CHEM A225L: ORGANIC CHEMISTRY B LABORATORY

Item	Value
Curriculum Committee Approval Date	12/04/2024
Top Code	190500 - Chemistry, General
Units	2 Total Units
Hours	108 Total Hours (Lab Hours 108)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)
Associate Arts Local General Education (GE)	• Area 5 Physical and Biological Sciences, Scientific Inquiry, Life Science (OB)
Associate Science Local General Education (GE)	• Area 5 Physical and Biological Sciences, Scientific Inquiry, Life (OSB)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 5C Laboratory Activity (5C)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 5C Laboratory Activity (5C)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B3 Laboratory Activity (B3)

Course Description

Further applications of laboratory theory and techniques in the synthesis and analysis of organic compounds including instrumental methods of chromatography. PREREQUISITE: CHEM A220 and CHEM A220L. Transfer Credit: CSU; UC.

Course Level Student Learning Outcome(s)

1. Execute multi-step organic chemistry experiments using the common techniques of organic chemistry including melting points, recrystallization, distillation, extraction, chromatography, refractometry, and infrared spectroscopy.
2. Construct a reaction planning table by calculating the quantities and concentrations of reactants in an organic chemistry synthesis reaction experiment.
3. Write the observations and results of organic chemistry experiments in a notebook journal using proper techniques for recording scientific experiments.
4. Identify the structures of unknown substances using chemical tests and instrumental methods.
5. Apply safe and proper laboratory techniques to make accurate, reproducible measurements of masses and volumes, and accurate, reproducible experimental observations.

Course Objectives

- 1. Make careful observations and maintain a laboratory notebook using common laboratory practices.
- 2. Synthesize organic compounds via the prominent reactions and mechanisms discussed in lecture.
- 3. Separate and isolate organic compounds from mixtures using standard laboratory techniques.
- 4. Use infrared spectroscopy to identify important functional groups.
- 5. Use nuclear magnetic spectroscopy to deduce structure.
- 6. Use chromatographic techniques to analyze organic mixtures.
- 7. Operate in a chemical laboratory in a safe and efficient manner.
- 8. Recognize, handle, and dispose of hazardous waste in a safe and environmentally sound manner.

Lecture Content

Further applications of laboratory theory and techniques are employed in the synthesis of organic compounds. Spectroscopic and chromatographic methods of identification and analysis are employed. Includes the separations and purification of organic and some bio-organic substances. Special emphasis is given to the proper maintenance of a laboratory notebook. Experiments are chosen to correlate with the reactions and mechanisms covered in the second semester lecture and include the following: 1. Preparation and reactions of an organo-metallic compound. 2. Diels-Alder reaction. 3. Effect of solvent on UV-absorption. 4. Electrophilic aromatic substitution reactions: a. group protection. b. substitute effect on reactivity. c. substitute effect on orientation. 5. Nucleophilic addition to the carbonyl group. 6. Condensation reactions (Aldol or Claissen.) 7. Benzyme formation and reaction. 8. n bsp; Nucleophilic Acyl substitution. 9. Diazonium salt formation and reactions. 10. Organic fat (or oil) extraction followed by a saponification reaction. 11. Isolation of casein and lactose from milk. 12. Photochemistry of aN organic substrate.

Lab Content

Further applications of laboratory theory and techniques are employed in the synthesis of organic compounds. Spectroscopic and chromatographic methods of identification and analysis are employed. Includes the separations and purification of organic and some bio-organic substances. Special emphasis is given to the proper maintenance of a laboratory notebook. Experiments are chosen to correlate with the reactions and mechanisms covered in the second semester lecture and include the following: 1. Preparation and reactions of an organo-metallic compound. 2. Diels-Alder reaction. 3. Effect of solvent on UV-absorption. 4. Electrophilic aromatic substitution reactions: a. group protection. b. substitute effect on reactivity. c. substitute effect on orientation. 5. Nucleophilic addition to the carbonyl group. 6. Condensation reactions (Aldol or Claissen.) 7. Benzyme formation and reaction. 8. n bsp; Nucleophilic Acyl substitution. 9. Diazonium salt formation and reactions. 10. Organic fat (or oil) extraction followed by a saponification reaction. 11. Isolation of casein and lactose from milk. 12. Photochemistry of aN organic substrate.

Method(s) of Instruction

- Lab (04)
- DE Live Online Lab (04S)

Instructional Techniques

1. Demonstration and discussion of laboratory techniques. 2. Lecture on experiment reactions and mechanisms.

Reading Assignments

Assigned reading from the course textbook and other appropriate sources.

Writing Assignments

Maintenance of a laboratory notebook wherein a record of each experiment performed will be kept. Each record will include a written introduction, data and observations, and a conclusion. Many experiments will also require sections for analysis and calculation.

Out-of-class Assignments

Assigned reading from the course textbook and other appropriate sources.

Demonstration of Critical Thinking

1. Successful on time participation in each lab meeting; on time completion of each lab. 2. Examinations based on procedure, data, observations, and conclusions recorded in student's laboratory notebook. 3. Quizzes on laboratory techniques, safety, and experiments (short answers and essay). 4. Evaluation of experimental results on designated experiments with regard to yield and purity.

Required Writing, Problem Solving, Skills Demonstration

Maintenance of a laboratory notebook wherein a record of each experiment performed will be kept. Each record will include a written introduction, data and observations, and a conclusion. Many experiments will also require sections for analysis and calculation.

Textbooks Resources

1. Required Pavia, D.L., Lampman, G.M., Kriz, G.S., Engel, R.G.. A Microscale Approach to Organic Laboratory Techniques, 5th ed. Brooks/Cole Cengage Learning, 2013

Other Resources

1. Laboratory notebook (5 x 5 quad ruled.) 2. Laboratory safety glasses.