Isotope analysis

Driving evolution in isotope analysis

Thermo Scientific DELTA Q IRMS

World-class isotope analysis driven by an innovative Qtegra ISDS Software platform

Driving productivity for laboratories investigating the origin, history, and potential adulteration of samples.

The Thermo Scientific™ DELTA™ Q Isotope Ratio Mass Spectrometer (IRMS) represents the next evolutionary leap forwards in isotope analysis. Harnessing decades of continuous improvement, the DELTA Q IRMS is the pinnacle of isotope analysis, providing high quality, robust data on an easy-to-use innovative Thermo Scientific™ Qtegra™ Intelligent Scientific Data Solution (ISDS) Software platform.

Future-proof platform through connectivity

For expanding analytical needs for IRMS applications, the DELTA Q IRMS is designed to be seamlessly connected with a wide range of Thermo Scientific™ peripherals, aimed at supporting varying investigations including food authenticity, criminal and environmental forensics, doping control, and scientific research.

Maximize laboratory uptime

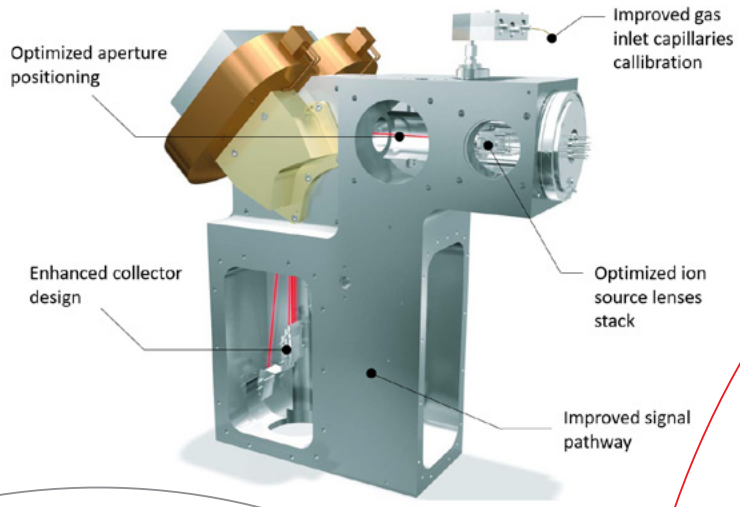
Our worldwide network of world-class service and support personnel offers specialized, end-to-end services that help you maximize operational productivity throughout the life of your instrument.

Designed to deliver ultimate performance

DELTA Q IRMS is a result of continuous improvements based on more than 20 years of excellence in Thermo Scientific™ DELTA Series Isotope Ratio Mass Spectrometers. Driven by user's feedback, we have carefully optimized our IRMS system, starting from the gas intake, the ionization volume, along the ion optical pathway up to the high sensitivity Faraday cup detectors, delivering improved measurement reproducibility and precision.

DELTA Q IRMS delivers:

- Calibrated inlet capillaries to ensure robust instrument to instrument performance for sensitivity and linearity,
- Optimized ion source lenses stack for improved ionization and data reproducibility,
- Optimized aperture positioning ensuring precise and accurate isotope ratio measurements across the extended focal plane of the mass analyzer,
- Enhanced collector design and protected ion optical path to ensure low scattering and improved signal-to-noise ratio, resulting in better data quality,
- Low capacitance and direct wiring of the Farday cups to the high sensitivity amplifier input for low noise and ultimate signal stability and robustness against external disturbances,
- Ethernet technology for data transfer.



Intelligent workflows delivered by Qtegra ISDS Software

Qtegra ISDS Software for gas IRMS dramatically improves your lab productivity with automatic Get Ready functionality, ready-to-go templates and inbuilt quality control tools. Qtegra ISDS Software has an intelligent workflow that drives you from sample to result, eliminating any barriers and flexibly switching between different system configurations. With the same look and feel across multiple instruments, analysts are empowered to effectively use their time in laboratory, even for the most challenging analysis setups. Qtegra ISDS Software sets the bar in Gas IRMS software by offering simplicity without compromising on flexibility.

The software platform is built on four pillars:

Intelligent

Built-in intelligence facilitates the full workflow from sample to results. Laboratories can be more reactive and profitable, with software that enables data driven decisions.

Scientific

Developed with scientific integrity, Qtegra ISDS Software delivers high quality, reliable data that labs can trust. Data transparency lets laboratory personnel focus on other tasks while ensuring the utmost confidence in scientific collaboration.

Data

Data is the key to success for all laboratories. Qtegra ISDS Software can help labs excel at efficiently delivering consistent and relevant results with extensive tools to effectively acquire and manage data.

Solution

Laboratories can enjoy the familiarity of common software across multiple analytical systems while differentiating their offering through customizable and application specific workflows.

When connected with Thermo Scientific peripherals using integrated Qtegra ISDS Software control, the DELTA Q IRMS provides precise and sensitive measurement of the isotope fingerprints—C, N, S, O and H isotopes— a unique chemical signature of samples, helping you gain unique insights into their history and origin.

Food authenticity and origin

Is the label declaration on my food correct?

Complexities in the food supply chain present opportunities for economically motivated fraud. From fruit and vegetables, to wine and coffee, the DELTA Q IRMS provides isotopic fingerprints ideally suited to determining food integrity.

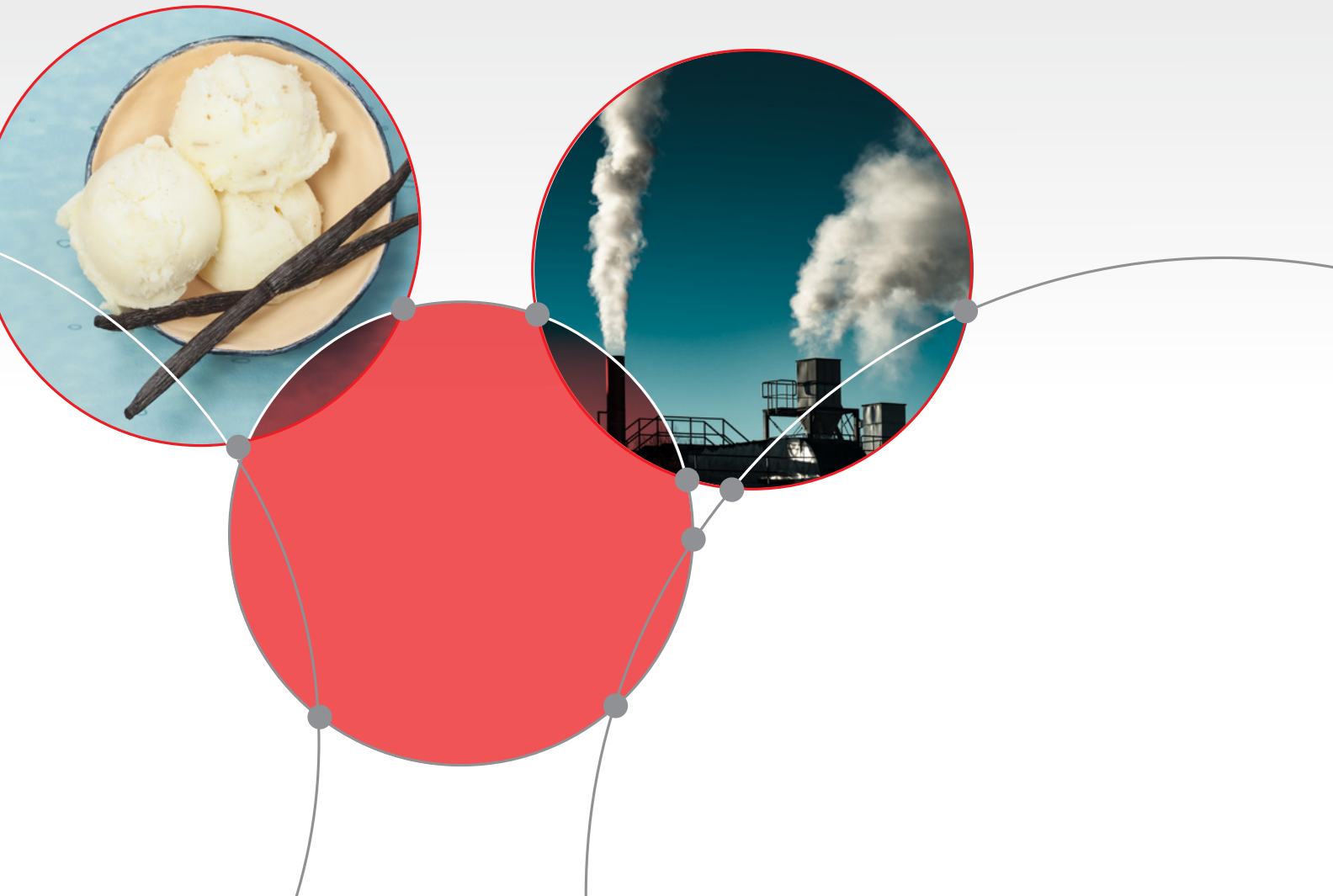
- Food Adulteration
- Food and Beverage Origin

Environmental

Where does the pollution in the soil, water or air come from?

An assessment of individual organic pollutants in soil, ground water and air contamination can be traced with C, N, and S isotope fingerprints. For example, the source of high-concentration sub-micron (PM2.5) pollutants in air can be identified.

- Agronomy
- Ecology and Biology

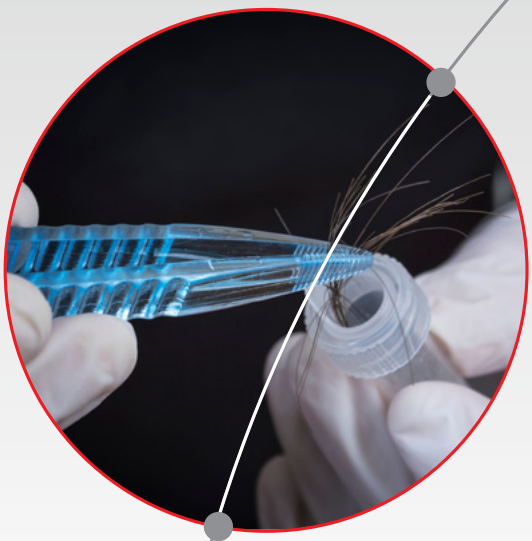


Sports Doping

Has this athlete taken performance-enhancing substances?

Analysis of stable carbon isotope ratios are routinely applied in doping control labs to distinguish endogenous steroids from their synthetic analogs in order to identify use of performance enhancing substances.

- Nutrition
- Medical research



Forensics

How do isotope fingerprints support forensic investigations?

From tracing explosives, illegal drugs, counterfeit currency, animal tissues like ivory, and crime scene evidence, forensic investigations examine samples to determine how similar or different they are, or to identify their origin.

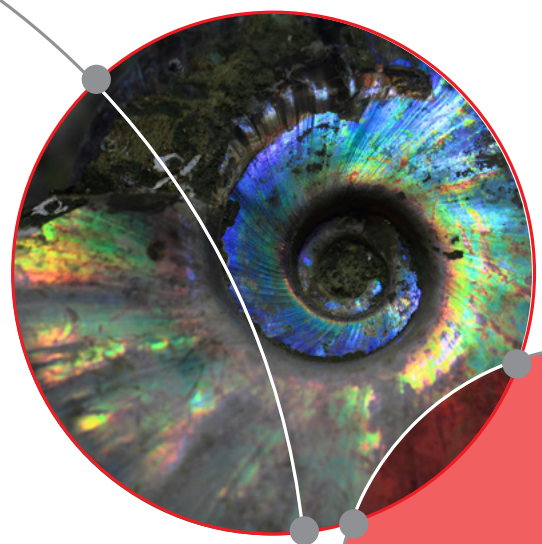
- Archaeology
- Provenance

Geosciences

What was the climate like millions of years ago?

By analyzing materials such as sediments, ice cores, and speleothems, the DELTA Q IRMS makes it possible to understand epochal changes in vegetation, rainfall patterns, and temperature. The isotope composition of samples allow an understanding of processes in modern and ancient environments.

- Soil Science
- Palaeoclimatology research

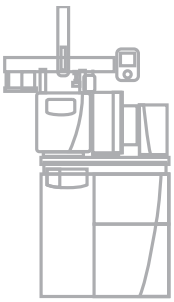


Connectivity for origin and authenticity

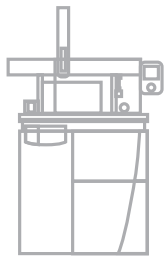
High throughput, unattended operation, and flexibility for demanding analysis is brought to laboratories through the DELTA Q IRMS and the connecting peripherals that are fully controlled by the Qtegra ISDS Software.

The Thermo Scientific™ EA IsoLink™ IRMS System is an automated, easy-to-use solution for isotopic analysis of carbon, hydrogen, nitrogen, sulfur and oxygen of bulk samples powered by chromatography driven technology with high sensitivity on small samples.

The Thermo Scientific™ LC IsoLink™ II IRMS System connects HPLC with IRMS, allowing sensitive, precise determination of $^{13}C/^{12}C$ ratios of polar compounds and bulk samples.



The Thermo Scientific™ GC IsoLink™ II IRMS System provides seamless solutions combining the separation power of capillary GC with IRMS with high sensitivity for the analysis of GC amenable compounds.



The Thermo Scientific™ GasBench System facilitates automated preparation and analyses of headspace samples, including water equilibration, carbonates, and atmospheric gases.

The Thermo Scientific™ Dual Inlet and Multiport Modules for automated analysis of isotopes in air, allowing precise and accurate comparison of clean sample and reference gases.

Learn more at **thermofisher.com/DELTAQ**