

ORGANIC CHEMISTRY I FALL 2010

Lecturer: Dr. Gail Horowitz

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Drop in Center Hours: Mon 11-12

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Recitation/Lab					
Instructors:	Dr. Murelli	Mr. Mahendran	Mr. Jones	Mr. Ghosh	Dr. Kunjappu
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Drop-In					
Hrs	Thurs	Tues	Fri	Mon	TBA
357NE:	11-12	11-12	11-12	11-12	

Thursday Instructor

Name: Ms. Rajapakse

Email: Crajapakse@brooklyn.cuny.edu

Office Hrs: Tues 4-5

Office: 353 NE

Phone: x5748

Required Purchases For Lecture & Lab:

1. Organic Chemistry, 5th Edition by W. Brown, C.S. Foote, B.L. Iverson, E. Cengage Learning, ISBN: 0-495-38857-2
2. Techniques & Experiments in Organic Chemistry, 2nd Edition by Gortler and Tripp, Whittier Publications, ISBN: 0-89529-016-2
3. Molecular Modeling Set
4. Composition Notebook
5. Lock for Lab Drawer
6. Rubber Gloves
7. Matches

Recommended Purchases For Lecture & Lab:

1. Solutions Manual for 5th Edition of the Textbook, ISBN 0-495-38870-X or Enhanced Edition of Textbook with OWL (online HW with solutions)
2. Hand Soap & Paper Towels

Resources for Students:

1. Drop In Center Office Hours: Room 357 NE days Mon, Tues, Thurs, Fri 11-12
2. Online Peer Tutoring: Thurs 9:30-10:30 pm, Sat 8-9 pm, Sun 6-7 pm, skype name = organicpeertutorBC
3. Supplementary Instruction in Learning Center: TBA
4. Library: Textbook, Solutions Manual & Molecular Models are on Reserve
5. Practice Problems on my Website: <http://userhome.brooklyn.cuny.edu/ghorowitz/>
6. Online Video Tutorials: <http://www.youtube.com/user/freelanceteach>
7. Online Tutorials: <http://ochem.jsd.claremont.edu/tutorials.htm#>
8. Animations of Reaction Mechanisms: www.chemtube3d.com
9. Supplementary Problems Online:
<http://www.cem.msu.edu/~reusch/VirtualText/Questions/problems.htm>
<http://www.mc.maricopa.edu/~minger/CHM235.htm>
<http://www.utdallas.edu/~scortes/ochem/>

How to Succeed In Organic Chemistry:

1. Set aside 10-15 hours per week of study time for the lecture component of this course.
2. Attend class religiously.
3. Review the textbook before class.
4. Take notes in lecture.
5. Problem solving is key:
 - Spend the majority of your study time doing problems, not reading.
 - Do the assigned textbook problems plus problems posted on my website.
 - Practice each topic until you have mastered it. Don't stop just because you have completed the assigned problems.
 - Study with a partner or in a group.
 - Don't be afraid to ask for help. Get help immediately if you get stuck.

Course Grade Breakdown:Lecture 50%

Exam I 25%

Exam II 25%

Final Exam 50%

Recitation 25% *

Quizzes 80%

Attendance & Participation 20%

Laboratory 25% *

Prelabs 30%

Lab Notebook 20%

Lab Reports 30%

Performance 10%

Unknown Identification 10%

* Subject to modification by recitation/lab instructor.

LECTURE SCHEDULE

Topic	Tentative Dates	Assigned Homework from Textbook and Internet (Also do Advanced Problems from my Website or your Recitation)
Chapter 1	Aug 26	23-25, 27-32, 34, 37, 45, 47, 50-52, 57, 59, 60, 64-65, 67, 71, 72 http://www.mc.maricopa.edu/~minger/CHM235.htm do problems on lewis structures, resonance and formal charges
Chapter 2, Appendix 9	Aug 31, Sept 2, 7	16, 17, 21, 23, 26-28, 30, 32-36, 39, 40, 42, 46, 48- 52, 56, 62-63 http://www.mc.maricopa.edu/~minger/CHM235.htm do problems on nomenclature, bond-line drawings and cyclohexane http://www.utdallas.edu/~scortes/ochem/OChem1_Lecture/exercises/ch3_confor_anal.pdf do all problems http://www.cem.msu.edu/~reusch/VirtualText/Questions/problems.htm do problems 4 & 5 within conformations and stereochem section
Quiz I: Chapter 2	TBA: Given in Recitation	
Last Day to Drop	Sept 15	
Chapter 3	Sept 16, 21	15-20, 22, 24-26, 30-31, 32, 34, 37, 39, exercise 3.10 http://www.mc.maricopa.edu/~minger/CHM235.htm do problems on stereochemistry http://www.cem.msu.edu/~reusch/VirtualText/Questions/problems.htm do problems 2,6,10,14-19 within conformations and stereochem section http://www.utdallas.edu/~scortes/ochem/OChem1_Lecture/exercises/ch5_stereo2.pdf do part B problems
Quiz II: Chapter 3	TBA: Given in Recitation	
Chapter 4	Sept 23	10, 11, 15, 16, 19, 20, 22, 23, 25, 31, 33, 35, 37, 41, 42, 44, 45 http://www.mc.maricopa.edu/~minger/CHM235.htm do both sets of Bronsted Lowry problems
Chapter 5	Sept 28	9, 10, 12, 14, 18, 20, 21, 32, 37
Chapter 6	Sept 30, Oct 5, 7	13, 14, 15-26, 28-30, 32, 33, 37-39, 42-49
Chapter 7	Oct 12	8, 11, 12, 16 -18, 20, 21, 23, 24
Exam I: Chapters 1-6	Oct 14	

Topic	Tentative Dates	Assigned Homework from Textbook and Internet (Also do Advanced Problems from my Website or your Recitation)
Chapter 8	Oct 19	10-12, 13, 14-16, 18, 21, 23, 26, 28-30
Chapter 9	Oct 21, 26, 28	10-18, 20-33, 36-40, 42-60
Quiz III: Chapter 9	TBA: Given in Recitation	
Chapter 10	Nov 2	18, 20-22, 25-29, 31-33, 35-40, 44-46, 48, 50-56
Chapter 11	Nov 4	10, 12, 13, 15, 17, 20, 21, 23, 24, 25-28, 31, 33, 34, 40, 42-44
Quiz IV: Chapters 10 & 11	TBA: Given in Recitation	
Chapter 15	Nov 9	7-12, 16-19
Chapter 16	Nov 11	19, 20, 24, 26, 31-33, 37, 39, 42, 43, 45, 46, 48, 51, 52, 54, 58, 66, 70
Exam II: Chapters 7- 11, 15	Nov 16	
Last Day to Withdraw	Nov 17	
Chapter 16 continued	Nov 18, 23	
Chapter 13	Nov 30, Dec 2	11, 13, 15-25, 28
Chapter 12	Dec 7	5-11
Chapter 14	Dec 9	6, 8, 11, 14, 16, 20, 24-30
Review	Dec 14	
Final Examination: Cumulative	Dec 21	

LABORATORY SCHEDULE

Lab	Experiment Instructions & Reading	Additional Required Reading	Mon	Wed Murelli Jones	Wed Ghosh	Thurs	Fri
1	Check-In; Simple Distillation (2.3-1 and 2.3-2); Identification of an Unknown by Boiling Point (2.3-4)	Ch 1, Ch 2	8/30	9/1	9/1	9/2	8/27
2	Simple vs. Fractional Distillation (3.4-1); Mixed Melting Points (7.4-2)	Ch 3; 7.2	9/13	9/8	9/15	9/16	9/3
3	Recrystallization of Acetanilide (7.4-3) and Benzoin (7.4-4) LAB REPORT REQUIRED	7.3-2 through 7.3-6	9/20	9/15	9/22	9/23	TUES 9/14
4	Unknown Purification by Recrystallization and Identification by Melting Point (7.4-5)	7.3-1	9/27	9/22	9/29	9/30	9/24
5	Electronic Structure of Molecules, Learning Center (A.1, A.2*, A.3, B*, C.3, D) *do only one molecule from those listed HANDOUT MUST BE SUBMITTED	Supplement	10/4 Murelli, Horowitz 10/18 Mahendran	9/29 Murelli 10/6 Jones	10/6	TBA	10/1 Horowitz 10/8 Kunjappu

6	Separation and Identification of Unknown Acid and Neutral Compounds by Extraction (8.4-1; 8.4-2; 8.4-3)	Ch 8	10/4 Mahendran 10/18 Murelli, Horowitz	9/29 Jones 10/6 Murelli	10/13	10/7	10/1 Kunjappu 10/8 Horowitz
7	Separation of Fluorene-Fluorenone Mixture by Column Chromatography (supplement)	9.1, 9.2, 9.3-1	10/25	10/13	10/20	10/14	10/15
8	Preparation of 1-bromobutane (12.2-1)	6.1; 6.2-1; 12.1	11/1	10/20	10/27	10/21	10/22
9	Preparation of Cyclohexene (13.2) and Properties of Alkenes (13.3; 13.4) LABORATORY REPORT REQUIRED	13.1	11/8	10/27	11/3	10/28	10/29
10 – 11	Oxidation of an Unknown Alcohol and Preparation of Derivatives (supplement)	14.1	11/15, 11/22	11/10, 11/17	11/10 11/17	11/4 11/11	11/5, 11/12
12 - 13	Preparation and Purification of Triphenylmethanol (supplement)	Ch 5 Ch 17 (omit 17.3)	11/29, 12/6	11/24, 12/1	11/24 12/1	11/18 12/2	11/19, 12/3
14	Check-out No Experimental Work SUBMIT LABORATORY NOTEBOOK		12/13	12/8	12/8	12/9	12/10

Please note that laboratory period 5 takes place at the learning center.

COURSE POLICIES AND PROCEDURES

Academic Integrity:

Academic dishonesty of any type, including cheating and plagiarism, is unacceptable at Brooklyn College. Cheating is any misrepresentation in academic work. Plagiarism is the representation of another person's work, words, or ideas as your own. Students should consult the Brooklyn College Student Handbook for a fuller, more specific discussion of related academic integrity standards. Academic dishonesty is punishable by failure of the "test, examination, term paper, or other assignment on which cheating occurred" (Faculty Council, May 18, 1954). In addition, disciplinary proceedings in cases of academic dishonesty may result in penalties of admonition, warning, censure, disciplinary probation, restitution, suspension, expulsion, complaint to civil authorities, or ejection. (Adopted by Policy Council, May 8, 1991.)

Students with Disabilities:

If you have a disability, it is the responsibility of the university to provide you with reasonable accommodations. You should first register with Ms. Stewart-Lovell, the Director of the Student Disability Services Center (718-951-5538). Then please provide me with a copy of your course accommodation form and if necessary please schedule an appointment with me to discuss your specific accommodation needs.

Illness During Examinations:

If you become ill during any examination and feel that you are unable to complete it, notify a proctor immediately, write the words "I am sick", and hand in your paper. Your paper will not be graded and you will be considered absent from the examination. If you complete the exam, your paper will be graded.

Absence from Examinations:

No make up examinations will be given to students who are absent from lecture examinations. Students who miss one of the exams with a valid excuse will be assigned a score for the exam missed on the basis of their performance on the other lecture exam and on the final. A grade of zero for lecture will be given if both lecture exams are missed. In the event of absence from the final exam, students must apply to the Academic Advisement Center for permission to take a make up final examination given during following semester.

Expectations for Recitation:

Students are expected to attend all recitation meetings and to arrive on time. Recitation will be spent working on problem solving. Students are expected to actively participate in this activity. A minimum of four quizzes will be administered during recitation. The dates of these quizzes will be announced in advance.

Laboratory Instructions and Regulations:

Safety is number 1 priority in lab. You will be provided with an approved pair of safety goggles. **Wearing goggles at all times in the laboratory is mandatory.** If you are caught not wearing goggles in the lab, you will be asked to leave and you won't be allowed back for that session.

During the first laboratory session, you will receive 2 copies of a hand-out of safety rules. One is for you to keep and the other one is for you to sign and to return to your lab instructor. You must read, understand and agree to abide by these rules if you want to take the course.

Please follow the instructions regarding check-in and check-out given by the senior college laboratory technician, Mr. Carl Paparella. Make sure that you clean your glassware and bench space everyday and that you return all your glassware and equipment to your laboratory drawer before you leave. Report any missing or broken items to Mr. Paparella.

If you miss a lab, please follow the following procedure in order to makeup the experiment. Pick up a makeup form from the stock room and ask your instructor to sign it. Check with the makeup instructor to make sure there is room for you to work in his or her laboratory. Have the makeup instructor sign the form so that credit can be given to you for having completed the experiment.

LABORATORY REPORTS AND NOTEBOOKS

Prelab Instructions:

The prelab ensures that you are familiar with the details of the lab experiment beforehand. A prelab is due at the beginning of every lab meeting except for the first lab. You must write your prelab in your laboratory notebook and also make a photocopy of your prelab which you will submit to your instructor. You will not be allowed to perform an experiment if your prelab is not prepared.

The prelab will be graded. Your prelab should contain the following 5 sections:

- 1) **Heading:** The heading should include your name, the date, the instructor's name, the lab period, and the title of the experiment.
- 2) **Reaction Table:** When applicable, draw out the reaction(s) to be performed in the experiment. Tabulate the name and molecular weight of each reactant along with its amount (i.e. weight and/or volume), number of moles, density and phase (i.e. solid, liquid, or gas).
- 3) **Hazards:** List the hazards associated with this experiment.
- 4) **Precautions:** Explain what will be done to minimize/prevent the hazards associated with this experiment (underline or highlight the precautions!).
- 5) **Procedure:** Enumerate the sequence of important steps to be done in this experiment. The procedure should be written in the 3rd person/passive voice and in the future or present tense. For example, you should write: "Four milliliters of ethanol are added" or "Four milliliters of ethanol will be added" (ethanol should be the subject of the sentence). Do not write "I will add four milliliters of ethanol" or "we will add four milliliters of ethanol".

Lab Notebook Instructions:

The lab notebook is the only valid record of a scientific experiment. You must make an entry for each lab experiment, which will be checked for content and format. Each entry should contain the following 8 sections:

SECTIONS 1-5 ARE IDENTICAL TO SECTIONS 1-5 OF THE PRELAB..

- 1) **Heading**
- 2) **Reaction table**
- 3) **Hazards**
- 4) **Precautions**
- 5) **Procedure**
- 6) **Observations:** Record important observations as you go along (when a reactant was added, was there a color change, did the solution bubble, etc.?)
- 7) **Data (or Results):** Record any raw data. This can be something you measured (e.g. a weight, melting point, boiling point) or the results of a test.
- 8) **Conclusions:** Analyze or interpret your data in this section (e.g. answer the question, what was the % yield of the product, what is the identity of your unknown?).

Lab Report Instructions:

The lab report is an exercise in scientific writing and is the same general format as a scientific publication. A lab report must be written after the designated experiments and is due at the beginning of the following week's lab meeting. Lab reports should be written in the 3rd person/passive voice. Lab reports should be written in the past tense, because you are describing something you've already done. Lab reports may be hand or typewritten and should contain the following 7 sections:

- 1) **Heading:** The heading should include your name, the date, your instructor's name, your lab section, and the title of the experiment.
- 2) **Introduction:** Briefly describe the chemical principles behind the experiment.
- 3) **Objective:** In this section, briefly and clearly state what the goal of the experiment was. In your prelab and lab notebook, you drew a chemical reaction(s) to describe the goal of the experiment. In your lab report, you must describe the goal of the experiment in words.
- 4) **Procedure:** Summarize the sequence of important steps that were performed. This should be written in paragraph form.
- 5) **Data (or Results):** This section should contain the raw data from your experiment without any data analysis.
- 6) **Analysis and Discussion:** This section will start with an analysis (e.g. what you calculated) of the data that you presented in the previous section.
- 7) **Conclusions:** In this section, you should relate your data analysis to the objective of the experiment. You also have to answer the questions that are provided in the lab book chapter. Make sure to answer the questions after you have completed the rest of the work.

You will have to hand-in a total of 2 lab reports plus a modeling handout this semester.

Lab Performance:

Your ability to work safely, efficiently, and independently will be factored into your grade.

Unknown Identification:

The identification of unknown compounds assigned to you will be part of your grade.

Sample Prelab

1. Heading

Name: Jane Doe

Date: January 29, 2010

Lab Supervisor: Dr. Horowitz

Lab Period: Monday 2PM

Experiment: Simple Distillation & Boiling Point Determination

2. Reaction Table

No chemical reaction took place in this experiment.

Substance	Molecular Wt.	density	Quantity	Moles	Phase
Aqueous Solution	18 g/mol	1.0 g/mL	25 mL, 25 g	1.39	Liquid
Methanol	32 g/mol	0.79 g/mL	25 mL, 20 g	0.62	Liquid
Unknown	NA	NA	1 mL, NA g	NA	Liquid

3. Hazards

Methanol and many of the unknowns are highly flammable.

Steam is extremely hot and can burn you.

4. Precautions

Avoid the use of flames near and around organic solvents.

Be careful when lighting the Bunsen burner.

Turn off your Bunsen burner when it is not in use. Make sure to close the gas valve.

Clamp the glassware of the distillation apparatus.

Use boiling stones when heating any liquid.

Wait until apparatus is cool before attempting to disassemble it.

5. Procedure

Distillation of an aqueous solution:

- Simple distillation apparatus will be assembled.
- 25 mL of aqueous copper sulfate will be added along with a boiling stone.
- Condenser water will be turned on.
- Bunsen burner will be lit and used to heat the solution.
- Distillate will be collected.
- Boiling point of distillate will be recorded for each 2 mL fraction of distillate collected.

Distillation of methanol:

- Simple distillation apparatus will be assembled.
- 25 mL of methanol will be added along with a boiling stone.
- Condenser water will be turned on.
- A steam bath will be turned on and used to heat the solution.
- Distillate will be collected.
- Boiling point of distillate will be recorded for each 2 mL fraction of distillate collected.

Semimicro boiling point determination:

- A test tube containing an unknown liquid will be obtained.
- A thermometer will be suspended with its bulb 3 cm above the surface of the liquid.
- The liquid will be heated gently with a Bunsen burner until boiling occurs.
- The boiling point of the unknown will be recorded and the identity of the unknown determined.

Sample Lab Notebook

1-5.

See above.

6. Observations

Distillation of an aqueous solution:

Material that distils over is colorless.

All of distillate comes over between 99 degrees and 101 degrees.

Distillation of methanol:

Steam bath is very hot!

Semimicro boiling point determination:

Temperature fluctuates as liquid is being heating, but then settles down and gets steady when liquid boils.

7. Data

Distillation of an aqueous solution:

Volume of Distillate (mL)	Boiling Range (°C)
<i>Fill in your raw data here</i>	

Distillation of methanol:

Volume of Distillate (mL)	Boiling Range (°C)
<i>Fill in your raw data here</i>	

Semimicro boiling point determination:

Unknown Number	Boiling Point (°C)

8. Conclusions/Interpretation of Data

Unknown was ethanol.

Sample Lab Report

1. Heading

Same as above.

2. Introduction

Distillation (a process of heating, vaporization and condensation) can be used to purify a liquid substance. Boiling point is a physical property that can be used to determine the identity of a substance and/or the purity of the substance.

3. Objective

To distil two substances, methanol and a colored aqueous solution.

To determine the boiling point and identity of an unknown liquid.

4. Procedure

Distillation of an aqueous solution:

Simple distillation apparatus was assembled. 25 mL of aqueous copper sulfate was added along with a boiling stone. Condenser water was turned on. Bunsen burner was lit and was used to heat the solution. Distillate was collected. Boiling point of distillate was recorded for each 2 mL fraction of distillate collected.

Distillation of methanol:

Simple distillation apparatus was assembled. 25 mL of methanol was added along with a boiling stone. Condenser water was turned on. A steam bath was turned on and used to heat the solution. Distillate was collected. Boiling point of distillate was recorded for each 2 mL fraction of distillate collected.

Semimicro boiling point determination:

A test tube containing an unknown liquid was obtained. A thermometer was suspended with its bulb 3 cm above the surface of the liquid. The liquid was heated gently with a Bunsen burner until boiling occurred. The boiling point of the unknown was recorded and the identity of the unknown was determined.

5. Data (or Results)

Same as above.

6. Analysis and Discussion

Insert your graphs here.

7. Conclusions

Through distillation, we were able to obtain pure water (we successfully removed the colored impurity). We were also able to purify methanol. Unknown was ethanol.