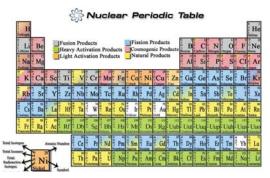
## **Radiochemistry Fundamentals**



This 5-day course is designed for engineering and science employees who need a basic understanding of fundamental nuclear and radiochemistry processes, and their applications in radioactive waste management, the nuclear fuel cycle, nuclear medicine, chemical engineering, and analytical chemistry.

#### A COURSE VARIED FOR ALL BACKGROUNDS ...

- Gain a solid background in the fundamentals and theory of nuclear and radiochemistry.
- Learn the basics of counting statistics for radiochemistry.
- Understand the basics of instrumentation for radiochemistry counting: gamma-ray spectroscopy, alpha spectroscopy, liquid scintillation, etc.
- Understand the principles of radiochemistry in the recycling of spent nuclear fuel.

#### Course Topics

#### **Atomic structure**

- · Atomic electron orbital arrangements
- · Organization of the periodic table
- Groups and trends on the periodic table

#### **Nuclear structure and stability**

- · Decay modes and types of radiation
- · The chart of the nuclides

#### Radioactive transformation

- Equilibria
- Secular equilibrium
- Transient equilibrium
- No equilibrium

#### **Decay Modes**

- Alpha decay
- Beta decay
- Gamma transitions
- Branching decay
- Spontaneous fissions
- Rare decay modes

#### Measurement of nuclear radiation

- Gas-filled detectors
- Scintillation detectors
- Semiconductors
- Alpha spectrometry
- Beta spectrometry
- Gamma ray spectrometry
- Gamma ray low-level counting
- · Statistics and errors in counting

#### **Nuclear reactions**

- Transmutation and the production of synthetic radioelements
- · Cross-sections of nuclear reactions
- Nuclear fission
- · Activation analysis

#### **Nuclear fuel cycle**

- · Nuclear reactor radiochemistry
- Reprocessing of nuclear fuels
- · Radioactive waste management

#### Dating by nuclear methods

- · Cosmogenic Radionuclides
- · Natural decay series
- Ratio of stable isotopes
- · Radioactive disequilibira

## General chemistry applied to radiochemistry

- Actinide chemistry
- · Mass balances
- · Chemical equations and stoichiometry
- · Equilibrium reactions
- Acid/base reactions
- · Oxidation/reduction reactions
- Aqueous solubility
- Phase partitioning

### **Onsite Training**

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CONTINUING EDUCATION CREDITS.
ASSIGNED ID NUMBER: 2011-00-013

# FOR FURTHER INFORMATION OR ASSISTANCE, PLEASE CONTACT:

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