Tracy Morkin
Department of Chemistry
"Plastics, Polymers, and Sustainability"

Intellectual Process

My participation in the Piedmont Project opened my eyes to the bigger picture of sustainability issues. Sustainability does not just involve recycling and organic foods. Promoting and maintaining a sustainable society is not just up to a single individual or even a single discipline. It's a multi-disciplinary effort that requires exchange of ideas and resources across disciplinary barriers. So often we limit our progress by minimal communication among people who seek a common goal. The Piedmont Project overcame some of those barriers to move towards the broad conversations necessary to achieve progress.

The question then becomes, "How do we as faculty engage our students in the conversation of sustainability in the context of their own education?" As an instructor of chemistry, recycling plastics is practically a playground at the intersection of physical chemistry, organic chemistry, and society. It seems to be a perfect area for discussing several aspects of recycling.

- Plastics have a number of 1-7 associated with them. Why are some numbers considered recyclable and some are not?
- What is the difference in structure between plastics 1-7?
- Why is it thermodynamically impractical to "de-polymerize" a polymer to its monomers?
- What chemical and physical processes are involved in recycling and reusing plastics?

The answer to each of these questions lies in the basic principles of structure and thermodynamics that are discussed in organic chemistry. This topic also presents a unique opportunity to link the natural sciences with other aspects of a liberal arts education at Emory as well as society at large.

Organic Chemistry 222
Spring 2010, Atwood Chemistry Building Room 360

Section : Tues, Thurs. 11:30 am
Instructor: Dr. Tracy L. Morkin
E-mail: tmorkin@LearnLink.emory.edu (Please note that e-mail sent to Dr. Morkin at any other account will not be answered)
Office: 208 Sanford Atwood Chemistry Center
Office Hours: Mon. 2:30 – 4 pm
Tues. 2:00 – 4:00 pm
Wed. 9:30 – 11:00 am
Thurs. and Fri. - by appointment only

Course Content and Timeline

Text/Chapters: "Organic Chemistry, 5th Edition," by Paula Yurkanis Bruice
Chapter 14-19,28*

Thursday January 15	First Day of Classes

Sunday January 25	First Week of SI
Thursday January 29	Quiz #1, in class
Thursday February 12	**TEST #1**, **6 pm**
Thursday February 26	Quiz #2, in class
March 9-13	Spring Break
Thursday March 26	**TEST #2, 6 pm**
Thursday April 9	Quiz #3, in class
Friday May 1	**FINAL EXAM, 8:30 – 11:30 am**

- Please note that Chapter 28 will be required reading before coming to class. We will cover polymers in the context of "**Sustainability in Organic Chemistry**" at the end of the semester. We will be using materials outside the textbook (to be provided closer to the end of the semester) to address such questions as:

  "What do the different numbers on the bottom of plastic containers mean? Why are some recyclable and some are not?"

  "Why is it so difficult and expensive in terms of money and energy to recycle certain plastics?"

  "Why are most plastics non-biodegradable?"

Evaluation

Final Exam	35%
2 Tests	40%
3 Quizzes	20% (the lowest score will be dropped)
Clickers	5%

Tests: There are going to be 2 tests. They will be held in the evenings at 6 pm and should last 2 hours. Please make conflicts known to Dr. Morkin as soon as possible.

Errors in Grading: Tests should be examined immediately upon return for grading or addition errors. If there is an error on a test, your request **in writing** no later than one week from when the test was returned to you. Please use the form that is available on LearnLink for submitting your re-grade request. Do not write on your exam if you plan to submit it for re-grading. Exams and quizzes will be photocopied randomly prior to grading and any alterations made to answers will be sent to the Emory University Honor Council immediately.

Technology and Assignments

1. **Personal Response System (a.k.a. "the clickers")** – You must bring your clicker with you to every lecture. They can be purchased with your textbook or separately from the Emory Bookstore. At the start of each lecture there will be two questions for you to answer that will be related to either the previous lecture or from the last day's assigned reading. These questions will be 4 points each. You will receive 1 point if you get the answer

wrong. There will be other questions throughout the lecture as well. The ones during the lecture are 4 points also, and you will get full credit for any answer.

2. **LearnLink** – The Chemistry 222 LearnLink site will contain a variety of useful tools and resources to help you succeed in this course. You can use this site to post questions to the class and Dr. Morkin and you will also find class announcements and links to helpful websites. **Please check this site DAILY.**

3. **Assignments** – There will be assigned problems from the end of the chapter assigned each day in class. It is strongly recommended that you keep up with these assignments, as they will help you prepare for tests and the final exam.

A Note from Dr. Morkin: Succeeding in Chemistry 222

You play the most important role in defining your success. Here are a number of tips that I would suggest:

1. **PRACTICE, PRACTICE, PRACTICE!** General chemistry is a course heavily based in problem-solving. You cannot improve your ability to do any sort of spectroscopy, syntheses or mechanisms by watching others work out solutions or by studying a solution in the textbook. There will be numerous suggested and assigned problems and I would encourage you to work each of these for yourself. Do not fall into the trap of spending an excessive amount of time reading the chapters or memorizing the solutions to specific problems! You will succeed if your motto is to "learn by doing."

2. **USE THE RESOURCES AT YOUR DISPOSAL.** There are a number of helpful places for you to seek help.
    a) **Dr. Morkin** – send an e-mail to the Chemistry 222 Conference (tmorkin@LearnLink.emory.edu), come to the office hours, drop by my office or e-mail me to schedule an appointment at a convenient time
    b) **SI** – get help from an undergraduate who has taken Chem 222 and succeeded. He will lead a mentoring session on Sunday afternoon.
    c) **Your Fellow Students** – Chemistry is the central science and therefore collaborative. TALK to each other when practicing problems and explain concepts to each other. The very best learning you can do is to explain something to someone else.

3. This class is made up of 4 main types of problems. These are the types of problems you can expect to see on tests and the final exam:

    a) **MECHANISMS**. You will have the most success if you start each problem with a COMPLETE and correct structure. In my experience, careless mistakes are often the result of forgotten formal charges, non-bonding electrons, and poorly drawn structures. Do not take unnecessary shortcuts. Also, if you try to memorize each and every mechanism, you will struggle enormously. Understand reactivity in terms of electrophile-nucleophile combinations (ie. "Who's got the electrons and who wants them?").

    b) **SYNTHESES**. This will require you to know and how to use a significant number of reagents, how certain functional groups react, and how to best form certain functional groups, as well and carbon-carbon bonds. I would suggest you make

lists, such as “Alkene Sytheses” and “Alkene Reactions,” etc. Flash cards are also helpful.

c) **SPECTROSCOPY**. Structure elucidation from IR and NMR spectroscopy. Know how to use their respective correlation tables.

d) **EXPLANATIONS**. Be able to explain reactivity in terms of hybridization, sterics, stereochemistry, acidity and pKa, bond length, bond strength, nucleophilic strength, leaving group ability,etc.

As much as I love teaching general chemistry, my PhD is in organic chemistry and I could not be more excited to be teaching Chem 222 again. Hopefully we will have some fun along the way. Please do not hesitate to e-mail me or drop by my office if I can help you at all. Good luck!

Best,

Tracy Morkin