thermo scientific

The joy of discovery

Your curiosity, our geosciences portfolio

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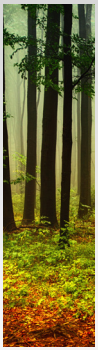
Geochemistry

How was our planet formed and how did it evolve through time? What do we know about the formation of the solar system? What about the other planets around us? The natural variations in the relative abundances of isotopes and elements are used as tools to explain the mechanisms behind geological systems on Earth and in the cosmos. These provide insights into a variety of processes, like the evolution of the Earth surface, the evolution of the ocean chemistry and Earth climate, weathering processes on Earth, and many more.

Biogeochemistry

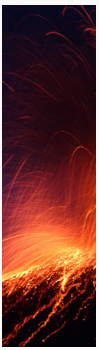
Isotopic signatures in a wide variety of complex organic compounds reveal unique insights in biological and biogeochemical processes. This is true as chemical and physical processes lead to changes in the natural isotope composition of organic compounds. For instance, the isotopes ^{13}C, ^{18}O, ^{15}N and ^{2}H provide scientists with a wealth of information on the origin of compounds, pathways of metabolism, synthesis and diagenesis as well as conditions of formation, and more.

Exciting things happen when geoscientists start exploring. Whether that research takes you deeper into the earth, the fossils, the sea or the sky, our comprehensive portfolio of geoscience solutions can power your next breakthrough and enable your next moment of greatness. We proudly offer the world's largest geosciences research portfolio — ready and waiting for your next discovery.



Geochronology

Geochronology involves age dating of rocks, minerals, fossils, sediments and other materials. Absolute age determination is performed by numeric dating methods, such as U-series methods, K-Ar and Ar-Ar methods, as well as Rb-Sr, Sm-Nd and Re-Os dating techniques. Relative age determination uses paleomagnetism and stable isotope ratio calculation.



Climate change research

The past climate helps us to understand climate change and how it can affect us today. Isotopic analysis of ice cores and biogenic carbonates can be linked to past temperatures and global sea level variations. Also, clumped-isotope thermometry attracts growing interest as a very powerful tool for paleotemperature reconstructions.

Multicollector Technology

Meet the ever expanding application demands of geosciences and other disciplines that require high-precision isotope ratio measurements with MC-ICP-MS instrumentation or extract high-precision isotope ratio information from your samples with the Thermal Ionization Mass Spectrometer.

MC-ICP-MS

The Thermo Scientific™ Neptune XT™ MC-ICP-MS integrates established field-proven technologies of the Neptune Series instruments with the latest developments in technology for isotope ratio analysis from Thermo Fisher Scientific™. These developments include 10^{13} Ω Amplifier Technology with gain calibration and Tau correction, a Jet Interface for highest sensitivity, and a central dual-channel detector (SEM/Faraday cup). www.thermofisher.com/mc-icp-ms

Thermal Ionization MS

Extract high-precision isotope ratio information from your samples. The Thermo Scientific™ Triton XT™ TIMS integrates the established field-proven technologies from the Triton Series instruments with the latest developments in technology for isotope ratio analysis from Thermo Fisher Scientific. www.thermofisher.com/tims

10^{13} Amplifier Technology

Are you limited in sample size? One of the major challenges in geosciences is the analysis of very small ion beams. The analytical precision of your studies can be limited by the detection system of the mass spectrometer. The amplifiers, equipped with Thermo Scientific™ 10^{13} Ω Amplifier Technology™ with a new resistor design, enable you to get faster analysis times and extremely low noise/signal characteristics. www.thermofisher.com/amplifier

Noble Gas MS

Noble Gas MS

The isotopes of the noble gases He, Ne, Ar, Kr and Xe are powerful tools in geochronology, cosmochemistry and thermochronology. Discover what our noble gas static vacuum mass spectrometers can do for your research.

Take the next step in noble gas mass spectrometry. The new series of Thermo Scientific™ noble gas mass spectrometers gives you unsurpassed precision, sensitivity, dynamic range, linearity and stability. www.thermofisher.com/noblegasms

Gas Isotope Ratio MS

High Resolution Gas IRMS

The new Thermo Scientific™ Ultra™ High Resolution Gas Isotope Ratio Mass Spectrometer revolutionizes the measurement of site-specific and clumped-isotope-ratio analysis of small molecules. Analysts now get direct access to the conditions under which molecules were formed, how they were transported, stored and degraded. This will enable new discoveries in climate research, biogeochemistry, forensics, oil and gas exploration. www.thermofisher.com/ultra

10 kV IRMS

Utilize the gold standard in IRMS. The Thermo Scientific™ 253 Plus™ 10 kV IRMS redefines high performance for isotope ratio mass spectrometry. It builds on the outstanding robustness, linearity, and sensitivity only available in the Thermo Scientific 10 kV IRMS technology. Technical innovations for the 253 Plus 10 kV IRMS improve sample utilization, stability, background and signal-to-noise resulting in ultimate precision on smallest sample sizes. www.thermofisher.com/irms

Carbonate Device

Achieve highly sensitive, ultra-precise isotopic measurements in an automated, high-throughput workflow with the Thermo Scientific™ Kiel IV™ Carbonate Device. This device, when coupled to an isotope ratio mass spectrometer, enables analysis of carbonate samples for paleoclimatic reconstructions involving biogenic carbonates such as foraminifera, bivalves, brachiopods, otoliths, and corals. Other fields of application include analysis of growth zones of individual organisms or microfossils from drill cores. www.thermofisher.com/kieliv

Isotope Ratio Mass Spectrometry

Do you need the flexibility and performance of stable isotope ratio mass spectrometry (IRMS) applications in a single analyzer? The Thermo Scientific™ DELTA V™ IRMS series combines high sensitivity with excellent linearity and stability to tackle applications as diverse as $^{13}C/^{12}C$ analysis of PAHs in soil, $^{2}H/^{1}H$ of n-alkanes in sediments, or $^{15}N/^{14}N$ monitoring of chlorophyll derivatives. The DELTA V IRMS can be equipped with a wide range of sample preparation devices and inlets, including preconcentrators, elemental analyzers, GC, and LC interfaces ensuring your instrument system is perfectly configured to your applications.

EA-IRMS

Discover an automated, easy-to-use solution for µg- to mg-level elemental and isotope analysis with the Thermo Scientific™ EA IsoLink™ IRMS System. Innovation in the EA IsoLink IRMS System provides helium saving technology and integration of temperature ramped gas chromatography delivering quick analysis times and low cost analysis alongside outstanding quality data especially on small sample amounts. These features allow you to push the boundaries for research and routine analyses whilst built-in flexibility offers you to quickly and simply adapt to changing analytical demands.
www.thermofisher.com/irms

GC-IRMS

Combining the separation power of gas chromatography with IRMS, the Thermo Scientific™ GC IsoLink II™ IRMS System provides a significant step forward in the performance of compound specific isotope analysis. This preparation device, coupled with the Thermo Scientific™ ConFlo™ IV universal continuous flow interface and the Thermo Scientific™ DELTA V™ IRMS provides a seamless solution, which meets all the analytical challenges of today's rapidly expanding world of stable isotope applications. www.thermofisher.com/irms

Quantitative Elemental Analysis

Complement your isotope ratio data with a wealth of information provided by fully quantitative elemental analysis. Depending on required detection limits and sample matrix composition, there is a full suite of instruments available, starting with Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) up to High Resolution ICP-MS.

ICP-OES

Use this range of preconfigured, plug and play Thermo Scientific Liquid Sample Introduction Kits for increased flexibility to analyze a wide variety of sample matrices with the Thermo Scientific™ iCAP™ 7000 Series ICP-OES System. Optional, dedicated kits are available for high solid content, organic, volatile organic and hydrofluoric acid (HF) containing samples. Precise, accurate sample delivery is guaranteed every time.
www.thermofisher.com/icp-oes

ICP-MS

The instruments of the Thermo Scientific™ iCAP™ Qnova Series ICP-MS deliver research level trace elemental analysis combined with routine ease of use. User-inspired hardware and software combine in the Thermo Scientific™ iCAP™ RQ ICP-MS to deliver maximized productivity and robustness. Simplicity and ease-of-use work in concert to streamline work-flows and achieve ‘right-first-time’ results; essential to all busy labs. Harness the power of Triple Quadrupole (TQ) technology for uncomplicated analysis with incredible accuracy using the Thermo Scientific™ iCAP™ TQ ICP-MS. Expand your analytical capabilities. www.thermofisher.com/icp-ms

High Resolution ICP-MS

Clean up your spectra. Make your analysis easy. High-Resolution ICP-MS is made for the most flexible and reliable analyses, for the best analytical results. Perform accurate and reliable quantitative multi-element analyses at trace level, with the highest sensitivity and without complicated sample preparation. The Thermo Scientific™ Element™ Series HR-ICP-MS Systems cover the mg/L to sub pg/L concentration range. www.thermofisher.com/hr-icp-ms

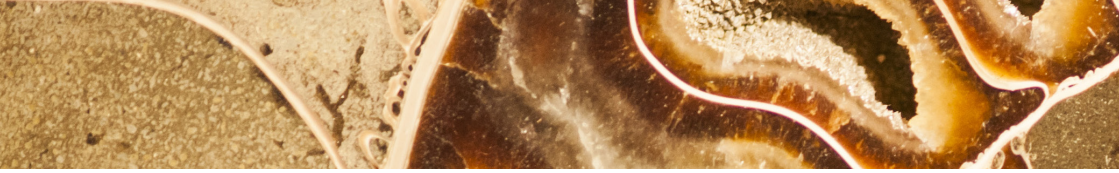
Gas Chromatography

Your laboratory is defined by the way you work, which is why Thermo Fisher Scientific gas chromatography solutions are designed to be customized to fit any laboratory workflow. These solutions allow you to drive productivity and throughput with Thermo Scientific Instant Connect Injector and Detector Modules, a unique approach designed to maximize uptime and flexibility.

Connect your gas chromatograph to the robust, performance-leading Thermo Scientific mass spectrometers to innovate your workflows even further and realize new levels of laboratory efficiency.

Gas Chromatography

Boost productivity, accelerate response times, and lower your total cost of ownership with the Thermo Scientific™ TRACE™ 1310 Gas Chromatograph. Providing versatility and exceptional GC and GC-MS performance, it's an ideal choice for larger production and QA/QC laboratories and research organizations. www.thermofisher.com/gc



High Resolution GC-MS/MS

Bring the power of the first-ever combination of high-resolution gas chromatography (GC) and high-resolution/accurate-mass (HRAM) Orbitrap mass spectrometry to your laboratory. The Thermo Scientific™ Q Exactive™ GC Orbitrap™ GC-MS/MS system provides comprehensive characterization of samples in a single analysis for the highest confidence in compound discovery, identification, and quantitation. This system offers the quantitative power of MS/MS combined with the high precision, full-scan HRAM capabilities only available in combination with Thermo Scientific™ Orbitrap™ Technology.

www.thermofisher.com/orbitrapgcms

GC-MS and GC-MS/MS

Satisfy your laboratory's current and future needs for truly unstoppable performance with GC-MS and GC-MS/MS. The Thermo Scientific™ ISQ™ 7000 Single Quadrupole GC-MS System offers extended uptime and robustness to maximize sample throughput, along with routine easy-to-use smart tools to simplify operation and speed up instrument familiarization. The Thermo Scientific™ TSQ™ 9000 Triple Quadrupole GC-MS/MS System delivers high sensitivity for the most challenging quantitative applications. Both are fully upgradeable from base to advanced configurations to boost flexibility and performance when you need it.

www.thermofisher.com/isq7000

www.thermofisher.com/tsq9000

Solutions for Ion Analysis

Ion Chromatography

For ion analysis, nothing compares to a Thermo Scientific™ Dionex™ Ion Chromatography (IC) System. Whether you have just a few samples or a heavy workload, whether your analytical task is simple or challenging, we have a solution to match your performance and requirements. Recent innovations include high pressure systems, 4 micron columns and capillary systems for precious samples, columns and more. As the technology leader in IC for 45 years, you can feel confident you're getting the best in our IC systems, consumables, service, and support. www.thermofisher.com/ic

Ion Chromatography with Mass Spectrometry

IC with MS Detection

Utilize mass detection when you need to ensure analytical confidence and dramatically improve the detection capability of your Thermo Scientific™ Dionex™ Integrion™ or ICS-6000 HPIC™ System. Ion chromatography with mass spectrometry (IC-MS) maximizes the ability to detect and quantify unexpected co-elutions of components and to confirm trace components. www.thermofisher.com/icms

Air Monitoring

The URG 9000 Series Ambient Ion Monitor (AIM) is an advanced air sampling instrument that simultaneously measures both fine particle composition (PM2.5) and precursor gases. The AIM enables the analysis of not only the atmospheric chemistry leading to the formation of PM2.5, but also physical transformation and subsequent particle/gas partitioning of its constituents. AIM samplers provide time-resolved direct measurements of anions (nitrate, sulfate, nitrite, phosphate and chloride) and cation particulates (ammonium, sodium, calcium, potassium and magnesium) in PM2.5. Furthermore, the AIM provides time resolved direct measurements of anion (hydrogen chloride, nitric acid, nitrous acid and sulfur dioxide) and cation (ammonia) gases.

Rapid Photometric Detection

Discrete Industrial Analyzers (DIA) provide rapid and automated photometric (Colorimetric and enzymatic) and electrochemical (pH and conductivity) analysis giving fast, reproducible results. With discrete cell technology, multiple analytes can be run simultaneously reducing operation and run time.

The Thermo Scientific™ Gallery™ Plus System can be automated to enable up to 350 tests per hour. DIA is an efficient alternative to traditional flow analyzers and the unique low volume cuvette design produces cost savings in reagents and waste. Laboratory tests include alkalinity, conductivity, nitrite, urea, total oxidized nitrogen (TON), silica and total hardness in a variety of sea, natural and waste waters and soil testing.
www.thermofisher.com/gallery

Automated Sample Preparation

Automate extraction, filtration and clean up of compounds from solid and semisolid samples, including soils, in minutes using the Thermo Scientific™ Dionex™ ASE™ 350 Accelerated Solvent Extractor. This system accommodates sample sizes of 1-100g, allows unattended extraction of up to 24 samples and uses 50 to 90% less solvent compared to other methods. The chemically inert pathway supports acid and alkaline sample matrices and solvents. Flexible, easy-to-operate and cost-effective, the Dionex ASE 350 is ideally suited for a wide variety of geochemical applications. www.thermofisher.com/ase

Molecular Spectroscopy

Desktop Scanning Electron Microscopy

Thermo Scientific™ Phenom™ Desktop Systems give direct access to the high-resolution and high-quality imaging and analysis required in a large variety of applications. The rapid sample loading and the incredibly fast time to image improve the effectiveness of failure analysis, quality insurance processes, or non-destructive testing of materials. www.thermofisher.com/sem

Raman Imaging Microscope

The Thermo Scientific™ DXR™3xi Raman Imaging Microscope reveals research grade imaging faster than ever. Users gain visual information instantly thanks to enhanced software features and higher spatial resolution. Advanced imaging capabilities coupled with minimal sample prep and intuitive software give users the power of Raman at speeds researchers need. www.thermofisher.com/raman

X-Ray Diffraction & Fluorescence

Thermo Fisher Scientific can help you understand the value of your mineralogical samples, from quantifying the economically important and undesirable compounds with XRF to interrogating their phase composition using XRD. With a choice of handheld, benchtop and floor-standing solutions available, XRF and XRD instrumentation are routinely employed in challenging environments to interrogate a wide range of elements and compounds at correspondingly wide concentration ranges, and in various sample matrices.

X-Ray Diffractometer

Get an easy-to-use X-ray diffraction (XRD) instrument for everyone. Due to its unique design, the bench-top Thermo Scientific™ ARL™ EQUINOX 100 X-Ray Diffractometer is a compact and lightweight instrument that requires no external water chilling. It uses latest X-ray micro source technology coupled to Smart Optics™ X-ray mirror technology for high flux and low energy consumption (200 W). The ARL EQUINOX 100 can turn the trunk of a car into your mobile lab for mining exploration or archaeological excavation. Results are available within minutes – from basic phase identification or advanced clay analysis to complex quantification of multi-phase geological mixtures. A variety of sophisticated sample holders is available – covering bulk samples, small sample quantities or in-situ heating experiments. No realignment necessary, change the application and measure right away! The ARL EQUINOX 100 is a reliable and easy solution for both lab and mobile use.
www.thermofisher.com/xrd

Sequential X-Ray Fluorescence Spectrometer

The Thermo Scientific™ ARL™ PERFORM'X Sequential X-Ray Fluorescence Spectrometer for advanced materials characterization integrates elemental analysis with mapping and small spot analysis to create a solution that can evaluate up to 90 elements in nearly any solid or liquid sample. Analyze diameters from 35 mm down to 0.5 mm in case of non-homogeneous samples. This is the perfect solution for geochemical, R&D and contract labs with demanding quantitative mineral analysis. www.thermofisher.com/xrf

Handheld XRF Analyzer

Confidently perform portable elemental analysis with the Thermo Scientific™ Niton™ XL5 handheld XRF analyzer. When versatility, functionality and analytical performance are top of mind, mining operations rely on the Niton XL5 for fast results and low detection limits. Perform outcrop and soil analysis, advanced exploration and drilling, core sample measurements, mine mapping, ore trading, grade control, and much more. The Niton XL5 provides operators the ability to scan a broad range of materials in one versatile analyzer.
www.thermofisher.com/niton

Exciting things happen when geoscientists start exploring. Whether that research takes you deeper into the earth, the fossils, the sea or the sky, our comprehensive portfolio of geoscience solutions can power your next breakthrough and enable your next moment of greatness. We proudly offer the world's largest geosciences research portfolio — ready and waiting for your next discovery.

Find out more at **thermofisher.com/geosciences**

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