

CHEM 0012Y - PROBLEM SOLVING FOR CHEMISTRY 12B

Catalog Description

Corequisite: Concurrent enrollment in CHEM 12B

Hours: 18 lecture

Description: Optional problem solving course to accompany CHEM 12B. Students use critical thinking and problem solving strategies to solve organic chemistry problems in topics that include nomenclature, alkynes, benzene, esters, amides, and amines. (CSU)

Course Student Learning Outcomes

- CSLO #1: Manipulate reaction schemes on problems related to aromatics, amines, and carbonyls.
- CSLO #2: Develop strategies for problem solving new compounds to create an effective synthesis focusing on aromatics, amines, and carbonyls.
- CSLO #3: Create an outline retro synthetically then create a forward reaction scheme to produce the target molecule focusing on aromatics, amines, and carbonyls.
- CSLO #4: Given the structure of reactant molecules, predict and draw mechanisms leading to products. Focus on alkynes, aromatics, and other carbonyl containing functional groups.
- CSLO #5: Use experimental data to derive the structure of molecules, draw them and predict how their structure will affect their reactivity. Focusing on alkynes, aromatics, and other carbonyl containing functional groups.

Effective Term

Fall 2024

Course Type

Credit - Degree-applicable

Contact Hours

18

Outside of Class Hours

36

Total Student Learning Hours

54

Course Objectives

1. Draw resonance of aromatic compounds and explain how the ortho, para, and meta positions are favorable/unfavorable locations.
2. Predict the aromaticity of heterocycle and explain how this affects their reactivity.
3. Predict missing reactants, reagents, or products from the following reactions Diels-Alder reaction, Electrocyclic reactions of conjugated

alkenes, Electrophilic aromatic substitutions, and hydration of carbonyls.

4. Create rules and strategies for problem solving that are effective in new unseen problems.
5. Build confidence in their problem solving techniques and apply it to multifaceted questions.

General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

Methods of Evaluation

- Classroom Discussions
 - Example: Students will be evaluated on their participation in classroom discussions and utilization of problem solving on the white boards. For example, "Consider the synthesis of phenol from benzene. Outline the key steps and reagents involved in this transformation." The students would then solve the problem on the board and the instructor can correct any mistakes made while they are working on the question.
- Problem Solving Examinations
 - Example: Students will be evaluated throughout the semester on successful completion of problem-solving worksheets. An example, "Explain and draw the mechanism of Fischer esterification, including the reagents."

Repeatable

No

Methods of Instruction

- Lecture/Discussion

Lecture:

1. In Class: A classroom review topic of aldehyde reactions is followed by a worksheet assignment that students will complete working in small groups while the instructor roams the room. Ideally, students would be working on the problems on the whiteboards so the professor can give guidance to facilitate the learning process.

Typical Out of Class Assignments

Reading Assignments

1. Read a section from the textbook. Be prepared to use the content to participate in the classroom and to complete assigned problems from the textbook. For example: Read the section on aldehydes and ketones from the textbook. Be prepared to use the content to participate in the classroom and to complete assigned problems from the textbook.
2. Read a sample problem from a handout and from the lecture notes.

Writing, Problem Solving or Performance

1. Solve problems from a worksheet using their notebooks, on the whiteboard, and/or in a group setting.
2. Solve problems from the

textbook. For example: A carboxylic acid with the molecular formula $C_5H_{10}O_2$ is treated with thionyl chloride to give compound A. Compound A has only one signal in its 1H NMR spectrum. Draw the structure of the product that is formed when compound A is treated with excess ammonia.

Other (Term projects, research papers, portfolios, etc.)

Required Materials

- Organic Chemistry
 - Author: David R. Klein
 - Publisher: Wiley
 - Publication Date: Jan 20, 2021
 - Text Edition: 4th
 - Classic Textbook?: Yes
 - OER Link:
 - OER: No
- Organic Chemistry
 - Author: John McMurry
 - Publisher: OpenStax
 - Publication Date: Sep 20, 2023
 - Text Edition: 10th
 - Classic Textbook?: Yes
 - OER Link:
 - OER: Yes

Other materials and-or supplies required of students that contribute to the cost of the course.