

Stable isotope ratios (carbon, nitrogen, oxygen, hydrogen)

The Environmental Isotope Labs (EIL) are equipped with modern isotope ratio mass spectrometers (IRMS) [Thermo Delta V Plus and Thermo Delta V Advantage], a Picarro Cavity Ring-Down Spectrometer (CRDS), and a range of sample preparation devices.

We also operate well-equipped sample processing laboratories, and these facilities are complemented by the broad range of environmental research expertise within ANSTO.

The EIL can analyse carbon ($\delta^{13}\text{C}$), nitrogen ($\delta^{15}\text{N}$), oxygen ($\delta^{18}\text{O}$), and hydrogen ($\delta^2\text{H}$) isotopes in a range of environmental samples. Most commonly we handle waters (groundwater, rainfall, river, lakes, etc.) and organics (soils and biota).

Stable isotope analysis in conjunction with tritium (^3H) and AMS Radiocarbon (^{14}C) analysis are utilised to conduct research which includes:

- Groundwater-surface water interactions
- Groundwater residence times (dating)
- Ecohydrology, aquatic food web studies
- Palaeo-climate and palaeo-hydrology

The Elemental Analyser / Isotope Ratio Mass Spectrometer (EA/IRMS) in the Accelerator Mass Spectrometry (AMS) laboratory is also available to analyse $\delta^{13}\text{C}$, $\delta^{15}\text{N}$ and CN% on a range of solid sample types (e.g. vegetation, sediment/soils, organic matter, samples with enriched $\delta^{13}\text{C}$ or $\delta^{15}\text{N}$ and collagen extracted from bone).

We offer advice regarding sample collection, handling and pre-treatment. If requested, we can perform sample pre-treatment to remove carbonates from sediments and soils prior to $\delta^{13}\text{C}$ analysis, or extract collagen from bone for $\delta^{13}\text{C}$, $\delta^{15}\text{N}$ and C:N ratio analyses. We request that contact is made with the facility prior to any sample pre-treatment, and if possible, prior to sample collection to ensure that the samples are suitable for measurement.

For experiments requiring analysis of enriched stable isotopes, please contact us to discuss experimental design.

Samples must be dry, finely ground and well homogenised. For each analysis, replicate samples are analysed as this is an indication of the homogeneity of the sample. Sample loading is included in the cost of analysis.

Sample type	Isotope Ratio	Standard sample amount required
Water	$\delta^2\text{H}$	30mL
Water	$\delta^{18}/^{16}\text{O}$	30mL
Fresh water	$\delta^2\text{H}$ and $\delta^{18}/^{16}\text{O}$	30mL
DIC (water)	$\delta^2\text{H}$	12mL
Organic (solid)	$\delta^{13}\text{C} + \text{C}\%$	No more than 1g
Organic (solid)	$\delta^{15}\text{N} + \text{N}\%$	No more than 1g
Organic (solid)	$\delta^{13}\text{C} + \text{C}\%$ and $\delta^{15}\text{N} + \text{N}\%$	No more than 1g
POM-glass-fibre-filter	$\delta^{13}\text{C}$	one 47mm GFF
POM-glass-fibre-filter	$\delta^{15}\text{N}$	one 47mm GFF
POM-glass-fibre-filter	$\delta^{13}\text{C}$ & $\delta^{15}\text{N}$	one 47mm GFF

Please note that $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ cannot be simultaneously analysed in all samples, please discuss your sample type with the contact scientist.

Please discuss your proposal with the appropriate ANSTO Contact Scientist before submitting your proposal as they will assist you in making the correct capability selection.

Capability selection

- Stable isotope, $\delta^{13}\text{C}$, C% , ^{15}N & N% analyses
- Stable isotope, $\delta^{13}\text{C}$ & C% analysis only
- Stable isotope $\delta^{15}\text{N}$ & N% analysis only
- Stable isotope, $\delta^2\text{H}$ & $\delta^{18}\text{O}$ analysis in fresh water only via CRDS
- Bone (collagen) samples: collagen extraction prior to $\delta^{13}\text{C}$, C% , $\delta^{15}\text{N}$ & N% analyses
- Bone (collagen) samples: N% for collagen test

For further information please contact:

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