Resources and Equipment in the CAES Department of Analytical Chemistry

The Department of Analytical Chemistry (DAC) at the Connecticut Agricultural Experiment Station (CAES) has been at the forefront of chemical analyses and research since its establishment in 1875. Located on the second floor of the Johnson-Horsfall Building in New Haven, Connecticut, the department occupies over 3,000 square feet of laboratory space. This dedicated area houses state-of-the-art equipment and resources essential for conducting both regulatory testing and cutting-edge research.

The DAC is integral to ensuring public health and safety by analyzing a diverse array of samples, including food, animal feed, Cannabis and Cannabis products (both hemp and marijuana), and environmental matrices such as soil and foliage. The department's capabilities extend to detecting and quantifying a wide range of analytes, including pesticides, heavy metals, polychlorinated biphenyls (PCBs), per- and polyfluoroalkyl substances (PFAS), mycotoxins, and cannabinoid profiles.

As one of 14 laboratories under the U.S. FDA's Food Emergency Response Network (FERN) Chemistry Cooperative Agreement Program, the department supports both state and federal agencies.

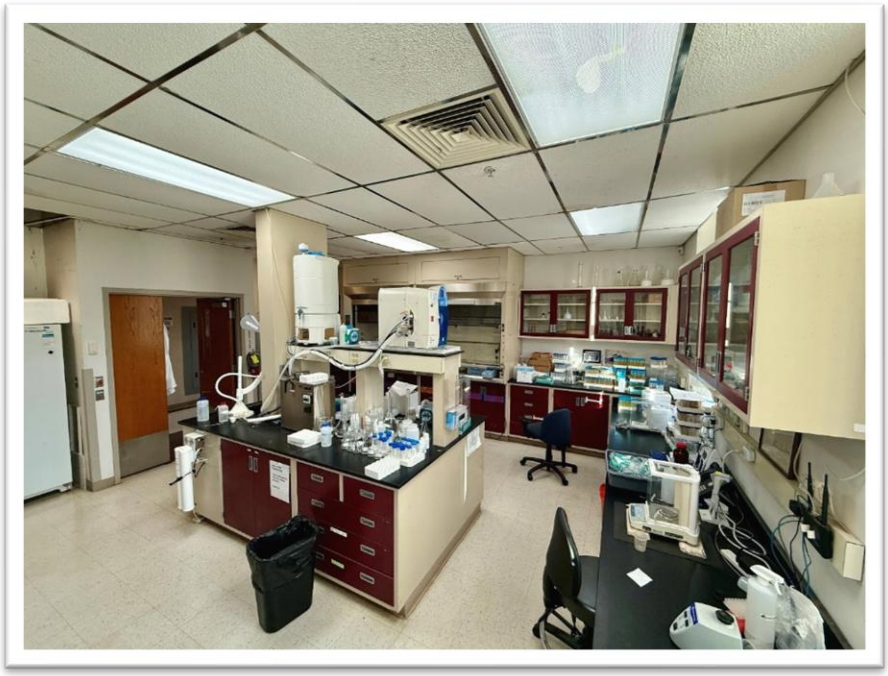
Instrument room 221

Instrument room 222

Organic prep lab room 223:

Organic prep lab room 224:

Inorganic prep room 225:



ISO/IEC 17025 Accreditation

The Department of Analytical Chemistry's commitment to quality and precision is exemplified by its ISO/IEC 17025 accreditation, awarded by the American Association for Laboratory Accreditation (A2LA) in December 2016. This internationally recognized standard outlines stringent requirements for laboratory competence, impartiality, and consistent operations. By achieving this accreditation, the department demonstrates adherence to rigorous quality management systems, ensuring the reliability, accuracy, and validity of its testing and calibration processes.

The accreditation scope encompasses a range of advanced test methods designed to deliver precise and reliable analyses across diverse sample types. For Mycotoxins analysis in animal feed and human foods (B1, B2, G1, and G2), the department employs LC/MS in accordance with CT Tech SOP 051. Percent crude fat in animal feed is determined using the Ankom Fat Extractor and ANKOM Hydrolysis System (CT Tech SOP 074), while percent crude protein analysis is conducted through the Leco Combustion Method (CT Tech SOP 058). Pesticide residues in food and plant materials are analyzed using GC/MS/MS and LC/MS methods outlined in CT Tech SOP 029. Total delta-9 tetrahydrocannabinol (THC) and cannabidiol (CBD) in hemp (*Cannabis sativa*) are measured with GC-FID (CT Tech SOP 069), while THC, THCA, CBD, and CBDA levels in food, plant materials, and consumer products are analyzed by HPLC-UV. These testing practices highlight the department's dedication to precision and excellence.

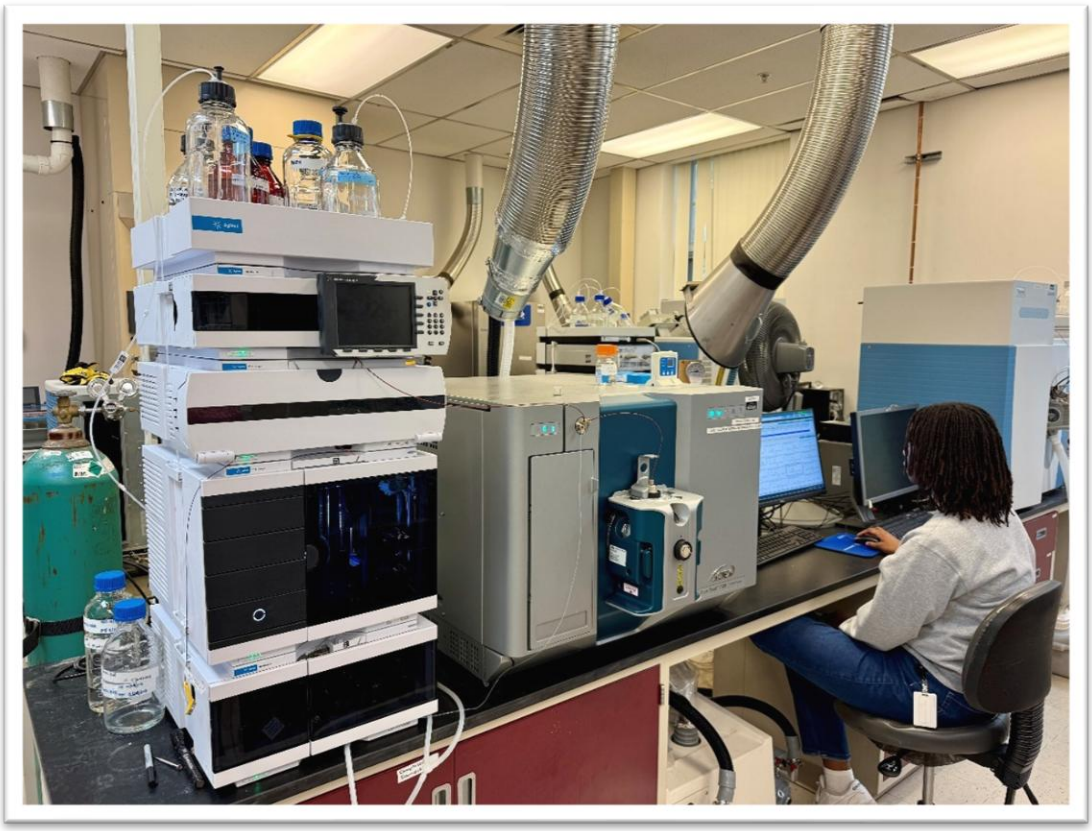
ISO/IEC 17025 accreditation not only ensures the global acceptance of the department's results but also aligns its operations with international regulatory standards. This accreditation fortifies the department's collaborations with state and federal agencies, including its integral role in the U.S. FDA's Food Emergency Response Network (FERN) Chemistry Cooperative Agreement Program, underscoring its pivotal contribution to public health and safety.

Resources and Equipment:

The DAC is equipped with a comprehensive array of instruments that enable precise and accurate analyses:

1. SciEx 7500 Triple Quadrupole LC-MS/MS
2. Agilent High Performance Liquid Chromatograph with ultraviolet detector (HPLC-UV)
3. Nitrogen Generator, NGP10+
4. Thermo Velos Pro LC-MS System
5. Thermo Q-Exactive Orbitrap High Resolution LC-MS/MS
6. Gas Chromatographs equipped with Mass Selective Detectors (GC-MSD)
    a. Agilent GC-MSD 6890N/5975
    b. Agilent GC-MSD 7890B**/5977A**
7. Agilent 7890A gas chromatograph equipped with a flame ionization detector (GC-FID)
8. Agilent 6890 gas chromatograph equipped with dual electron capture detectors (GC-ECD)
9. Thermo TSQ9000 Triple Quadrupole GC-MS
10. Leco Nitrogen Analyzer FP828
11. Thermo iCAP ICP-OES 6000
12. Thermo iCAP Pro XP, ICP-OES,
13. Agilent 7850 and Agilent 1260, ICP-MS connected to an LC
14. GC/MSD with headspace, 8890 GC/5977C MSD/8697 Headspace sampler

1)



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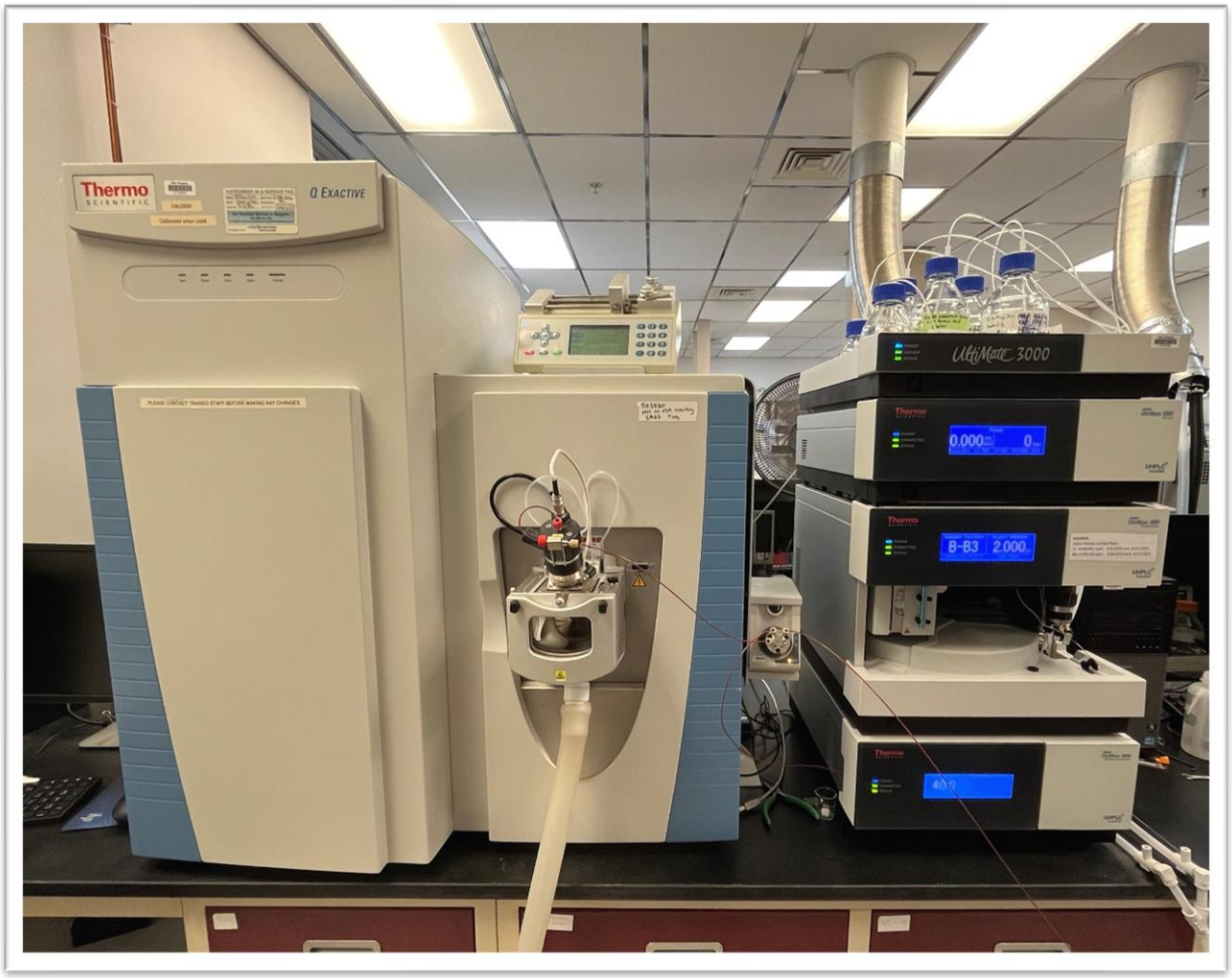

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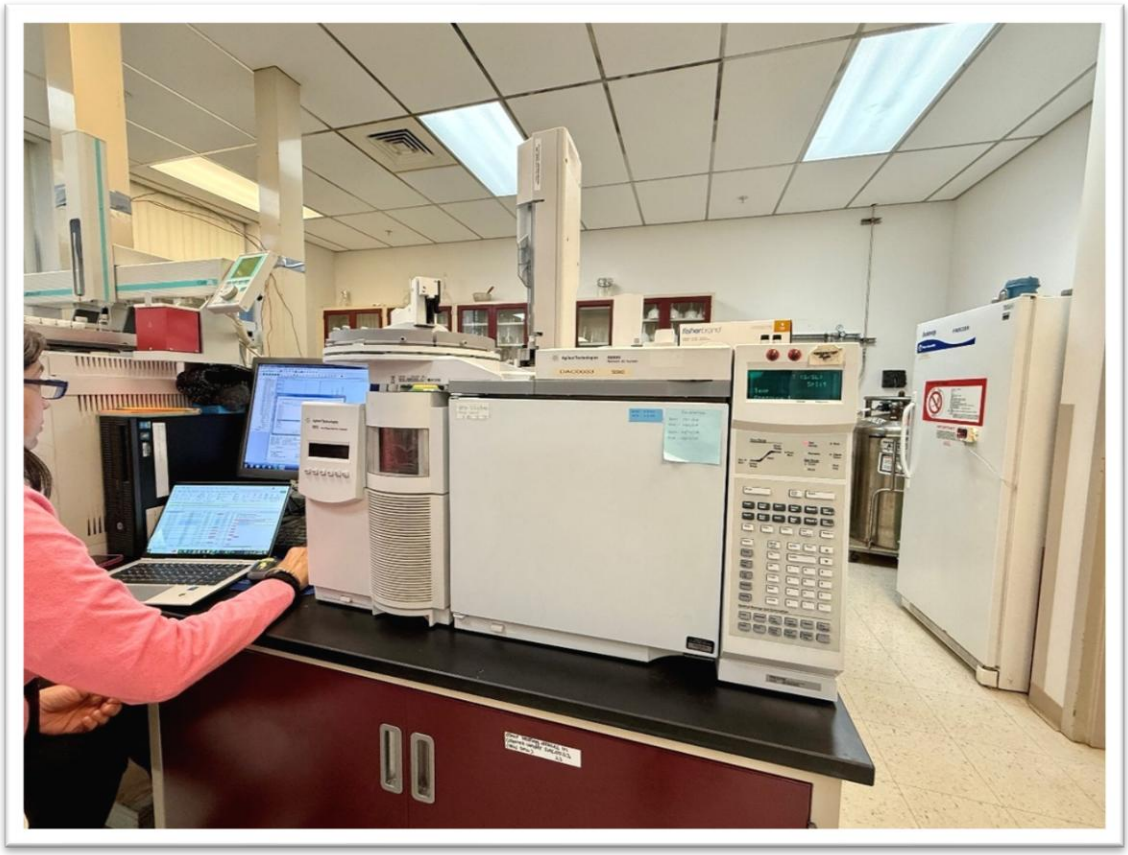

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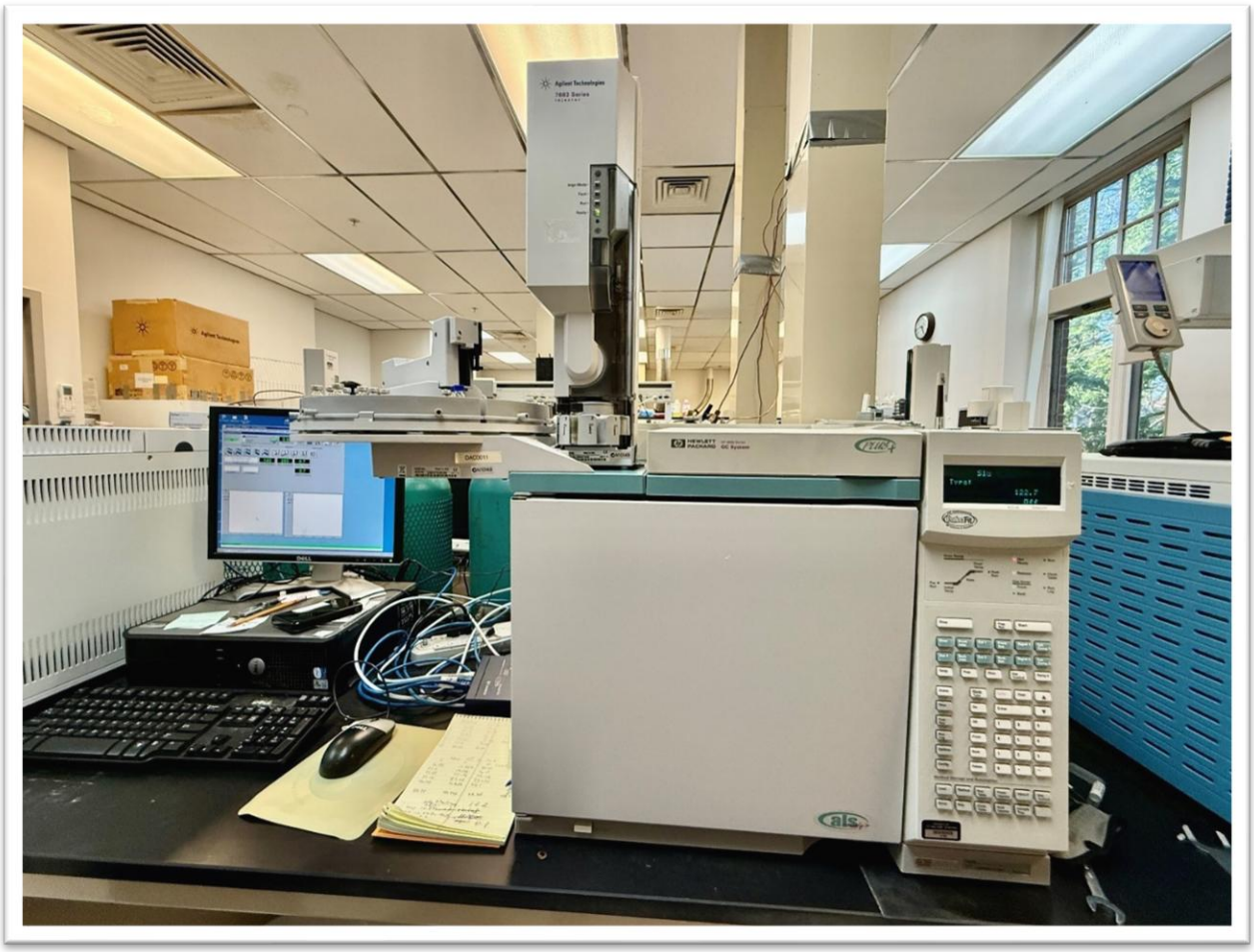
Agilent Technologies
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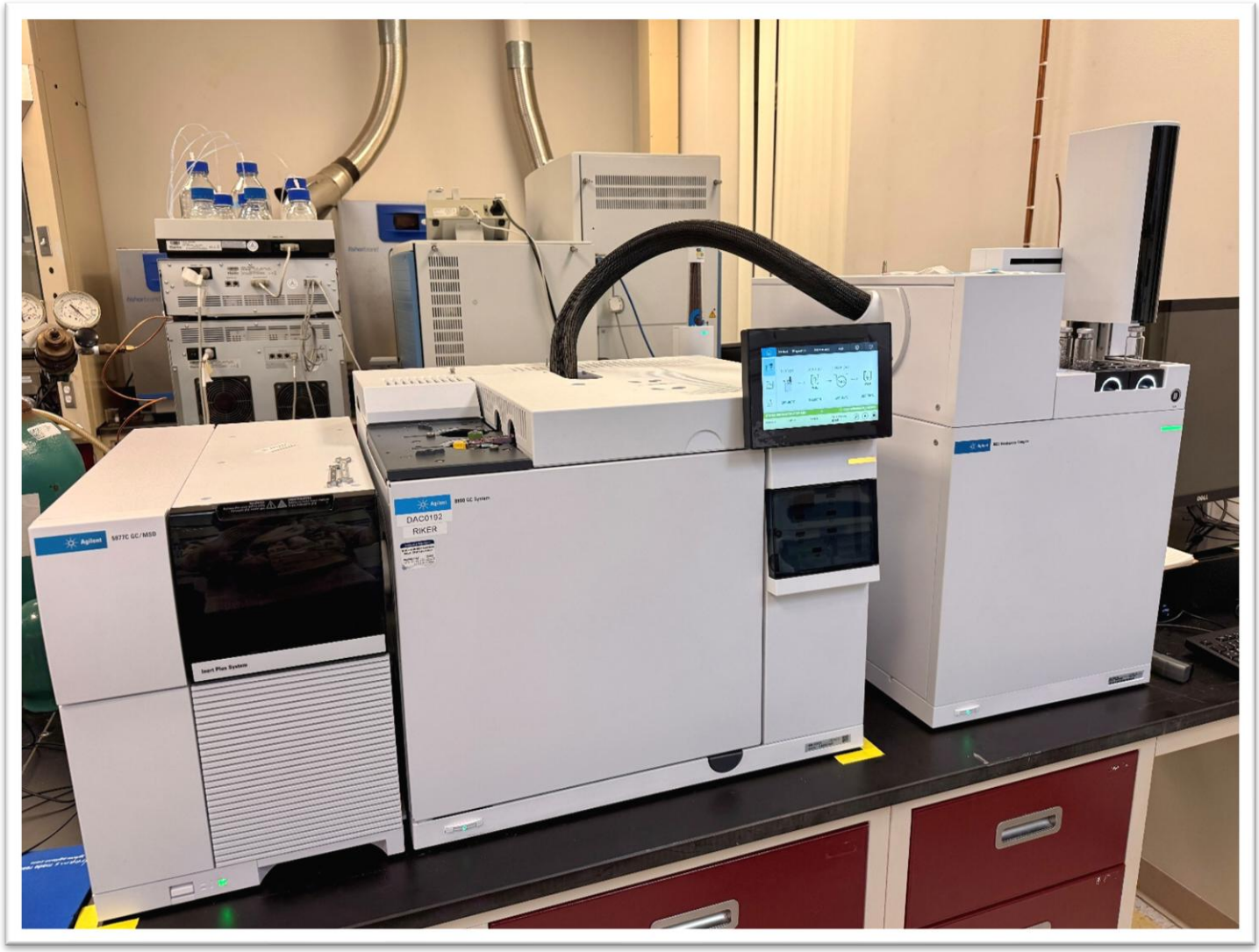
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