

J. Sargeant Reynolds Community College
Course Content Summary

Course Prefix and Number: CHM 245

Credits: 2

Course Title: Organic Chemistry Laboratory I

Course Description: Introduces fundamental chemistry of carbon compounds, including structures, physical properties, syntheses, and typical reactions. Emphasizes reaction mechanisms and synthesis. Includes qualitative organic analysis. Part I of II. Prerequisite or Co-requisite: CHM 241. Laboratory 6 hours.

General Course Purpose: This is a transfer course for science majors that will satisfy various pre-health degree requirements. This course is designed for students pursuing bachelor's degrees in biology, chemistry or chemical engineering, and as a prerequisite for students seeking professional degrees in medical, pharmaceutical, dental, veterinary programs, and certain advanced nursing programs.

Course Prerequisites and Co-requisites:

Prerequisite or Co-requisite: CHM 241

Student Learning Outcomes:

- a. The students will practice good safety habits.
- b. The students will use the chemical literature and electronic resources, including Material Safety Data sheets, to gather physical and chemical properties of chemicals, indicating any hazards and cite sources of information.
- c. The students will make observations of chemical phenomena and interpret these observations.
- d. The students will demonstrate accurate recording of experimental procedures and data.
- e. The students will engage in scientific (brief, complete, and effective) writing.
- f. The students will maintain a neat laboratory notebook that will include items 2-5.
- g. The students will demonstrate effective use of glassware, tools, and instruments specific to the organic chemistry laboratory, with appropriate attention to students' safety and respect for the equipment.
- h. The students will demonstrate proper handling of chemicals, including proper waste reduction and disposal.
- i. Upon completing CHM 245, the student will be able to
 - Perform chemical tests for the classification of hydrocarbons, alcohols, aldehydes, and ketones;
 - Assemble and perform simple distillation and fractional distillation, identifying all components, and compare and contrast the two methods;
 - Assemble and perform reflux;
 - Purify organic solids by recrystallization;
 - Determine melting point ranges of organic solids using a Mel-Temp;
 - Perform extractions using a separatory funnel;
 - Separate mixtures of substances using chromatographic techniques, and identify components given standard;
 - Use molecular models to build models organic molecules;
 - Perform organic syntheses; and
 - Students will explain theoretical basis of all techniques and state reasons for use of specific reagents.

Major Topics to Be Included:

- a. Bonding and structure
- b. Alcohols and alkyl halides
- c. Structure and stability of alkenes
- d. Stereochemistry
- e. Nucleophilic substitution reactions
- f. Conjugation in dienes and allylic systems
- g. Spectroscopy: UV/Vis, IR, and NMR

Experiments performed in CHM 245:

- a. Hydrocarbons
- b. Molecular models
- c. Distillation
- d. Recrystallization
- e. Extraction
- f. Geometric isomerization
- g. Thin layer chromatography
- h. Separation of acidic, basic, and neutral compounds
- i. The production of aspirin
- j. Soap
- k. Esterification
- l. Functional groups
- m. Dehydration of cyclohexanol

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