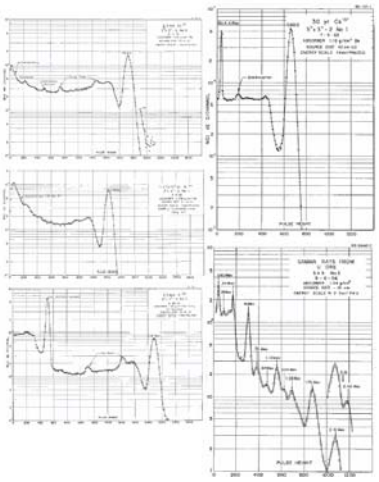
Gamma Spectroscopy Applications



This 5-day course is designed to remove the 'black-box' approach to gamma spectroscopy results. (i.e., Put the sample on the detector, push the button, read the printed report, accept the results). It will provide a solid basis in the fundamentals of gamma spectroscopy while focusing on the areas that permit the operator to prepare a representative sample, optimize system parameters, understand the effects of cascade summing, interference peaks, geometry, and libraries parameters. Class exercises guide the student through the interpretation of results with consideration of peak fit, source term and process knowledge of the sample. Laboratory QA and good practices are also discussed. Time-permitting, students will be introduced to the concepts and benefits of modeled geometries and in situ measurements.

This course will also provide an overview of the hardware and techniques employed in gamma-ray spectroscopy and provide an understanding of the fundamentals physical processes underlying their application. The primary focus of the course is HPGe detectors although applications of NaI(Tl), CZT and LaBr3(Ce) detectors are included as applicable to the course participants.

The course will review basic radioactive decay theory and interaction of radiation with matter to explain spectral features and their interpretation, including peak identification and energy determination, backscatter peaks, single and double escape peaks and proper use of control charts.

This course is designed to provide a practical introduction to gamma spectroscopy for those new to the field of gamma spectroscopy, but also provide practical applications to those who are currently performing gamma spectroscopy. The course is intended for radiochemists, technicians and others who will be doing routine and specialized gamma spectroscopy, as well as quality assurance officers and data validators who may have a need to understand gamma spectroscopy measurements.

THIS COURSE WILL HELP YOU….

- Gain a solid background in the fundamentals and theory of gamma spectroscopy.
- Learn which factors in sample preparation insure that that the sample is representative of the efficiencies used for calculating results.
- Understand the effects of cascade summing, interference correction, fluorescent x-rays and other areas that are not often addressed.
- Learn to optimize your libraries and software parameters.
- Establish a defensible QA program that works for the laboratory.
- Understand the application of Data Quality Objectives
- Find and use applicable reference materials.
- Understand why results printed out on the report are not always applicable to the sample being analyzed.

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Contact TMS for further details.

of Health Physics AAHP

The American Academy of Health Physics (AAHP) has awarded this course 32 continuing education credits.
Assigned ID Number: 2011-00-008

For further information or assistance, please contact:

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Topics

Review of Fundamentals
- Spectral Characteristics
- Transient and Secular Equilibrium
- Decay Corrections
  - a. Short Lived Nuclides Decay During Counting
  - b. Buildup
  - c .Neutron Activation
- Peak Shape and Fitting What it is and What it Means.
- Decay Schemes/ Gamma Abundance
  -References

Review of Electronics and Effects on Spectral Results
- Pole zero
- ADC
- Dead Time
- High and Low Count Rate Considerations

Calibration
- Energy and Shape Calibrations
- Fixed Geometry Efficiency Calibration Considerations
- Modeled Laboratory Geometry Considerations
- In Situ Field Geometry Considerations

Counting Statistics
- Counting Error
- MDA/ Critical Level Calculations
- Total Propagated Uncertainty

How Does the Software Identify A Nuclide
- Peak Search and Fit
- Interactive Peak Fit
- Interference Corrections
- MDA/LLD/ Critical Level
- Analysis Parameters which affect Results

Summation Error Corrections
- Random Summing
- Coincidence (Cascade) Summing Correction

Library Parameters
- Selecting Key Lines
- Selecting Confirming Peaks
- Use of Lines from Progeny for Quantification of a Nuclide
- Optimizing the Library to the Software

Reviewing Spectra
- Exercises

Unidentified Peaks
- Why Resolve These Peaks?
- How to Resolve These Peaks.

Quality Assurance
- Establishing Parameters
- Trending Charts
- Control Charts
- Verification of Efficiency Calibrations
- ANSI N42.23