

## Analytical Facilities for Solid and Liquid Analysis

The School of Geography, Earth and Environmental Sciences has an extensive range of modern analytical instrumentation (ICP-MS, GC-MS, GC, TOC, IC), plus complimentary equipment that are used to support undergraduate and post-graduate applications for both solid and liquid sample analysis.

Sample types include river and borehole waters, rocks, sludges and sediments. A fully equipped field site on campus provides a unique capability for hydrogeological research through the use of a specialised set of hydrogeological equipment including a borehole logger and chemical/colloid sampling devices.

### Inductively Coupled Plasma Mass Spectrometer (ICP-MS)

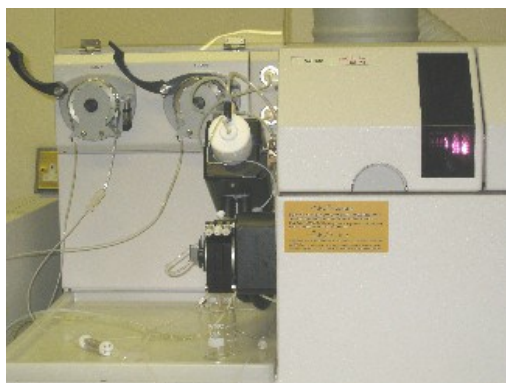
Contact: [a.c.jones.bcs@bham.ac.uk](mailto:a.c.jones.bcs@bham.ac.uk) (<mailto:a.c.jones.bcs@bham.ac.uk>)

The ICP-MS is an Agilent 7500ce instrument. It performs rapid multielement determinations in liquid samples and is able to analyse for the majority of elements below fluorine in the periodic table at trace levels (ppb-ppt). This analytical ability has numerous research applications across different environmental, geochemical and biological fields.



The ICP-MS applies octopole 'collision cell technology' using helium and hydrogen gases to eliminate spectrally based interferences.

The sample introduction system is externally mounted for ease of access and is also equipped with an autodiluter system to assist in the reduction of sample matrix effects.



### Gas Chromatography- Mass Spectrometer (GC-MS)

Contact: [j.m.harris@bham.ac.uk](mailto:j.m.harris@bham.ac.uk) (<mailto:j.m.harris@bham.ac.uk>)

The GC-MS comprise an Agilent 6890W GC (Gas Chromatograph) and Agilent 5973 MSD (Mass Selective Detector) fitted with a Gerstel multi-purpose sampler and FID (Flame Ionisation Detection). The GC-MS allows for a wide range of organic contaminants to be analysed and is fitted with various capillary columns to allow separation of complex mixtures.



The instrument is routinely used for VOC (volatile organic compound) analysis via head-space GCMS and for hydrocarbon gases (ethene, ethane, methane) via the GC-FID option. The Gerstel injector is a robotic system with great flexibility allowing head-space (gas) and liquid (solvent) sample injection as well as SPME (solid phase micro extraction) fibre injection.

### Gas Chromatography (GC)

Contact: [g.pinay@bham.ac.uk](mailto:g.pinay@bham.ac.uk) (<mailto:g.pinay@bham.ac.uk>)

The Gas Chromatograph (Perkin Elmer Clarus 500) is equipped with an electron captor detector (63Ni) and has been set up to measure nitrous oxide (N<sub>2</sub>O) which is an important greenhouse gas. Sensitivity ranges from 0.3 to 300 ppm. It is used to measure natural N<sub>2</sub>O emission as well as in situ and potential denitrification activity.



### Total Organic Carbon Analyser

Contact: [a.baker.2@bham.ac.uk](mailto:a.baker.2@bham.ac.uk) (<mailto:a.baker.2@bham.ac.uk>) or [j.m.harris@bham.ac.uk](mailto:j.m.harris@bham.ac.uk) (<mailto:j.m.harris@bham.ac.uk>)

The TOC analyser (with autosampler) incorporates both high and low sensitivity detectors, for analysis of total carbon, inorganic carbon, total organic carbon and non-purgeable organic carbon in fresh water, ground water, marine and waste water samples in the concentration range of <1ppm up to 1000ppm.



The TOC analyser is also equipped with a solid sample module. Samples are combusted using ceramic boats for total and inorganic carbon analysis in diverse solid samples (soils, bedrock, sludges).



In addition for anion analysis there is a Dionex Ion Chromatography system (Model ICS 90) with an automated sampler.

Portable waterproof meters are available for analysing pH, DO, EC, alkalinity and anions in the field.

There is also a technical laboratory with a lathe, pillar drill, circular saw, grinding equipment and various hand tools for the design and development of equipment for various fieldwork projects.

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