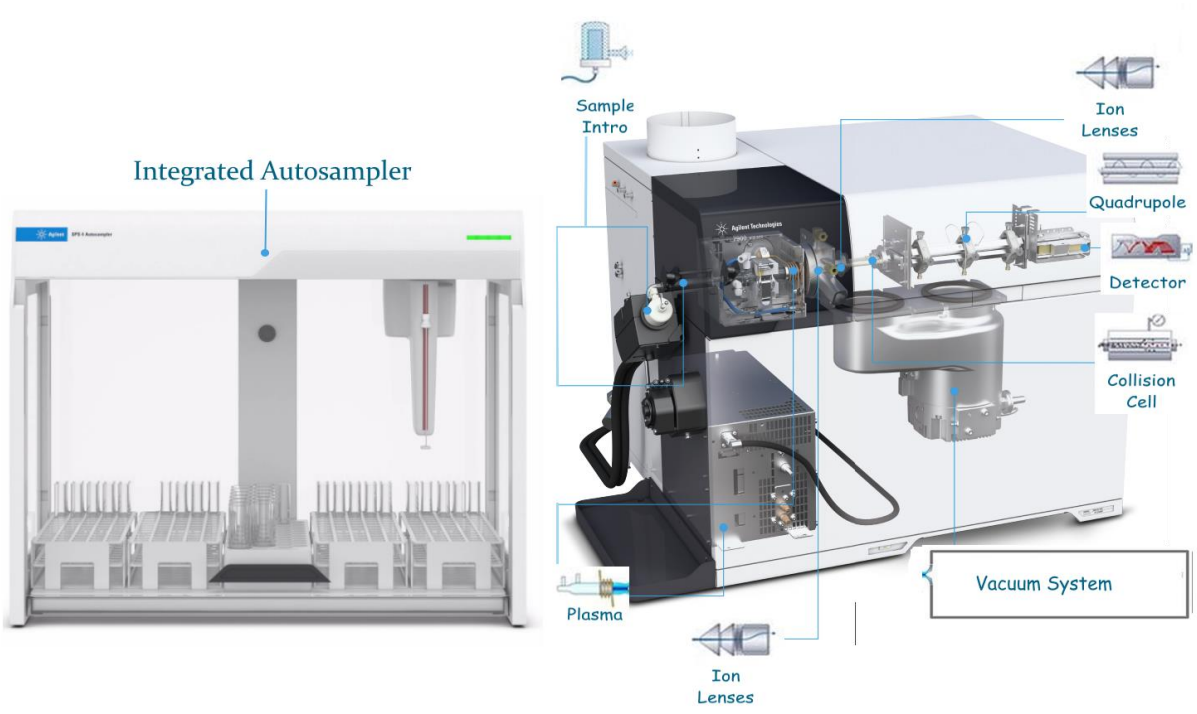
Water Analysis at the TRACES Centre

The importance of sustainable management of water resources around the globe has never been more critical than at present. Access to safe drinking water, agriculture, sanitation, and the protection of both rural and urban infrastructure all rely on this management which is necessary to support a healthy and growing population. Effective management for the protection of freshwater and oceans and their ecosystems, as well remediation and reclamation of impacted aquatic systems, leans heavily on the information and conclusions gathered from interdisciplinary study and research. The foundation of study and research is data, and the TRACES Centre is committed to producing quality measurements in support of the complex analytical needs of the DPES research community. TRACES has both upgraded and expanded its analytical capabilities for the analysis of water whether it be for the assessment of nutrients, quantifying toxic compounds, or investigating substances of emerging concern. This article provides a brief snapshot of some of the key instrumentation that TRACES offers in aqueous testing.

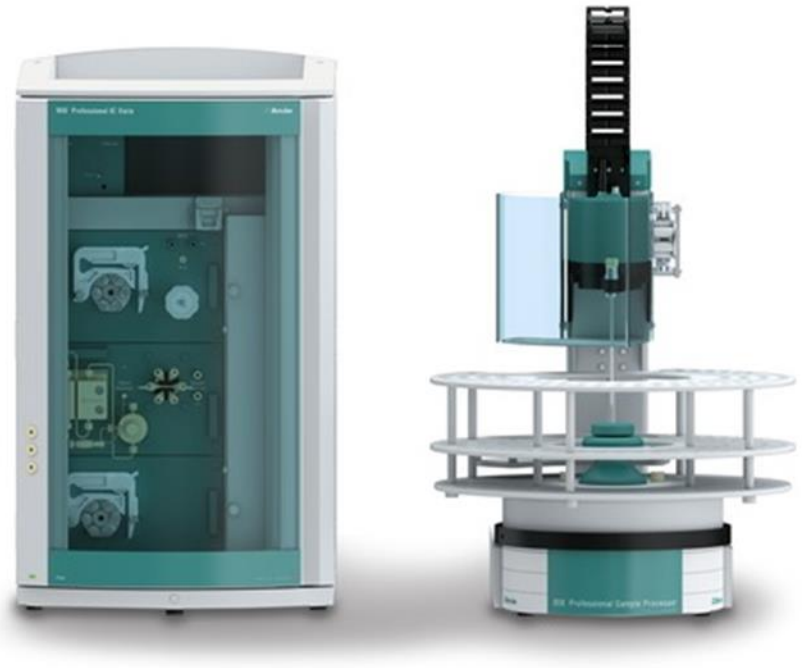
ICP-MS (New Addition to TRACES)

ICP-MS (inductively coupled plasma mass spectrometry) is an elemental analysis technique that uses an argon (Ar) plasma to convert the sample into ions that are then measured using a mass spectrometer. **It can be used to quantify heavy metals such as Cr, Cd and lead in drinking water** for example. In comparison to flame atomic absorption spectroscopy (FAAS), ICP-MS is not only capable of lower levels of detection (low ppb), but also **multi-element scans (>20 metals) in a single run**. This is in contrast to single element analysis (one at time) with the FAAS system. The ICP-MS system in the TRACES facility also has built-in EPA methods such as US EPA Methods 200.8 and 6020 for drinking water and other waters.



IC

Ion chromatography is a staple measurement technique for the analysis of anions and cations and weak organic acids in the analysis water (drinking water, groundwater, etc.). It allows the user to **determine the identity and amounts of dissolved ions such as chloride, phosphate, sulfate, calcium and ammonium** at low ppm levels**.**



FAAS and GFAAS

Flame (FAAS) and graphite furnace (GFAAS) atomic absorption spectroscopy is a technique that measures the concentrations of elements at ppm and ppb levels respectively. **Much like the ICP-MS, FAAS is an elemental technique that can be used to quantify heavy metals** in aqueous samples**.** Instead of using a plasma to covert

the sample to ions and mass spectrometry for detection, FAAS uses a flame to covert the sample to atoms and spectroscopy for detection. While the ICP-MS can achieve lower limits of detection and multi-element scans, the FAAS is more cost-effective and easier to use than the ICP-MS. It is well suited for small batches of samples with only a few elements of interest and where budget is a constraint.

TOC Analyzer (Upgraded model)

The TOC (Total Organic Carbon) Analyzer uses oxidative combustion IR analysis to measure the concentration of dissolved carbon in aqueous samples. The instrument has the versatility to **determine total carbon (TC), total inorganic carbon (IC), total organic carbon (TOC) and total non-purgeable organic carbon (NPOC) in both fresh and seawater samples** at high ppb levels. The TOC Analyzer is also capable of **measuring total nitrogen (TN) in water samples** via chemiluminescence analysis of N_2 (g).