Corequisite: Chemistry 233

Laboratory Time: Wednesday, 8:30 am-11:20 am (section 003)
Laboratory Location: Clark Hall 401
Instructor: Dr. Jessica Hoover (e-mail: Jessica.Hoover@mail.wvu.edu; phone: 304-293-0367);
Room 459, Chemistry Research Laboratory
Office Hours: 1:00pm-2:00 pm Tuesday; other times by appointment

General Instructions:

1. Before any laboratory work is permitted you must read the WVU "Safety and Laboratory Rules for Organic Chemistry" and then sign a statement that you will abide by these rules.

   NOTE: SAFETY GOGGLES, LABORATORY APRONS, AND PROPER ATTIRE ARE REQUIRED FOR ORGANIC LABORATORIES. Goggles and aprons can be purchased at the University Bookstore. NO open toes, tank-tops, or shorts are allowed to be worn in the lab. Also, no food or beverage of any kind is permitted within the laboratory. Be aware of the location of eyewash and safety showers. Long hair must be pulled back from the face. Again, goggles must be worn at ALL times, including during check-in/out.

2. Use a “Chemistry Spiral Bound Carbonless Copy Lab Notebook” (100 pg, Hayden-McNeil, ISBN #: 978-1-930882-74-4) for outlining your experiment. You must bring this notebook to each laboratory meeting. You must record all of your prelab plans, experimental observations and results, conclusions, and answers to experimental prelab and post-lab questions (found in the laboratory manual). Follow the guidelines in the manual (Chapter 2 and page 5) and on the attached sheets on how to keep a good laboratory notebook. Your teaching assistant will collect the carbonless copies and grade these weekly.

3. Attendance is required. If you are forced to miss a laboratory period due to illness or an emergency, see your Instructor and Teaching Assistant. There are NO MAKE-UP LABS!!

4. If you withdraw from Chemistry 233 you must simultaneously withdraw from Chemistry 235 unless special permission is granted by the Instructor.
5. A quiz will be given each week at the beginning of the laboratory period, so be on time. The quiz will be based on the experiment of the previous week and the experiment to be performed following the quiz. Study the experiments before you come to the laboratory! You are expected to understand the principles of the experiment and to know what you are going to do when you are in the laboratory.

6. Your Teaching Assistant (TA) is in charge of your laboratory section. Follow instructions made by your TA concerning lab safety, keeping the lab clean, experimental procedures, handing in assignments, etc. Do not be hesitant about asking your TA questions - he/she is there to help you! As is the instructor!

7. Grading: The following guidelines will be used to determine the grade you receive in this course.

- Notebook (including pre-lab, procedure, results, calculations, conc., post-lab) . . . 40%
- Quizzes ........................................................................................................... 20%
- Final exam ........................................................................................................ 20%
- TA Subjective Grade (including safety, housekeeping, neatness, attitude, etc.) . . 10%
- Experimental Unknown Identification ......................................................... 10%

**Academic Integrity:** The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code at [http://studentlife.wvu.edu/office_of_student_conduct](http://studentlife.wvu.edu/office_of_student_conduct). Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter. [adopted 2-11-08]

Academic dishonesty, as defined in Article III Section B of the WVU Student Conduct Code, will be dealt with according to University policy as described in Article IV.

**Inclusivity Statement:** "The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion.

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Accessibility Services (293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see [http://diversity.wvu.edu](http://diversity.wvu.edu)."

**Disclaimer:** The schedule, policies, and assignments within this syllabus are subject to change in the event of extenuating circumstances.
### CHEMISTRY 235: ORGANIC CHEMISTRY I LABORATORY  
Spring 2015


<table>
<thead>
<tr>
<th>Week of</th>
<th>Experiment</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Jan 12</td>
<td>Check-in, General Instructions, Safety, and the Lab Notebook</td>
</tr>
<tr>
<td>Week 2</td>
<td>Jan 19</td>
<td>3 Melting Points. Also study Exp. 1 &amp; 2.</td>
</tr>
<tr>
<td>Week 3</td>
<td>Jan 26</td>
<td>4 Crystallization. Do both Macroscale (p. 22) and Microscale (p. 25).</td>
</tr>
<tr>
<td>Week 4</td>
<td>Feb 2</td>
<td>5 Distillation. Students work in pairs and share data. One does simple distillation and the other does fractional distillation.</td>
</tr>
<tr>
<td>Week 5</td>
<td>Feb 9</td>
<td>6 7 Gas Chromatography AND Thin-Layer Chromatography (do both GC and TLC)</td>
</tr>
<tr>
<td>Week 6</td>
<td>Feb 16</td>
<td>8 Extraction: Separation of Unknown Mixture</td>
</tr>
<tr>
<td>Week 7</td>
<td>Feb 23</td>
<td>9 Stereochemistry: Molecular Models. Each student should bring a set of molecular models to lab. You are advised to begin this exercise before coming to the lab.</td>
</tr>
</tbody>
</table>
| Week 8   | March 2    | 19 Stereospecific Bromination of trans-Stilbene (Procedure B.1 only) AND Diphenylacetylene(Procedure B.1 only)  
We will be doing a two-step synthesis of diphenylacetylene starting with stilbene. |
| Week 9   | March 9    | 17 Hydroboration-Oxidation of Alkenes |
| Week 10  | March 16   | 22 The Diels-Alder Reaction |
| Week 11  | March 23   | 😊 No labs due to Spring Break 😊 |
| Week 12  | March 30   | 14 $S_{N}1$ and $S_{N}2$ Reactions |
| Week 13  | April 6    | 16 E1 Elimination Reactions, Dehydrations of Butyl Alcohols |
| Week 14  | April 13   | 18 Reduction of Ketones to Alcohols with Sodium Borohydride |
| Week 15  | April 20   | 21 Addition Polymerization |
| Week 16  | April 27   | Lab Final Examination and Check-out |
CHEMISTRY 235: LABORATORY NOTEBOOK
ORGANIC CHEMISTRY I
Spring 2015

During the Chemistry 235 laboratory you must preliminarily outline (experiment title, date, introduction, theory) and report experimental procedures/data/results/conclusions for each experiment in a “Chemistry Spiral Bound Carbonless Copy Lab Notebook” (100 pg, Hayden-McNeil, ISBN #: 978-1-930882-74-4).

**What is the purpose of a laboratory notebook?**
The laboratory notebook allows confirmation/replication of experimental results and findings. If properly signed and dated, the notebook also establishes intellectual ownership and verifies first to invent. The laboratory notebook can be used as legal evidence in judicial proceedings and patent applications.

For Chem 235, you will use your laboratory notebook as a basis for your written laboratory report forms. The laboratory notebook is also worth 40% of your laboratory grade.

**Who owns the laboratory notebook?**
If you are carrying out research or laboratory testing procedures for a company (e.g. pharmaceutical company) or within academia, the corporation/institute that sponsored (financially or intellectually) or sanctioned your research/work has ownership of the laboratory notebook.

For Chem 235, you will be considered the intellectual stakeholder and will have ownership of your own laboratory notebook.

**What should be included in the Chem 235 laboratory notebook?**
Given below are some general guidelines of things to include in the laboratory notebook.

- The *Experiment Title and Date, Introduction, Theory, Table of Reagents, and Pre-lab Questions (Items 1-5 below)* sections constitute your experimental outline and must be completed before you may begin work on the experiment.

- The *Experimental Procedure, Results, Data/Calculations, and Conclusion* sections must be completed as you work through the experiment.

- *Post-lab Questions* can be completed after the experiment or after you leave the laboratory.

1. **Title and Date:** include experiment title, date, numerical designation, pertinent literature references

2. **Purpose:** purpose of experiment or short statement of what will be covered/studied during the experiment and why. Also include conditions, apparatus, long term plans, preliminary calculations, safety concerns/considerations.
Should include \textit{“hypothesis-type”} statements such as:...it is expected that...or...the results should show....

3. \textbf{Theory (Reactions and Mechanisms/Techniques and Concepts studied):} chemical reactions with mechanisms, instrumental theory, calculations pertinent to the experiment.

4. \textbf{Table of Reagents:} tabular list of compounds that will be used with pertinent physical properties (e.g. molar masses, densities, melting point, hazards)

5. \textbf{Pre-lab Questions}

6. \textbf{Experimental Procedure and Results:} Step-by-step written account of procedure recorded as you perform experiment. Record what YOU did during the experiment and not what the lab manual says to do. Record: weights of materials actually used, record YOUR raw data, experimental results, and observations, include charts, or tables of data, calibration information, repair, or maintenance information.

Will include \textit{“experimental-type”} statements such as:...30.0 mL of liquid acetone was added to 1.256 mg of solid sample #1...or...it was found that the solution turned blue after 10 minutes.....

7. \textbf{Data and Calculations:} data collected during the lab (i.e., melting point, boiling point, refractive index of synthesized compound) and any calculations (i.e., theoretical yield, percent yield).

8. \textbf{Conclusion:} a statement summing up the experiment, explaining data and why the experiment did or did not work for you, list possible sources of error and how such an error would affect the results, make suggestions for improving the procedure or your performance, include future plans (What would be the next step to continue the research?)

9. \textbf{Post-lab Questions}

\textbf{What are some laboratory notebook DO’s?}

- DO use a pen. Black pen is best.
- DO include a Table of Contents on the first 1-2 pages. (Leave the first 1-2 pages blank and update the Table of Contents throughout the semester.)
- DO include the date, experiment title, and signature on each page.
- DO sign and date each new entry. Best date: 12 May 2015 NOT 5/12/2015 which can be mistaken for 5 Dec. 2015 in Europe.
- DO begin a new experiment on a blank page.
- DO fix errors by drawing a single line through the incorrect entry and writing the correction above or below the incorrect entry.
- DO initial and date the correction!!
- DO include a description and/or drawing of apparatus used.
- DO include usual (temperature, ambient pressure, etc.) and unusual (power outage, hurricane, fire, etc.) laboratory conditions.
- DO list your name on the outside and inside cover.
- DO list some type of contact information on the inside cover in case of loss.
• DO include the course title, semester date, section number, desk number, teaching assistant name (supervisor/project director in industry/academia), lock number, and room number on the inside cover.

What are some laboratory notebook DON’TS?

• DON’T use pencil.
• DON’T erase or use white-out to delete entries.
• DON’T scribble over or write over mistakes. Draw a single line through incorrect entry, write correction above/below; initial and date correction.
• DON’T skip pages or leave pages blank. If a page or portion of page is left blank, place a large X on the entire blank area, initial and date.
• DON’T rip out pages (except for the carbonless copy for grading purposes).
• DON’T record data on scraps of paper. Record all data in the laboratory notebook.
• DON’T record data/observations at a later time. Record as the experiment is completed.