

# Virginia Western Community College

## CHM 245

### Organic Chemistry Laboratory I

#### Prerequisites

CHM 112

#### Corequisites

CHM 241

#### Course Description

Includes qualitative organic analysis. Offered in the fall semester.

**Semester Credits: 2**

**Lecture Hours: 1**

**Laboratory Hours: 3**

#### Required Materials

##### **Textbook:**

Experimental Organic Chemistry: A Miniscale and Microscale Approach. Gilbert, et al. 5th edition. Cengage Publishing. ISBN: 9781439049143

#### Course Outcomes

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

- Determine the melting points and boiling points of chemical substances.
- Separate mixtures of substances using distillation, recrystallization, and chromatography.
- Perform extractions to isolate organic compounds.
- Perform syntheses and use isolation techniques to obtain products.
- Perform qualitative analyses.
- Visualize the practical application of the reactions presented in CHM 241

#### Topical Description

##### Experiment # and Reading Assignments

1. Melting Point  
(Sect. 2.7; page 38-41)  
(Sec. 3.3; page 113-117)  
Exercises: 1, 2, 7, 10, 11, 14, 15 (page 119-121)
2. Simple and Fractional Distillation  
(Sect. 2.13, 2.14; page 55-59)  
(Sec. 4.3; page 131-133)  
(Sec. 4.4; page 135-141)

##### Experiment Name

- Determination of Capillary Tube Melting Points  
(page 118-119)
- A. Simple Distillation Miniscale (page 133-134)
  - B. Fractional Distillation of a Binary Mixture (page 141-143)

- Exercises: 1, 4, 5, 6, 7, 8, 10, 13 (page 143-144)
3. Steam Distillation  
(Sect. 2.16; page 64-65)  
(Sect. 4.5; page 141-143)  
(Sect. 4.6; page 147-149)  
Exercises: 1, 2, 4, 8, 9 (page 150-151)
  4. Recrystallization  
(Sect. 3.2; page 94-101)  
Exercises: 6, 7, 8, 10, 12, 13, 15, 17, 18, 19, 21, 23, 24 (page 110-112)
  5. Extraction  
(Sect. 2.21; page 75-81)  
(Sect. 5.2, 5.3; page 154-161)  
Exercises: 3, 4, 5, 6, 11, 18, 19, 20 (page 167-170)
  6. Chromatography  
(Sect. 6.1; page 179-180)  
(Sect. 6.3; page 188-192)  
Exercises: 3, 7, 8, 11, 12, 13, 14, 17 (page 194-195)
  7. Alkynes (2 week lab)  
(Sect. 11.3; page 410-412)  
(Sect. 11.4; page 416-417)  
Exercises: 4, 5 (page 414)  
Exercise: 2 (page 418)
  8. Nucleophilic Aliphatic Substitution  
(Sect. 14.4; page 465-467)  
Exercises: 1, 2, 3, 4, 15 (page 470-471)
  9. Nucleophilic Aliphatic Substitution  
(Sect. 14.1-14.3; page 461-465)  
(Sect. 14.5; page 473-475)  
Exercises: 1, 2, 3, 7, 13, 14 (page 477-479)
  10. Dehydrohalogenation of Alkyl Halides  
(Sect. 10.2; page 338-340)  
Exercises: 2, 4, 5, 6, 8 (page 344)
  11. Dehydration of Alcohols  
(Sect. 10.3; page 348-352)  
Exercises: 2, 3, 4, 5, 6, 7, 13, 16 (page 355-357)
  12. Bromination: Hydrogen Abstraction Selectivity  
(Sect. 9.3; page 324-326)  
Exercises: 1, 2, 3, 4, 8, 9, 13 (page 328-329)
  13. Organometallic Chemistry  
(Sect. 19.1-19.2; page 639-643)  
(Sect. 19.3-19.4; page 649-652)  
Exercises 24, 25, 27, 29 (Page 662)
- Distillation Using an External Steam Source  
(Figure 2.45; page 65)  
Procedure: Steam Dist'n of Citral from Lemon Grass Oil (page 149-150)
- A. Solvent Selection (page 101-103)
  - B. Recrystallization of Impure Solids
    - 1) Benzoic acid (page 103-104)
- Experimental Procedure for Extraction  
(B) Two-Base Extraction (page 162-163)
- Column Chromatography (Page 192-194)
- Preparation of 3-hydroxy-3-methyl-2-butanone  
(page 412-413)  
Formation of a Silver Acetylide and Its  
Decomposition (page 417)
- Preparation of 1-Bromobutane  
(page 467-468)
- A. Preparation of 2-chloro-2-methylbutane  
(page 475-476)
  - A. Elimination of Alcoholic Potassium Hydroxide  
(page 341-343)
  - A. Dehydration of 4-Methyl-2-Pentanol  
(page 352-353)
- Relative Rates of Free-Radical Chain Bromination  
(page 326-328)
- A. Preparation of Grignard Reagent (page 643-645)  
(use n-butyl bromide)
  - D. Preparation of 2-methyl-3-heptanol (page 658-660)

**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 grade on a scale from 0 – 100. Pre-lab questions are worth approximate 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 245 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