

**Syllabus**  
**Organic Chemistry I Laboratory**  
**CHE 310L-011**

Fall 2004  
Monday, 2:00 P.M. – 5:00 P.M.  
Room SC 461

Instructor: J. H. Niewahner, SC 448, 572-6363, [niewahnerj@exchange.nku.edu](mailto:niewahnerj@exchange.nku.edu)  
Office hours: MW 11:00 A.M. - 11:50 A.M.  
T 1:30 P.M. - 3:00 P.M.  
R 10:00 A.M.- 10:50 A.M.

Prerequisite: CHE 121 and CHE 121L

Corequisite: CHE 310

Required Text

Nimitz, J. S. *Experiments in Organic Chemistry*; Prentice-Hall: New Jersey, 1991

Other Required Material

1) Lab Record Book, Hayden McNeil Publishing 2) Safety Goggles 3) Paper Towels or Sponge or Towel

Web Access

This course requires students to use and access various internet resources such as email and Blackboard.

Calculators

Calculators will be necessary for taking tests. However, programmable and graphics calculators are not permitted during tests. In no case may calculators be passed from one student to another during a test. The lack of an operable calculator will not excuse a student from having to solve a problem

Preparation

Students are expected to come to lab with a thorough understanding of the principles involved in the experiment, the goals of the experiment, and the procedures to be followed. Whenever appropriate, the student should also know what data and observations are anticipated. This requires the student to read the experiment well ahead of time and read all recommended reading materials.

### Lab Record Book

The Lab Record Book (Hayden McNeil Publishing) is required for all experiments. The record for each experiment will be divided into the following seven sections: **Title; Objectives; Protocol; Materials; Procedure, Data and Observations; Results and Calculations, and Equipment**. These headings are to be used in separating the sections in the lab record book. Each experiment record is to start on a new page and begin with the **Title** of the experiment, then **Objectives** or purposes, followed by the **Protocol**, and then a **Materials** section. *The Title, Objectives, Protocol, and Materials must be written in the Lab Record Book before coming to the lab.* Protocol is the set of experimental steps one expects to follow. Steps in the Protocol should be numbered and should be written across both columns of the record book. The copy pages of the Title, Objectives, Protocol, and Materials are to be handed in to your instructor **at the beginning** of the lab period, namely, 2:00 P.M. Students who either do not have the Title, Objectives, Protocol, and Materials written ahead of time or who submit them after the class has begun will be penalized up to 10% for the experiment. The **Procedure, Data and Observations** section is started on the next new page. Procedure is the set of steps one has actually carried out. Procedural steps are to be numbered sequentially. Usually there are some differences between Protocol and Procedure due to changes that are made just prior to carrying out an experiment or changes required during the course of the experiment. Sometimes a step in the Procedure will include data such as the mass of some material. In such cases it is convenient to write the procedure in the left column of the record book and the data in the right column. (Note: this is different from writing the Protocol). One must be careful when writing the Procedure not to simply copy the Protocol, as there is the risk of not writing what you actually did. The key to writing a proper and complete record is to make sure that someone else could carry out the experiment based on what you have written in your Procedure, Data, and Observations section. Data must be recorded to the proper number of significant figures, have the correct labels, and be clearly identified. Include any information that would help you repeat the experiment and let you know if you are getting similar or different results. The next section is **Results and Calculations** section which is where you give a description of your findings, including IR and NMR data, as well as calculations of theoretical and percent yields. The last section is the **Equipment** section which includes the make and model of major pieces of equipment that were used. This would include equipment such as IR, UV-VIS, NMR, etc. but not small pieces of equipment, such as hot plate -stirrers, melting point apparatus, balances, etc. Copy pages of Procedures, Data and Observations, Results and Calculations, and Equipment are to be handed in at the end of the period.

### Samples

All samples are to be placed in a vial, labeled with your name and the name of the compound and handed in to the instructor at the end of the lab period

### Lab Report

For most experiments the Lab Report consists of completing the “Data Sheets” that are in the Lab Supplement.

For the experiments titled “Nucleophilic Substitution” and “Dehydrohalogenation”, formal lab reports are required rather than simply completing the “Data Sheets”. See the attachment describing the Formal Lab Report.

### Due Dates

Unless otherwise informed, reports are due at the **beginning** of the lab period following the completion of the experiment. Reports that are handed in after this time will be considered late and will be penalized 10 points per day. Reports will not be accepted if they are submitted more than 1 week late and students will receive a maximum of 30 points for those experiments.

### Absences

One make up lab may be provided, at the discretion of the instructor, for an extreme circumstance. Students who are absent from a lab must contact the instructor within 24 hours of the beginning of the scheduled lab period to discuss the possibility of a make up. This does not mean that you will automatically be given permission to make up a lab.

### Safety

**All safety rules must be obeyed. Repeated violation of these rules, such as not wearing safety glasses, will result in dismissal from the lab and a grade of zero for that experiment. Habitual violation of Safety Rules during the semester will result in dismissal from the course and a grade of F for the course.**

### Tests

There will be one test given on October 25 and another on December 6. These tests will consist of both a practical portion and a written portion. The practical portion will be worth between 15 and 30% of the overall test score. Students will be expected to acquire IR and NMR spectra without the aid of any handouts.

### Cell Phones

Please turn off your cell phone before you come to lab. Inform your instructor if you are expecting an emergency phone call. Under no circumstances can cell phones be used while taking a test.

### Tentative Schedule of Experiments

<u>Date</u>	<u>Experiment</u>	<u>Reference</u>
Aug. 23	Check in, Recrystallization and Sublimation of Ferrocene and TLC	1, 2, 3, Website
Aug. 30	Synthesis of Ferrocene. Rxn followed by TLC	Website
Sept. 6	No class. Labor day	
Sept. 13	Purification of Acetylferrocene by Column Chromatography	4, Website
Sept. 20	Identification and Characterization of Acetylferrocene. NMR, IR, Melting Point	1, 5, 6, Website
Sept. 27	Synthesis and Purification of Cyclohexene	7, 8, 9, Website
Oct. 4	Identification and Characterization of Cyclohexene. NMR, IR, Boiling Point	5, 6, 10, Website
Oct. 11	Acid-Base Extraction	Website
Oct. 18	Fall Break - No Lab	
Oct. 25	Mid-Term Exam	
Nov. 1	Molecular Modeling	Website
Nov. 8	Nucleophilic Substitution, S <sub>N</sub> 1	11
Nov. 15	Bromination and Stereochemistry	12
Nov. 22	Dehydrohalogenation	Website
Nov. 29	Carbocation Rearrangement	13
Dec. 6	Check out. Final Exam	

### References

1. Nimitz, J. S.; *Experiments in Organic Chemistry*; Prentice Hall: New Jersey, 1991; pp. 22 - 28.
2. *ibid.* p. 52
3. *ibid.* Section 4
4. *ibid.* Section 5
5. *ibid.* Section 13
6. *ibid.* Section 14
7. *ibid.* pp. 82 - 86
8. *ibid.* pp. 46 - 49.
9. Girolami, G. S; Rauchfuss, T. B.; Angelici, R. J. *Synthesis and Technique in Inorganic Chemistry*; University Science Books: Sausalito, CA, 1999; third edition; p. 258
10. Nimitz, J. S.; *Experiments in Organic Chemistry*; Prentice Hall: New Jersey, 1991; pp. 34 - 39
11. *ibid.* pp. 120-124
12. *ibid.* pp. 95-101
13. *ibid.* pp. 246-252

### Grading

Experiments will be graded on a 100 point basis.

Experiments	70% of overall score
Tests	30% of overall score

<u>Overall Score</u>	<u>Letter Grade</u>
90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
0 - 59	F

### Other

This syllabus is subject to change.

If there is any part of this syllabus that you do not understand, you must bring it to the attention of the instructor within one week of the distribution of the syllabus.

You are expected to abide by the Student Honor Code. Anyone cheating or plagiarizing will receive a zero for that experiment or test. Anyone cheating or plagiarizing a second time will receive an F for the course.

Organic Chemistry I, CHE 310L-011  
Mailserv Information

Instructor: J. H. Niewahner  
Fall 2004

In order to better communicate with students enrolled in CHE 310L-011, a Mailserv has been established for this section of Organic Chemistry I Lab. Students may submit questions and they will be answered as soon as possible. Usually questions submitted by 9:00 P.M. will be answered the same day. Information that the instructor wishes to pass on to the students outside of regular class time will also be done by way of the Mailserv. **All students enrolled in CHE 310L-011 are expected to subscribe to the Mailserv and check the messages regularly.** Students are responsible for information sent by way of the Mailserv.

#### How to Subscribe

Send mail to MAILSERV@NKU.EDU and in the body of the message type  
SUBSCRIBE che310labjn

#### How to Unsubscribe

Send mail to MAILSERV@NKU.EDU and in the body of the message type  
UNSUBSCRIBE che310labjn

#### How to Send a Message to the List

Once you have subscribed to the "list", messages are then sent to che310labjn@nku.edu

## Organic Chemistry I Laboratory Formal Report

The format of the formal lab report generally follows that which is recommended for journal articles published by the American Chemical Society (ACS). Reviewing an article in one of the ACS publications will let you see first hand how a formal report is to be written.

You can access a journal as follows:

Go to [www.nku.edu/~library/res/ejournals.html](http://www.nku.edu/~library/res/ejournals.html)

Click on Catalog

Click on Basic Search

In Find this organic chemistry

in Find Results in Journal Title (from pull down tab)

Click on Search

For the ACS journal click on the number next to the item that has Call Number: Electronic Access ACS

To gain access to this journal

Click on Access restricted to subscribers

To view all ACS ejournals available

Click on ELECTRONIC ACCESS ACS

### General

- Avoid using "I".
- Edit your work for spelling and grammar.
- Present your ideas in a logical fashion.
- Tabulate your data whenever possible.
- Convince the reader that you know understand the significance of the data and results.
- Be neat, concise, thorough.
- Write your report as if your job depended on it; your grade definitely depends on it.

### Components of a Formal Report

A formal report typically consists of several sections; these are Abstract, Introduction, Experimental Section, Data and Results Section, Discussion Section, Conclusions Section, Acknowledgment Section, and a Reference Section.

You may find it beneficial to look over a few articles in any of the American Chemical Society journals such as *Inorganic Chemistry*, *Organometallics*, or *The Journal of the American Chemical Society*. These are available online through the Stealy Library. The format and content of the different section is shown below. Upon request, a copy of this template can be emailed to you as an attachment.

## **The Title of the Experiment is Written Across the Top of the Page in Bold Print and in Larger Font, such as 14, than the Rest of the Article**

The author's names are given in the order first name, initial, and then last name. If more than one author, the names are separated by commas. The author to whom correspondence is to be sent is marked with an asterisk. This is usually the main author. Then at the bottom of the page insert an asterisk and the address of this author. This is done by placing the cursor after the name of the main author and click on "Insert" in the top toolbar, then Reference, then Footnote, then choose Footnote, "Bottom of page". Under Format choose in Number Format the option that shows the asterisk and others and start with the asterisk.\* Each author has a notation that refers the reader to each author's affiliation that is given in italics just below the names of the authors.

*Affiliation of authors is given in italics.*

The abstract is written in the same font as the bulk of the article. It is indented on both sides by about one-half inch. No heading is given. The abstract summarizes the results obtained in the experiment. Often percent yields, major spectral absorption values, melting or boiling points, etc. would be reported.

### Introduction

Place the cursor at the beginning of the word "Introduction" and then click on the "column" icon in the top toolbar and scroll across to show two columns. This section provides background information regarding the experiment, a brief explanation of the principles involved, and explains how the study about to be done (your experiment) fits in or adds to the existing body of knowledge. If you have a reference to information, provide the reference at the end of the paper and assign it a number.<sup>1</sup> To add the reference, place the cursor at the location that you want the reference number to be added and click on "Insert" in the top toolbar, then to Reference, and to Footnote. Click on Endnotes and then choose End of Document. Under Format, select the Arabic numbering (1, 2, 3, etc.) and start with number 1. The numbers will be inserted automatically throughout the document.

Generally, the Introduction will lead into a statement of the objective(s) of the experiment or project or research.

Typically past tense is NOT used since in the Introduction you are explaining what you are about to do; not what you have already done. Save past tense for the discussion section.

Separate ideas should be kept in separate paragraphs. Skipping from one idea or principle to another makes it difficult for the reader to determine what is actually being studied and how different aspects of the project are tied together. In other words, present a logical explanation of the basis for the experiment.

References are typically placed assigned numbers in the order they occur and are placed at the bottom of the page.

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\* Address of author to whom correspondence should be sent.

### Experimental

In most A.C.S. journals this is a verbal description of how the research was carried out. Procedures are described and data such as quantities used and conditions are included but results are not included in this section. General conditions such as using inert atmosphere or open bench, purified solvents or as purchased, etc., is given in this section. Major equipment used should be identified with the make and model number.

### Data and Results

This section includes all of your observations, spectra, tables which summarize results, and calculations from data. Data of a procedural nature is not included in this section but should be in the experimental section. Spectra and tables should be properly labeled and titled. Calculations are usually included in this section.

### Discussion of Results

The discussion section is where you explain the data and the results. You discuss the results in terms of how they fit in with known theories or you provide some other reasonable theory that accounts for the data. In this section you must discuss the significance of your data. Here also, as in the Introduction section, keep the discussion of different types of data in separate sections; definitely do not move back and forth between different concepts. Refer to specific data or tables or spectra when discussing your results rather than referring to data in a general way. For example, it

would be of no help to say "the spectra were consistent with the spectrochemical series".<sup>ii</sup> In general, the Discussion section should tie the data and results to the basis for doing the experiment that were brought out in the Introduction.

### Conclusions

This is a summary of the significance of your data. It is somewhat similar to the abstract but the results are typically not given. The conclusion is more general than the abstract.

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<sup>i</sup> Reference to the first article cited goes here.

<sup>ii</sup> Reference to the second article cited goes here.