



Technical Bulletin

New Ultra High Performance Liquid Chromatograph - Mass Spectrometer at Lakehead University Instrumentation Lab

Lakehead University's Instrumentation Laboratory has acquired a new Ultra High Performance Liquid Chromatograph – Mass Spectrometer (UHPLC-MS) thanks to the joint efforts of LUCAS and the Bio-Refining Research Institute (BRI). Though really two separate instruments, together they make up one powerful analytical tool able to separate a mixture into individual components using the UHPLC and then determining the mass of those separated components in the mass spectrometer (MS).

The Dionex UHPLC is essentially an HPLC with several additional advantages. It is able to withstand the high back pressure generated from using smaller columns, with a finer particle size, as well the tubing has a smaller internal diameter. What this means is faster runs, better resolution, and lower running costs for the user.

The undergirding workhorse of the entire system is the mass spectrometer (MS). The MS is a Bruker amaZon X ion trap, one of the fastest ion traps on the market capable of scan speeds of up to 52000 u/sec. Not only can the amaZon X keep up with the UHPLC but it can switch ion polarity with virtually zero delay!



This new ion trap compliments the existing Gas Chromatograph – Mass Spectrometer (GC-MS) at Lakehead's Instrumentation Laboratory (LUIL). Users will no longer be limited to running only volatile samples with a maximum mass of 800amu. The new system can run a wide range of samples with a mass range of 50-3000amu, opening the door for proteomics and metabolite identification that was not previously possible on the GC-MS, as well as expanding the use for general chemistry.

The ion trap is equipped with two source options; electrospray ionization (ESI) and atmospheric pressure chemical ionization (APCI). ESI will be able to ionize most samples, but for the highly

non-polar compounds such as oils and biodiesel, users can take advantage of the APCI source. Another great feature of the ion trap is its MS/MS capabilities. Users of the GC-MS have been able to further fragment ions of interest using MS/MS, however with the new ion trap, ions can be theoretically fragment components up to 11 times, aiding in compound identification.

This instrument acquisition has greatly increased the analytical tool-box for Lakehead University, potentially benefitting the research efforts of a number of Lakehead University researchers from Anthropology, Biology, Bio-Refining, Chemistry, Chemical Engineering and the Northern Ontario Medical School. Of these researchers, those from Lakehead University's BRI, anticipate that after some method development, the system will be able to help identify and categorize the carbohydrates they have been working on.

The addition of this instrument to the LUCAS laboratories will greatly increase the university's capacity to develop new analytical services centred on organic chemistry.

LUIL technical staff received training at the Bruker training facility and Lakehead University students started to receive training on this instrument beginning in the 2010-2011 academic year as part of the course "Advanced Research Methodologies (MS section)". For more information on the use of LCMS contact Greg Kepka at 807-343-8294.

For more detailed specifications please visit LUIL's UHPLC-MS webpage at:
[https:// lakeheadu.ca/centre/lucas/laboratories/luil/facilities/lc-ms](https://lakeheadu.ca/centre/lucas/laboratories/luil/facilities/lc-ms)