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 ^{1}HNMR (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 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.