

B.A. Sophomore Year – Spring Semester Lab

CEM 255 Organic Laboratory

Description: Preparation and qualitative analysis of organic compounds.

Credit: 2 Credits (3 hours lab, 1 hour of lecture per week)

Prerequisite: CEM 252 or concurrent enrollment in CEM 252

Students are introduced to microscale techniques in organic chemistry laboratory. They also perform a few synthetic experiments including a multi-step synthesis. There is a hands-on-experiment with ^1H NMR (300MHz). The lab reports are informal and they include purpose, procedure, results, and discussion.

Experiments:

1. Calibration of Thermometer and Molecular Model Experiment

Students calibrate their thermometer and do a molecular model experiment during the check in.

2. Thin Layer Chromatography (TLC)

Students learn TLC technique and identify a two-component mixture by using the six standards.

3. Distillation

a. Students perform simple and fractional distillation. Then, They calculate the number of theoretical plate (by injecting their products into a GC) for each of the experiments and compare the efficiency of their distillation set-ups.

b. Synthesis of cyclohexene from cyclohexanol. Fractional distillation is used to remove cyclohexene as it is made in order to achieve quantitative yields.

4. Extraction

Microscale technique is used to separate a carboxylic acid from an ester by performing an acid–base extraction.

5. Identification of an unknown using NMR–Spectroscopy

Students are to identify the identity of a liquid unknown sample of an aldehyde or ketone by taking the boiling point (microscale), making a solid derivative, and taking NMR spectra and fully characterizing it.

6. Multistep Synthesis (Semimicro)

The conversion of methyl benzoate into 3–nitrobenzamide in a three step synthesis.

7. Microscale Grignard Reaction

This experiment is a microscale reaction of phenyl magnesium bromide (Grignard reagent) with methyl benzoate.

8. Azo Dye Synthesis (Semimicro)

Preparation of Orange II dye by forming the diazonium salt of sulfanilic acid and coupling it with sodium salt of β -naphthol.