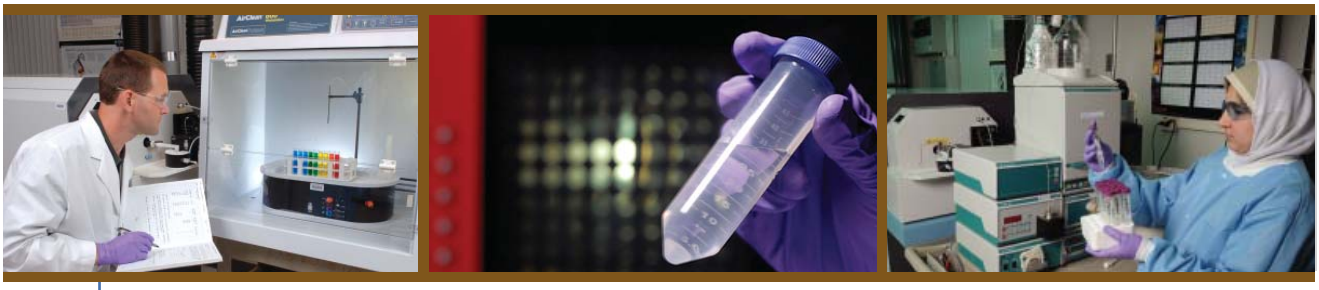
Trace Element Speciation and Metallomics



Government agencies and industry rely on RTI International to solve real-world, trace element speciation problems. Using state-of-the-art instrumentation, our experts develop and apply unique qualitative and quantitative methods to determine trace elements in environmental, biological, geological, and clinical samples.

At RTI, we select and tailor research methods and instruments to meet the unique needs of each client and each contract. Our scientific expertise and commitment to Good Laboratory Practices and Good Manufacturing Practices mean clients get the accurate results necessary to fully understand the environmental, biomedical, epidemiological, and toxicological impact of trace elements.

Metal-Protein Complexes

RTI's program in trace inorganics analysis has acquired an international reputation for specialized measurements. We also support client needs in the emerging science of metallomics. We offer both the scientific expertise and sophisticated equipment necessary for the isolation, quantitation, and structural determination of metal-protein complexes.

Arsenic

Arsenic toxicity varies according to its chemical form. For example, inorganic arsenic forms such as arsenite (As III) and arsenate (As V) are toxic and carcinogenic. These forms must be distinguished from the arsenic metabolites monomethylarsonic acid (MMA V) and dimethylarsenic acid (DMA V), as well as the innocuous species arsenobetaine (AsB) and arsenocholine (AsC).

With support from the American Water Works Association Research Foundation, RTI researchers developed a validated, robust, high-throughput method to detect these six arsenic species in urine and food composite matrices. We also developed a method that allows toxic monomethylarsonous acid (MMA III) to be separated from the other species.

Chromium

While trivalent chromium (Cr(III)) is an essential nutrient, hexavalent chromium (Cr(VI)) is a toxic species and a known carcinogen. RTI has decades of experience determining the presence of Cr(VI) in the environment. Our dedicated staff work with state-of-the-art instrumentation to successfully accomplish the most demanding tasks in chromium species research. Our experience includes

- Analyzing air, soil, water, and commercial products to assess the potential risk of exposure to Cr(VI) within environmental or production sources
- Collaborating with the American Chemical Council to develop a method to test for the presence of Cr(VI) in treated residential deck lumber in order to assess risk to the general public

- Performing Cr(VI) method development and analysis for the California Air Resources Board and the U.S. Environmental Protection Agency (EPA) to monitor ambient air and support source testing
- Studying the trace level measurement of Cr(III) and Cr(VI) in water samples on behalf of the National Toxicology Program.

Mercury

Elemental mercury is a known hazard, and methyl mercury is especially toxic to the developing central nervous system. RTI provides routine and nonroutine analytical support to determine mercury species in various media. RTI has

- Developed and applied methods for determining total and methyl mercury in environmental and biological samples as a means of monitoring potential human exposure
- Routinely monitored methyl mercury in fish tissues, with support from the U.S. Fish and Wildlife Service
- Studied mercury species in human hair on behalf of the National Oceanic and Atmospheric Administration
- Worked with EPA to identify a source sampling method for elemental mercury and oxidized mercury (Hg II) from combustion sources.

Nickel

With support from EPA and the Nickel Producers Environmental Research Association, RTI developed an improved nickel speciation analytical method for nickel producers to use in monitoring workplace atmospheres. These improvements, which included the use of microwave heating and the elimination of perchloric acid, provide for the speciation of the soluble, sulfidic, elemental, and oxidic forms of nickel found in industrial atmospheres.

Tin

RTI has more than 25 years of experience determining and measuring organotin compounds in various media. With support from the National Institute for Occupational Safety and Health, we have researched the presence of organotin (including tributyltin) compounds in air. Our scientists have also developed a method to determine methyltin compounds in drinking water.

Other Metals

In addition to these elements and their species, RTI investigates the species of many other elements. Whatever the task, our scientists have the skill and the flexibility to meet unique client needs in trace element research.

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