

Department of Chemistry
University of Missouri-St. Louis

Chemistry 2633: Techniques of Organic Chemistry

Spring 2016

Lecture: Monday 2:00-2:50; Room 104 Benton Hall
Laboratory: Tuesday through Thursday 12:30-5:00; Room B401, Benton Hall
Instructor: James Chickos: Office: 435 Benton Hall; e-mail: jsc@umsl.edu
Phone: 516-5377 web: www.umsl.edu/~chickosj/

Office hours: Monday, 3:00-4:50 PM and during lab hrs

Teaching Assistants:

Tuesday 12:30-5:00: PM Chase Gobble: cg42d@mail.umsl.edu
Wednesday 12:30-5:00: PM Carissa Nelson: crnwf9@mail.umsl.edu
Thursday 12:30-5:00: PM Xiao Jia: xgjcm8@mail.umsl.edu

Text and Supplies

Laboratory Manual for Chemistry 2633; (**M**), (available in the book store); Laboratory Notebook: **Bound student notebook with carbonless copies**, available in the University Bookstore or elsewhere.
Safety Glasses: These are available in the bookstore.

Safety glasses must be worn in the laboratory at all times.

Course Description

Chemistry 2633 is the first semester in the U.M.-St. Louis Organic Chemistry Laboratory sequence. The formal prerequisite for this course is Structural Organic Chemistry, Chemistry 2612 (or an equivalent lecture course). This course is designed to provide an introduction to the basic experimental techniques and procedures used in the practice of Organic Chemistry. It will be assumed that you are acquainted with general techniques employed in the laboratory, such as weighing, measuring volumes, preparing solutions, measuring temperature, etc. Please inform us if you are not familiar with these techniques. You should also be familiar with the basics of Organic Chemistry including some nomenclature, structural theory and some reactions of common functional groups.

If you have any physical handicaps that may influence your performance in the laboratory, you should inform us so that we can try to accommodate your needs. Most of the materials we will be working with are generally considered to be relatively non-toxic. However, each of us may respond differently to them. Please inform us if you encounter any difficulty or discomfort working with any of these materials.

Remember: In addition to MyGateway, course material will be available at the following address: www.umsl.edu/~chickosj/. Any announcements and additional information for the course will appear on the course site in MyGateway so you should check this site periodically. Cheating on tests, falsification of lab data or notebook entries, or malfeasance of that sort, will result in a grade of zero for the test or lab in question.

Evaluation of Performance

Your final letter grade will be based on your accumulated point total on a 900 point scale in the following areas:

- I. Notebook grades (300 pts.).
- II. Grades on yields and unknowns (200 pts.).
- III. Examinations, and other written assignments (400 pts.).

Two examinations will cover material from the lectures, laboratory experiments, and reading assignments. You are responsible for the material covered in the reading assignments, even if not specifically covered in the lectures. Points will be deducted for handing in experiments late. Sample examinations will be made available on the web at the address given above.

Grades: Grades in the course are curved. This means that the total number of points earned does not necessarily guarantee a particular grade. Letter grades are assigned on relative rankings, not on total points earned. In classes with several sections, laboratory grades may be normalized to a common mean to accommodate any grading differential by instructor; therefore, the final score may differ somewhat from the score posted on My Gateway.

SCHEDULE

Tentative Lecture Schedule

During the course of this semester, we will be using and discussing infrared and NMR spectroscopy. This material is covered in Appendices 1 and 2 of the laboratory manual. You should familiarize yourself with this material as we discuss it. Additional spectra for both IR and NMR are provided in the appendices that follow.

Week of

Jan.18: **Reading Assignment:** pgs 1-10. **You will need to read the file on safety. Send an e-mail that you have done so. E-mail: jsc@umsl.edu.** Your grades will not be available until your e-mail has been received. The material on safety is available on the web at: www.umsl.edu/~chickosj/.

Jan.25: **Reading Assignment:** Drying Agents; **M** pg 16-17; Expt. 1. Preparation of Aspirin, **M** pp. 19-21;

Feb. 1: **Reading Assignment:** Expt. 2. Preparation of Acetaminophen: **M** pp. 22-23. Appendix 1 pp. 59-69

Feb. 8: **Reading Assignment:** Extraction **M** pp. 15-16; Expt. 3. Caffeine Experiment **M** pp. 24.

Feb.15: **Reading Assignment:** Expt. 4. Thin Layer Chromatography: **M** pp. 26-29. Appendix 1 pp. 69-79

Feb.22: **Reading Assignment:** Expt. 5. Synthesis of Banana Oil: **M** pp. 30-31. Simple Distillation; 32-40

Feb.29: **Reading Assignment:** Expt. 6. Fractional Distillation, Gas Chromatography, **M** pp. 40-46.

Mar. 7: **Reading Assignment:** Expt. 7. Steam Distillation: **M** pp. 47-49. Appendix 1 pp. 79-87.

Mar.14: **Exam 1 covering experiments 1-6. Reading Assignment:** Expt 8. Preparation of Methyl Salicylate. Vacuum Distillation; p 50.

Mar.21: **Reading Assignment:** Expt 8. Identification of Organic Unknowns, **M** pp. 51-54; Appendix 2; NMR Spectroscopy, pp 88- 97. Appendix 2 pp. 88-97.

Mar. 28: Spring break.

Apr. 4: **Reading Assignment:** Multistep Synthesis; **M** Synthesis of Benzoin. pp. 55-6.

Apr. 11: **Reading Assignment:** Multistep Synthesis; Oxidation of Benzoin to Benzil; **M** pp. 56-7.

Apr.18: **Reading Assignment:** Multistep Synthesis; Preparation of Tetraphenylcyclopentadienone.

Apr.25: **Reading Assignment:** Reduction of Benzil with Sodium Borohydride; **M** pp. 58.

May 2: **Exam 2 covering experiments 7-10, IR and NMR.**

Laboratory Schedule

Week of

Jan.18: **Laboratory Assignment:** Laboratory Check-in; Introduction to the Organic Laboratory; **M** pp. 1-18; Laboratory Safety; Laboratory Check-in;

Jan.25: **Laboratory Assignment:** Expt. 1. Preparation of Aspirin, **M** pp. 19-21

Feb.1: **Laboratory Assignment:** Expt. 2. Preparation of Acetaminophen, **M** pp. 22-23.

Feb:8: **Laboratory Assignment:** Expt. 3. Isolation of Caffeine from Tea; **M** pp. 24.

Feb:15 **Laboratory Assignment:** Expt. 4. Thin Layer Chromatography: **M** pp. 26-29. **Expts 1 and 2 are due.**

Feb.22: **Laboratory Assignment:** Expt. 5. Synthesis of Banana Oil: **M** pp. 30-31.

Feb:29 **Laboratory Assignment:** Expt. 6. Fractional and Simple Distillation of a Binary Mixture: **M** pp. 40-6; Complete experiments 1-5; Gas chromatographic analysis of the distillations the will be performed the following week. Be sure to save your samples in a capped vial. **Expt. 3 and 4 are**

due are due at the end of the period.

Mar.7: **Laboratory Assignment:** Expt. 7. Isolation of a Natural Product by Steam Distillation: **M** pp. 47-9.

Mar.14: **Laboratory Assignment:** Expt. 8. Preparation of Methyl Salicylate-Vacuum Distillation: **M**. p. 50.

Mar.21: **Laboratory Assignment:** Expt. 9. Identification of Unknowns; **M** 51-4.

Mar.28: Spring break

Apr.4: **Laboratory Assignment:** Multistep Synthesis; Synthesis of Benzoin. p 55-6. **Expts 5 and 6 are due at the end of the period.**

Apr.11: **Laboratory Assignment:** Expt. 10. Multistep Synthesis: Oxidation of Benzoin to Benzil; **M**. pp. 55-6, (ongoing); Identification of Unknowns (ongoing).

Apr.18: **Laboratory Assignment:** Expt. 10. Multistep Synthesis, Preparation of Tetrphenylcyclopentadienone; Reduction of Benzil with Sodium Borohydride. **M** pp. 58

Apr.25: **Laboratory Assignment:** Multistep Synthesis, (continued), unknowns (continued).

May 2: **Completion of all remaining experiments. All remaining experiments are due: Check out.**