

G3601

Far Field Gamma Monitor

Introduction

The Model G3601 Far Field Gamma Assay Instrument describes a generic design that can be supplied in a number of different configurations. As it includes a gamma ray spectrometer it employs either a high purity Germanium (HPGe) or Scintillation (NaI or LaBr³) detector. The choice of detector type and detection efficiency is based on the counting requirements and the required energy resolution.

The detector is shielded with a stainless steel clad lead shield. The shield contains a graded internal liner of tin and copper to suppress lead x-rays generated in the lead shield. The front section of the detector lead shield usually serves as cylindrical collimator. The degree of collimation and hence the detector field of view can be adjusted by moving the cylindrical HPGe or scintillation detector along the axis of the shield. The detector field of view is reduced as the front face of the detector is withdrawn into the shield.



Image of the Far Field Gamma systems used in the ANTECH Gamma Mobile Assay Laboratory (G-MAL). In this example the detectors are electro-mechanically cooled and each detector also has a lead shadow shield.

A multi-channel analyser (MCA) is used for gamma ray spectral data acquisition with both HPGe and scintillation detectors. The MCA is used to capture the gamma ray spectrum obtained for each measurement. The spectral data is analysed using appropriate analysis software. ANTECH Far Field Gamma Instruments support several software analysis codes including ANTECH ISOCOR, ORTEC Isotopic or ISOPLUS, and SNAP. The output of the data analysis code is the activity as a function of radionuclide. Typically gamma ray spectra data are saved and can be subsequently re-analysed for the presence of additional radionuclides not included at the time of the original analysis.

Features

- Collimated detector field of view includes the entire waste drum or object
- Detector may be either high purity Germanium (HPGe) or Scintillation (NaI or LaBr³)
- HPGe detectors may use either liquid nitrogen (LN) or electro-mechanical cooling
- Object being measured or assayed is rotated during the measurement
- Distance between the collimated and shielded detector and the waste drum or object can be adjusted
- Average density correction based on measurement of the weight of the object
- Background may be reduced by the use of a shadow shield placed behind the drum or object.
- Shielded and collimated detector may be mounted on a mobile cart
- Filters or separation may be used to reduce the count rate (dose-rate) at the detector

Benefits

- Measures wide range of sample activity from very low-level waste (VLLW) to high activity remote handled (RH) waste
- Detector and shield (collimator) are easily transported
- Detector count rate and dead-time can be adjusted (for example for RH measurements) by adjusting detector – sample separation distance
- Counting time is reduced and counting efficiency is increased as the entire drum or sample object is within the detector field of view
- Detector field of view (collimation) can be adjusted to reduce background

Specification

Detector	High Purity Germanium (HPGe) or Scintillation (NaI or LaBr ³)
Drum rotation	Drum or sample is rotated during the measurement
Collimator	Front section of detector shield usually serves as cylindrical collimator
Spectrum	A single gamma ray energy spectrum is obtained during the measurement for each waste drum or object
Multi-channel analyser (MCA)	DPA, DSPEC Jr2 or DSPEC 50
Software	ANTECH ISOCOR, ORTEC Isotopic or ISOPLUS and SNAP
Power Requirements	115/240 VAC