

About Los Alamos

As the senior laboratory in the DOE system, the Laboratory executes work in all of DOE's missions: national security, science, energy, and environmental management. Our contributions are part of what makes DOE a science, technology, and engineering powerhouse for the nation.

About Chemistry Division

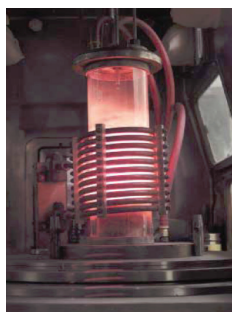
With five groups and a staff of nearly 300, the Chemistry Division serves the Laboratory's missions with innovative chemical science and technology for energy research, threat identification and mitigation, weapons science, health, space research, and much more.

Our capabilities are also essential for energy security, civilian-sector R&D, and industrial partnering.

We have expertise in

- Actinide chemistry
- Isotope science
- Synthetic and mechanistic chemistry
- Chemistry for measurement and detection science
- Chemistry of materials
- Data analysis and modeling for chemical sciences
- Radiochemistry and nuclear science

Over the years, many of our postdoctoral fellows have joined the Laboratory as technical staff members. Others have gone on to academic, research, national laboratory, or industrial appointments.



C-AAC applies qualified analytical measurement capabilities to certify the chemical composition of LANL-built plutonium pits for diamond-stamped product acceptance.

Opportunities

Chemistry Division offers opportunities across the employment spectrum, from student positions, to graduate and postdoctoral fellowships, to mid-career research positions. We also have active programs in industrial partnering.

Learn more about Chemistry Division:

<http://www.lanl.gov/org/padste/adcles/chemistry/>

Actinide Analytical Chemistry office: (505) 667-4087

Chemistry Division Office: (505) 667-4457

Cover: Working with actinides requires specialized gloveboxes and monitoring equipment.

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CHEMISTRY

Actinide Analytical Chemistry (C-AAC)



C-AAC provides expertise in chemical and radiochemical analysis of materials where actinide elements make up a significant portion of the sample

 **Los Alamos**
NATIONAL LABORATORY

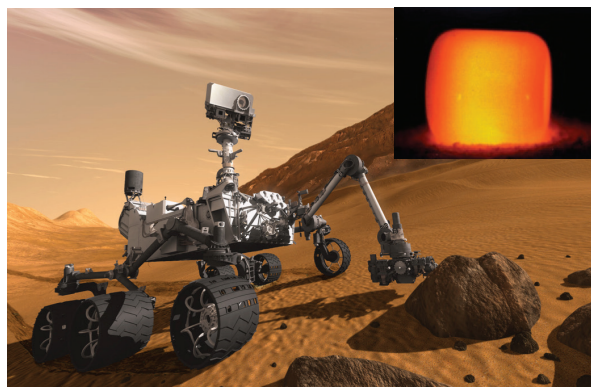
About C-AAC

C-AAC provides expertise in chemical and radiochemical analysis of materials where actinide elements make up a significant portion of the sample. These analyses range from assay of the major components down to trace analysis of impurities – spanning over seven orders of magnitude of chemical analysis capability. In support of these capabilities, the group has the key facilities, glove boxes, hoods, analytical instrumentation, and technical expertise for safely handling and analyzing milligram to kilogram quantities of special nuclear material. The mission of C-AAC began with the Manhattan project and continues today through maintaining a strong nuclear capability by being a recognized leader within the international nuclear community for our in-depth technical capabilities, knowledge, and the strength of our quality assurance program. Additional strengths that support the nation's nuclear chemistry capability are our role in safeguards measurements, stockpile support, threat reduction, and nuclear forensics.

Capabilities

Safeguards measurements

Safeguards measurement activities support control of accountable nuclear materials and special nuclear



Plutonium-238 radioisotope power systems generate electricity for the NASA Mars Science Laboratory. C-AAC performed the chemical analyses required to certify 32, 60-watt heat sources for this mission.



Chemists at the UK Atomic Weapons Establishment and at LANL share technical problem-solving and opportunities at international meetings.

materials through analytical chemistry. This effort overlaps somewhat with nuclear forensics in that its objective is to detect and deter the malicious diversion and use of nuclear materials.

Nuclear forensics

Nuclear forensics aids in the prevention of nuclear terrorism, and failing that, enabling the rapid attribution of a nuclear event. C-AAC supports through collection, analysis and evaluation of radiological and nuclear material in both pre-detonation and post-detonation scenarios. The group is vital to the Laboratory's status as a DHS National Technical Nuclear Forensics Hub Laboratory.

Stockpile support

C-AAC supports the Laboratory's nuclear stockpile stewardship mission. In the absence of underground testing, analytical chemistry of plutonium is one of the most important tools available for ensuring the safety, security, and reliability of the nuclear stockpile.



Threat reduction

Threat reduction covers a wide range of activities including: collaboration with international

LANL was designated a hub-laboratory for pre-detonation nuclear forensics in 2010 and has more recently been accredited for bulk nuclear material analysis, in accordance with the international standard ISO/IEC 17025:2005. Analytical instrumentation shown here.



AAC works with standard reference materials. Shown are nondestructive analysis (NDA) standards for the Department of Homeland Security (DNDOS) for field application.

colleagues to detect and prevent the proliferation of nuclear weapons; decommissioning of excess weapons plutonium; fabrication and certification of Certified Reference Material (CRMs).

Techniques

- Actinide Assay
- Trace Element Analysis
- Mass Spectrometry
- Radiochemistry
- X-Ray Fluorescence
- Particle characterization
- Surface characterization



C-AAC provides analyses and directs other LANL contributors in demonstrating the capability to extract plutonium from sealed radioactive sources for forensic characterization. Top: photography, radiography, lathe machining. Bottom: extraction, opening.