

Revised: Fall 2016

# CHM 246

## Organic Chemistry Lab II

### COURSE OUTLINE

#### Prerequisites:

CHM 241, CHM 245

#### Course Description:

Development of techniques in preparation, purification and identification of organic compounds. Includes qualitative organic analysis. Shall be taken concurrently with CHM 242.

Lecture 0-1 hours. Laboratory 3-4 hours. Total 3-4 hours per week.

0-3 credits

**Semester Credits: 2. Lecture Hours: 1 Lab/Recitation Hours: 3**

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# CHM

## Course Outcomes

**At the completion of this course, the student should be able to:**

Pursue basic procedures and techniques employed in modern organic chemistry laboratories.

Develop skills in methods of preparation, purification and identification of organic compounds using infrared spectroscopy.

Visualize the practical application of the reactions presented in CHM 241/242.

Perform qualitative organic analysis for separating and identifying unknown organic mixtures using learned methods

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## Required Materials:

### Lab Textbook

Lab Manual – Experimental Organic Chemistry – A Miniscale & Microscale Approach w/ Pre-lab exercises, Gilbert, et. Al., 5th edition, Cengage Learning, ISBN 9781439049143

Textbook website for pre-lab exercises. ISBN-13: 9781439049143

The following supplementary materials are available:

1. Textbook website.

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## Topical Description:

Exp#	Reading Assignments	Experiments
1.	Organometallic Chemistry (sect. 19.1-19.2 pages 639-643) (sect. 19.3-19.4, page 649-651)	A. Preparation of Grignard Reagents (pages 643-645) C. Preparation of Triphenylmethanol (pages 652-653)
2.	Electrophilic Aromatic Substitution (section 15.1; pages 491-492) Nitration of Bromobenzene (page 513-515) Exercises: 3,4,5,17 (page 519-520)	A. Nitration of Bromobenzene (pages 515-517)
3.	Relative Rates Electrophilic Aromatic Substitution (Sect. 15.5, pages 522-524) Exercises: 1,11,12 (pages 527-529)	A. Relative Rates of Electrophilic Aromatic Bromination (pages 525-527)
4.	Esterification of Acid (handout)	Synthesis of Methyl Salicylate
5.	Reduction of Carbonyl Compounds; Preparation of Alcohols (Sect. 17.4; page 581) Exercises: 1,2,3,6,7,9,10 (page 584-585)	Reduction of 9- Fluorenone (page 582-584)
6.	Kinetic and Thermodynamic Control of a Reaction (Sect. 13, page 445-450) Exercises: 1,3,4,5,6 (page 453-456)	Lab Pages 451--453 A. Preparation of Cyclohexanone Semicarbazone B. Preparation of 2-Furaldehyde Semicarbazone C. Reaction of Semicarbazide with Cyclohexanone and 2-Furaldehyde In Phosphate Buffer Solution C. Reaction of Semicarbazide with Cyclohexanone and 2-Furaldehyde in Bicarbonate Buffer Solution D. Test of Reversibility of Semicarbazone Formation



7. The Cannizzaro Reaction  
(Sect. 16.3; page 553-554)  
Exercises: 1,3,5,6,7,8,9 (pages 557-559)

Base-Catalyzed Oxidation-Reduction of  
Aldehydes by the Cannizzaro Reaction  
(page 555-557)

8. Preparation of Aldehydes and Ketones By  
Oxidation of Alcohols  
(Section 16.2, page 539-542)

A. Oxidation of Cyclododecanol to  
Cyclododecanone (p. 543-544)

After finishing Exp. #8 we will talk about #9 below that will be the lab for rest of the semester.

9. Identifying Organic Compounds. (Chapter 25; page 833-904) (8 weeks)  
Each student (or pair) will receive six singles and two doubles unknowns. Follow systematic procedure for identification of organic compounds as outlined in the lab textbook, (pages 835-846). Pay attention to page 842 – the solubility data can be a great help. Classification Tests for Functional Group Identification are summarized in pages 844-845. No derivatives will be prepared. Procedure for classification tests for functional groups begins page 856.

Delay CHM 246 Lab Schedule (Inclement Weather)

Regular time 8-12

Delayed Time 10:00- 1:30

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## Notes to Instructors

1. Approved safety goggles are still required to be worn in the laboratory. The laboratory working area also includes the weighing room and the sinks. **NO GOGGLES—NO LAB.**
2. Each lab report is graded on a scale from 0 – 100. The only exception is the unknown lab report which will have a value exceeding 100 to be determined by the instructor. Pre-lab questions are worth approximately 10 percent and post-lab questions, if any, are worth approximately 15 percent of each lab grade. Lab reports are due one week from the date of completion. These reports must be typed on 8 ½ x 11 letter-size paper. The format for writing lab reports will be explained in the class before each lab. Five points will be taken off per school day for each late lab report.
3. The final grade for CHM 246 will be based on the following:

Lab Reports	=	75%
Final Exam	=	25%

### Grading Scale

100% - 90%	=	A
89.9% - 80%	=	B
79.9% - 70%	=	C
69.9% - 60%	=	D
Less than 60%	=	F

