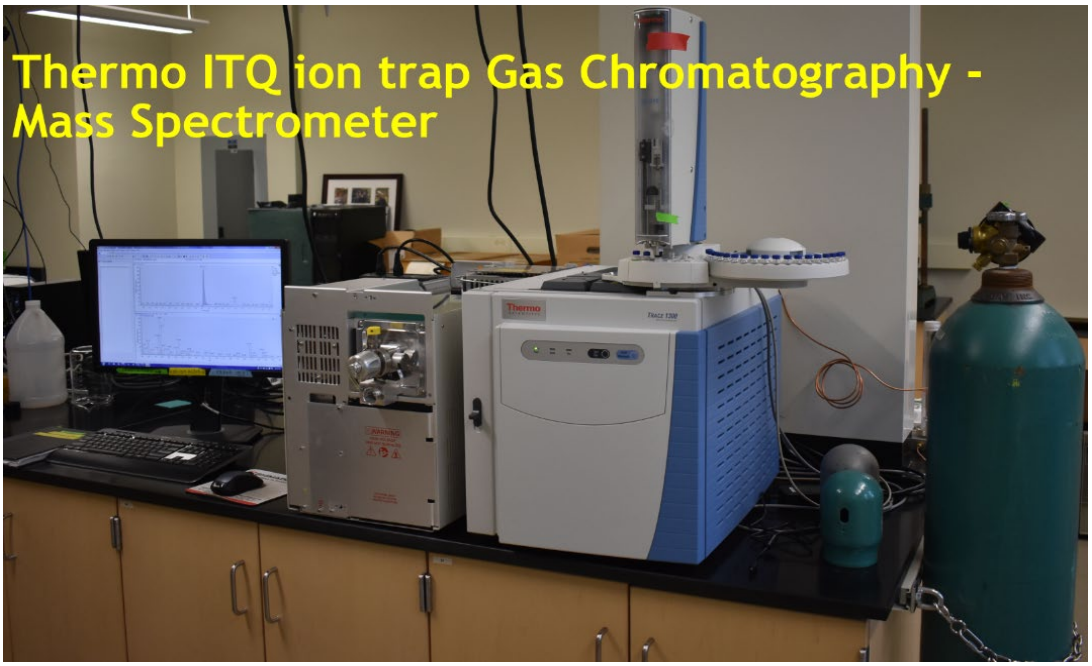
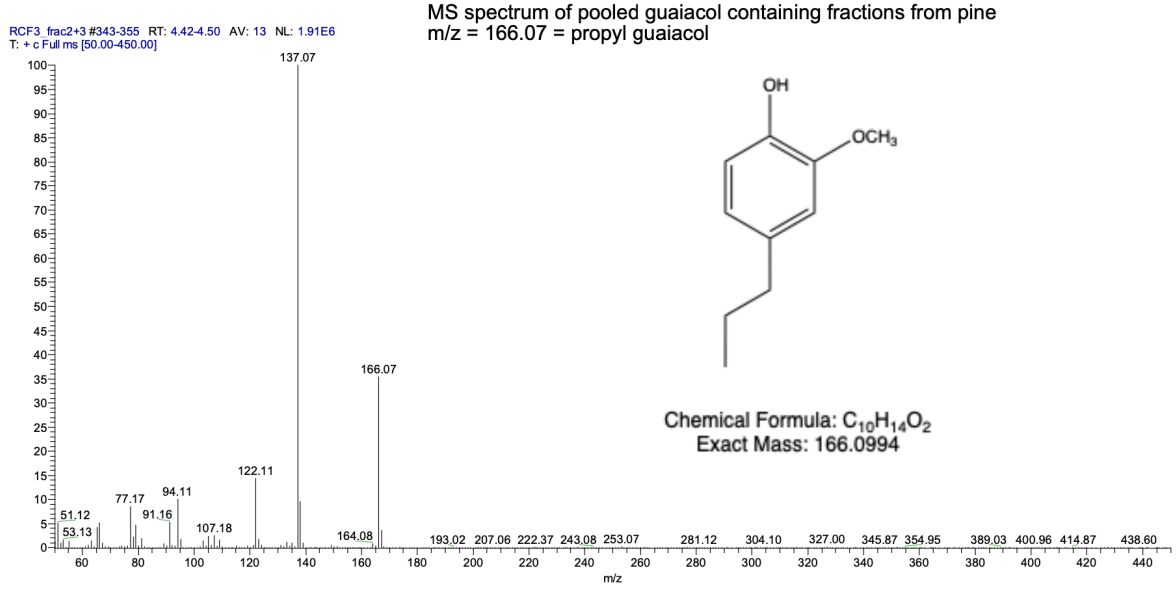
Queens Chemistry Lab Equipment

Thermo ITQ Ion Trap Gas Chromatography-Mass Spectrometer

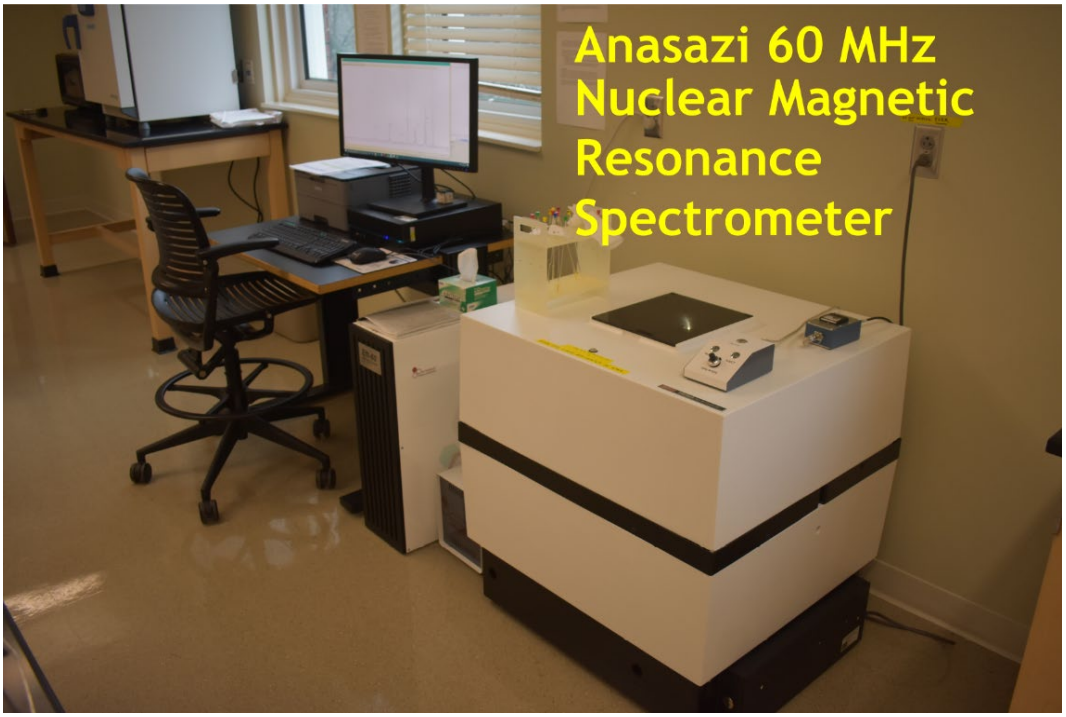


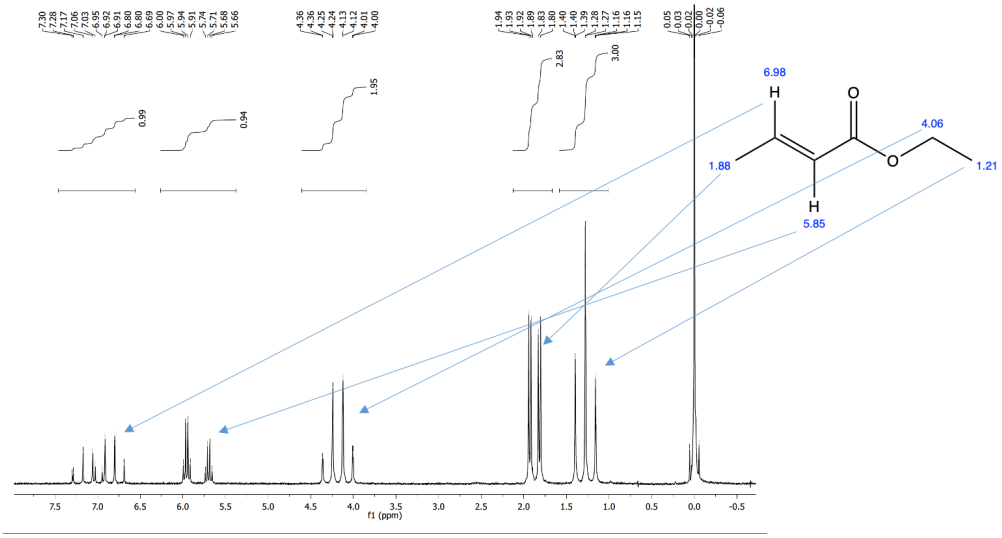
MS spectrum of pooled guaiacol containing fractions from pine
m/z = 166.07 = propyl guaiacol



Gas Chromatography Mass Spectrometer (GC-MS): This instrument is used to analyze as little as 100 nanograms of sample. This high sensitivity is ideal for researching biochemical systems, environmental specimens, even crime scene evidence! The GC-MS is introduced in General Chemistry II, and routinely used in Organic I & II and Analytical Chemistry courses. Additionally its robot arm autosampler has served many capstone research students by allowing an unattended overnight data collection. The example mass spectrum was obtained on a student's sample of pine wood that was deconstructed and chemically converted into a new antibiotic!

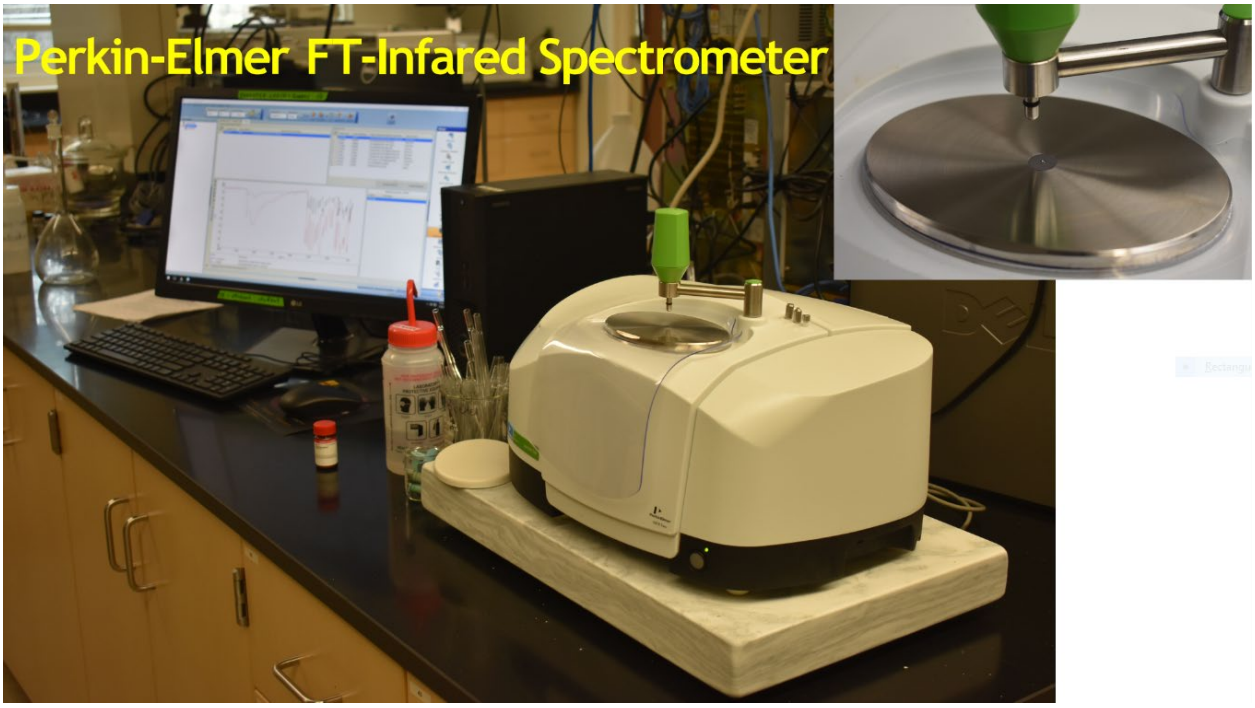
Anasazi 60 MHz Nuclear Magnetic Resonance Spectrometer

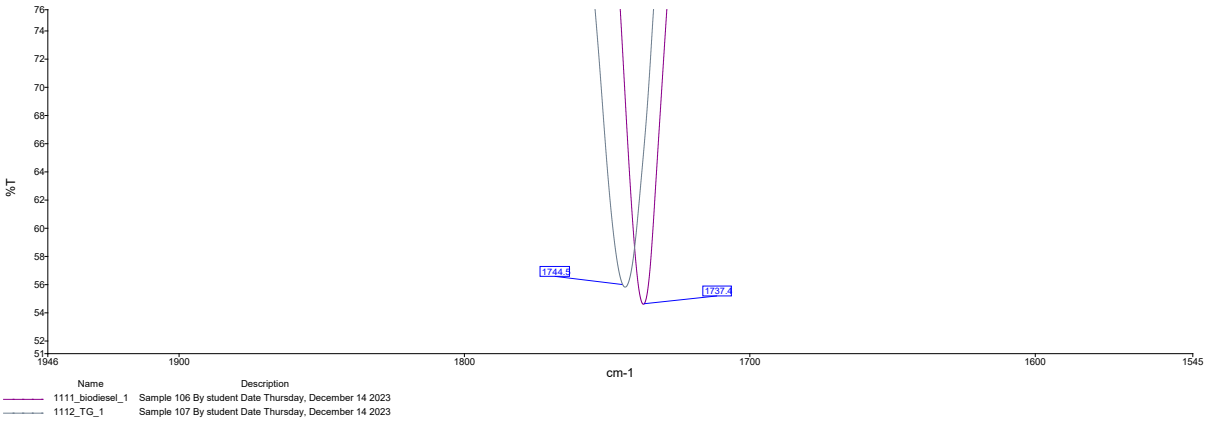




Nuclear Magnetic Resonance (NMR) Spectrometer: The "crown jewel" of the instrument collection at Queens is a small MRI machine that measures nuclear spin frequency. For chemists, this tool allows complete molecular structure analysis and determination. The NMR is used by all levels of students interested in solving molecular puzzles, mainly our Organic II and Instrumental Analysis students who dives into 1D and 2D NMR theory by applying problems from medicine to renewable energy. We also use the NMR to check the structures of fragrance molecules we make, such as the ester, *trans*-ethyl crotonate, shown above.

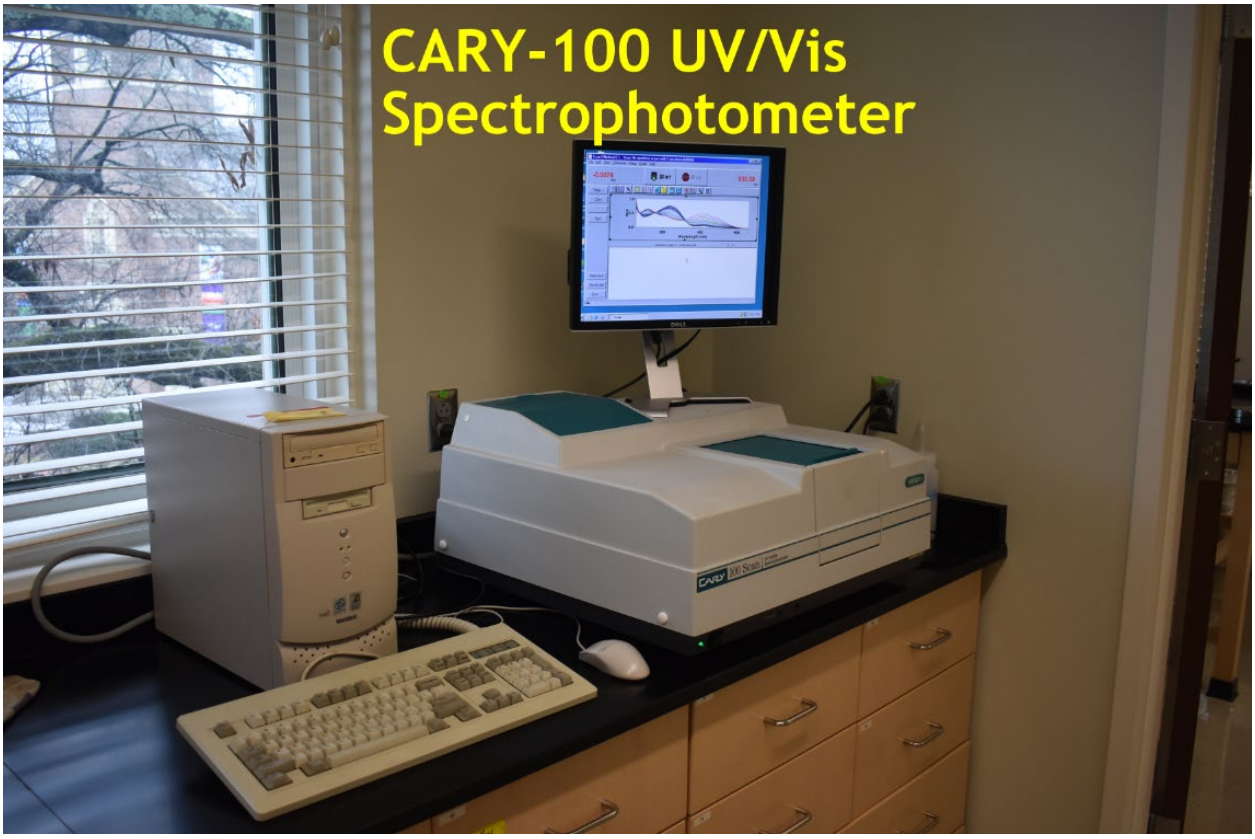
Perkin-Elmer FT- Infrared Spectrometer





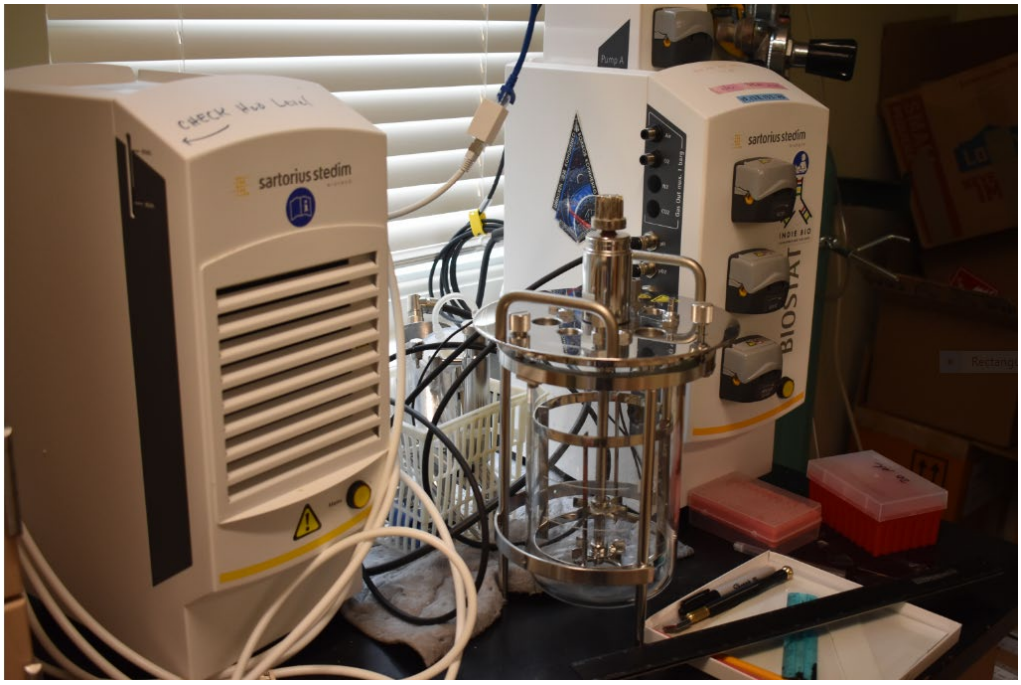
Fourier Transform Infrared Spectrometer (FT-IR): This instrument measures bond vibrations in molecules. The data can confirm the presence (or absence) of specific organic functional groups, such as alcohols and ketones. The instrument is used routinely in Organic Chemistry courses and research projects to monitor redox and amination reactions. In the spectrum shown, the FT-IR signal resolves the ester group of a triglyceride cooking oil (1744 cm^{-1}) and biodiesel fuel (1737 cm^{-1}). Sample preparation requires only 10 microliters and a run time of 20 seconds make the FT-IR an ideal screening tool for routine analyses.

CARY-100 UV/Vis Spectrophotometer



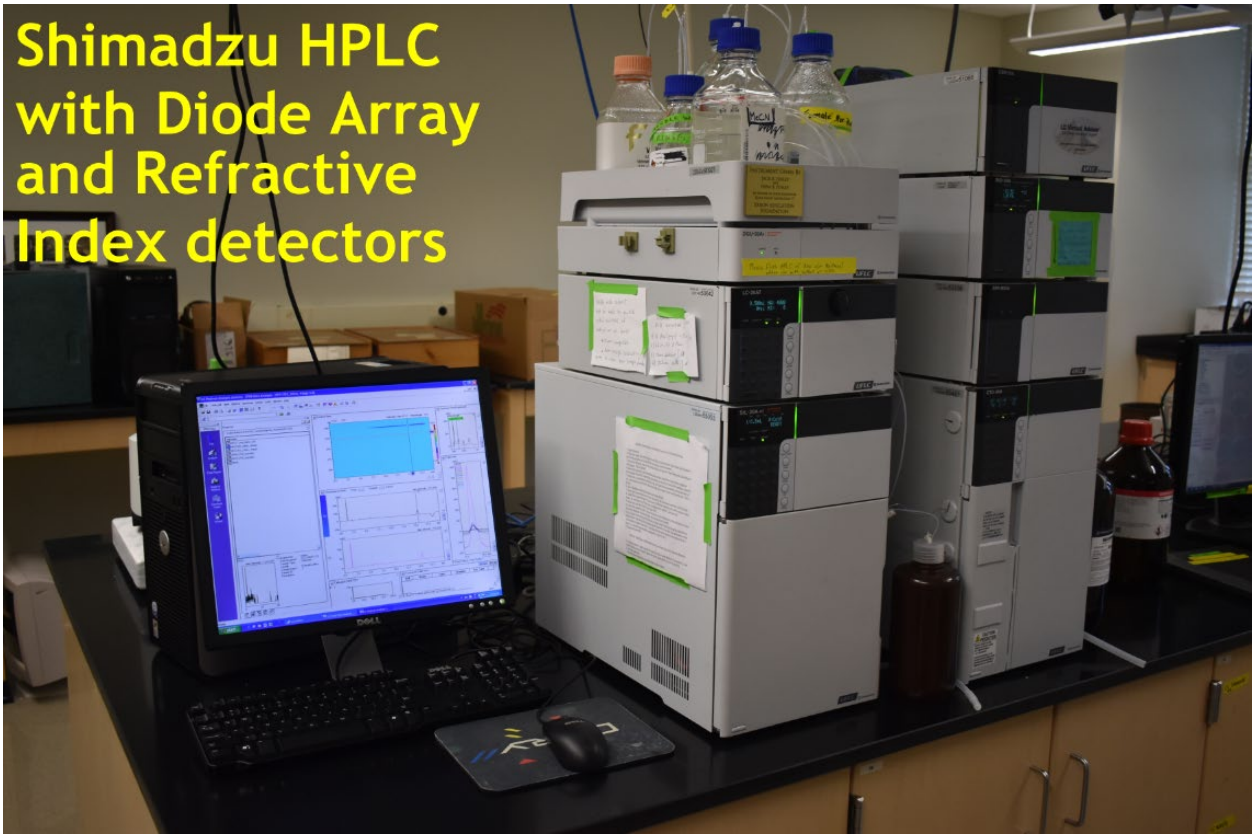
UV-Vis Spectrophotometer: This device is used to measure light absorption by solutions. General chemistry students use this instrument to determine the quality of cranberry juice after generating calibration curves with the data it provides. Additionally, Analytical chemistry students use the UV instrument for statistical analysis of beverage formulations, such as tonic water. The UV spectrophotometer is also used by Biochemistry research students to study protein and RNA concentrations.

Sartorius 2L Bioreactor



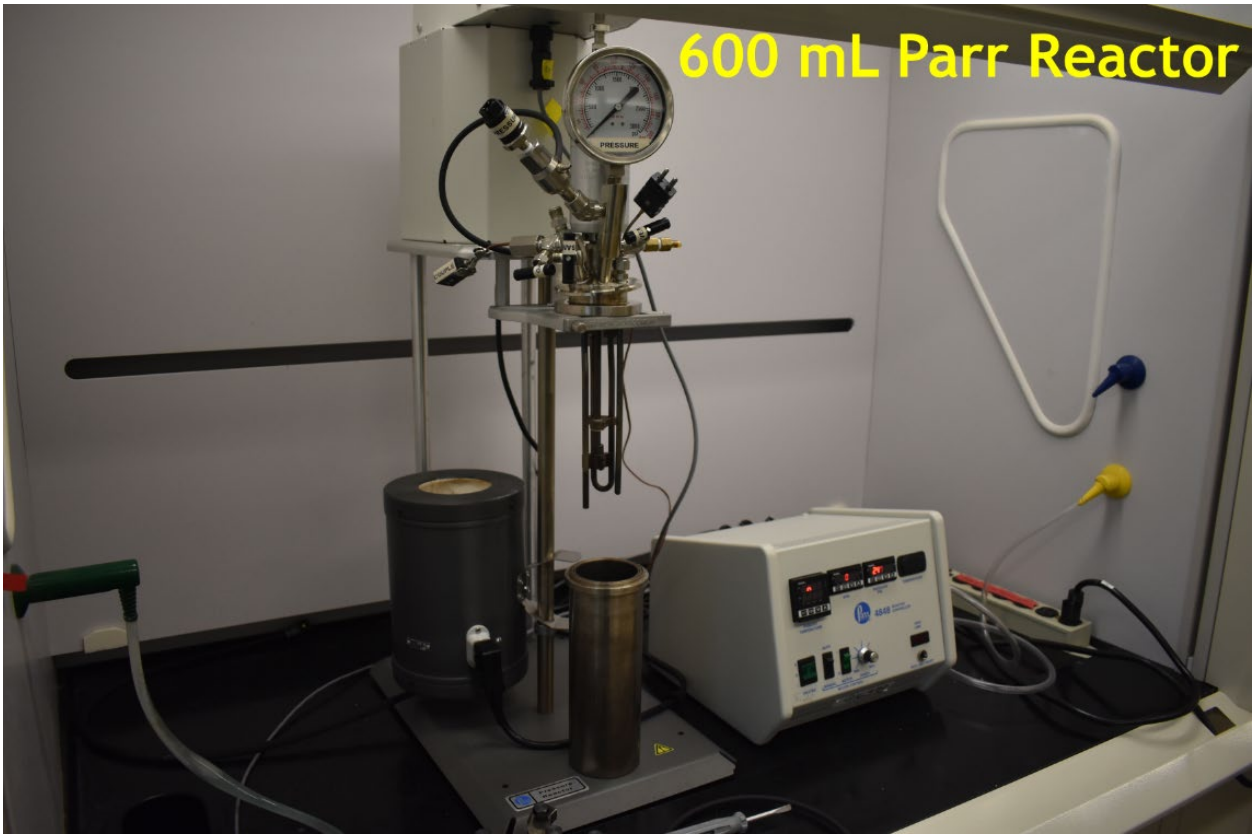
Bioreactor: This reactor is used to grow microorganisms in a controlled environment, typically for the production of useful biomolecules (antibiotics, oils, dyes, proteins, organic acids, fuels, fragrances). The reactor is controlled by a dedicated IP address, so users can monitor and modify experiments from their cell phones while on campus!

Shimadzu HPLC with Diode Array and Refractive Index Detectors



High Pressure Liquid Chromatography (HPLC): This instrument is used to separate and analyze mixtures using light. The diode-array detector is campable of monitoring wavelengths from 200-600 nm and the refractive index detector can “see” molecules that are otherwise invisible to UV, such as sugars. Organic chemistry students use this instrument in labs investigating reactions of CBD oils, and research students use the HPLC to determine yields of products ranging from catalysts to food ingredients.

600 mL Parr Reactor



Parr Reactor: This reactor safely reaches temperatures of 400ºC and pressures of 4000 psi! As such, it is an ideal tool for General Chemistry II and Physical Chemistry I courses where students investigate thermodynamics and equilibrium of chemical reactions. Additionally, the reactor has been used for research projects whereby biopolymers (cellulose, lignin) are deconstructed and used to make biofuels and renewable chemicals.

ChemDraw and SciFinder Software Station

ChemDraw Software station: Our ChemDraw software is located in the Rogers Science Library (reading room) where students can draw chemical structures and predict their chemical and physical properties. This software is ideal for oral and written presentations and considered an industry standard when linked to the SciFinder Chemical Abstracts (CAS) search engine. Through the latter, students enjoy open access to journal abstract and articles spanning all realms of science.