A 5-Day Short Course

Radiochemistry Fundamentals

May 6-10, 2024 ◆ Online Live Instruction

Course Description

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 Developed For Varied 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 Instructor

Sheldon Landsberger, PhD, is a Professor of Nuclear and Radiation Engineering at The University of Texas at Austin. He is nationally and internationally known for his work in low level gamma-ray counting and the application of neutron activation analysis in environmental research. He has more than 180 peer-reviewed journal publications. For the past 30 years he has been extensively involved in nuclear instrumentation, health physics and radioactive waste management both in teaching and research. He has been a consultant for the International Atomic Energy Agency since 1988 and has travelled to more than 30 countries as an expert instructor in nuclear science and engineering.

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Course Outline

- 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

HOW TO REGISTER ...

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