactions

Chapter 18. Aromatic Compounds

Chapter 19. Aromatic Substitution Reactions

Chapter 20. Aldehydes and Ketones

Chapter 21. Carboxylic Acids and Their Derivatives

Chapter 22. Alpha Carbon Chemistry: Enols and Enolates

Chapter 23. Amines

Concepts you must understand from General Chemistry:

- Properties of covalent bonds
- The octet rule
- Structural isomers
- Lewis dot structures
- Formal charges
- Resonance
- Electronegativity and bond polarity
- VSEPR (Valence Shell Electron Pair Repulsion)
- Hybridization

Chem 142 2015 Lab Schedule

Date	Expt #	Title	Page
1/26-1/29		Check-in	
2/2-2/5	1	Reduction of Vanillin	9
2/9-2/12	2	Oxidation	12
2/16-2/19		NO LAB	
2/23-2/26	3/4	Generation and reaction of an organometallic compound Part 1	15
3/5-3/8		NO LAB/ SPRING RECESS	
3/9-3/12	3/4	Generation and reaction of an organometallic compound Part 2	15
3/16-3/19	5	Diels-Alder	18
3/23-3/26	6	Nitration of Methyl Benzoate	21
3/30-4/2	7	The Wittig Reaction	24
4/6-4/9	8	Production of Biodiesel	27
4/13-4/16	9	Synthesis of Aspirin	29
4/20-4/23	10	Solventless Aldol and Check-Out	31

On-line resources that may be useful to you

http://www.wiley.com/college/klein
Navigate to the Student Companion Site

http://www.chemtube3d.com/Main%20Page.html
High quality videos of organic reaction mechanisms.

http://ochem.jsd.claremont.edu/
On-line flash cards
Video Tutorials
Practice Problems