ALPHA SPECTROMETRY SOURCES

This section contains detailed information about unsealed alpha emitting radiation sources. A radionuclide selection chart and plots of the alpha spectra are shown to help you to choose the right nuclide for your application.

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4. Alpha spectrometry sources

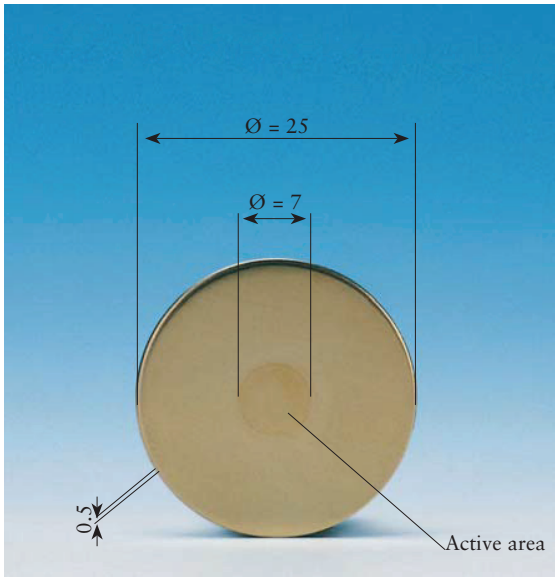
4.1 General information

Applications

Alpha spectrometry sources are intended for calibrating and checking solid state alpha spectrometers, for applications in environmental monitoring and research.

The advantages of these sources are:

- Narrow line widths (normally less than 20keV) - easy, accurate, calibration of spectrometer
- Wipe test results comparable to sealed sources - low risk of contaminating equipment



Construction

The radionuclides are deposited onto a stainless steel disc, 25mm in diameter, 0.5mm thick (drawing: VZ-1679). The reagents used are ultra-pure, resulting in an essentially massless deposit. This process minimises line broadening and produces sources exhibiting line widths of less than 20keV full width half maximum (sources containing Np-237 have line widths typically 50keV, due to the low specific activity of Np-237). Wipe test results comparable with sealed sources are achieved for this manufacturing process. However, any material placed over the active deposit will degrade the spectrum, so it is not possible to construct a source that can be classified as a sealed source as defined in ISO2919.

Certification

Calibrated single nuclide sources are supplied with a DKD certificate stating alpha particle emission rate and activity.
Triple nuclide sources are designed for energy calibration applications.

Uncertainties

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95% (see section 9.2).
The expanded uncertainty of the emission rate for a calibrated single nuclide source is ≤3 %.

4.1 General Information

Traceability

The sources are traceable to standards held by national laboratories such as the Physikalisch-Technische Bundesanstalt (Germany), the National Physical Laboratory (UK), the National Institute of Standards and Technology (USA) the Laboratoire Primaire des Rayonnements Ionisants (France), and many other national laboratories world-wide. Further details are given in section 9.1.

Recommendations on source handling

To maintain the accuracy of measurements, these sources must be handled with care. Sources should be handled with tweezers to avoid leaving grease on the surface of the source, which would degrade the spectrum. The sources must not be cleaned with abrasive compounds such as metal polish, as this would remove the active deposit. The sources should be kept in their storage boxes when not in use.

Tolerances

The maximum deviation of the measured activity at the reference time from the nominal value is +/-30%.

Quality assurance

The sources are calibrated at Eckert & Ziegler Nuclitec GmbH's DKD accredited measurement laboratory in Germany. The manufacturing facility operates a quality management system which has been independently audited and approved to ISO9001:1994.

Availability

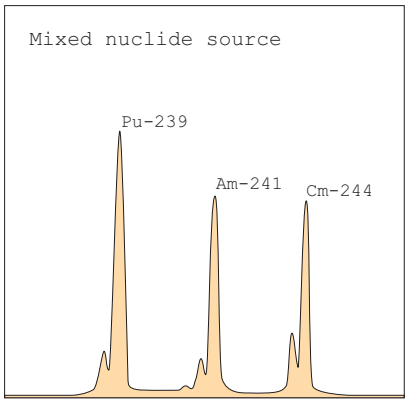
The sources are normally delivered within 4-6 weeks from receipt of order.

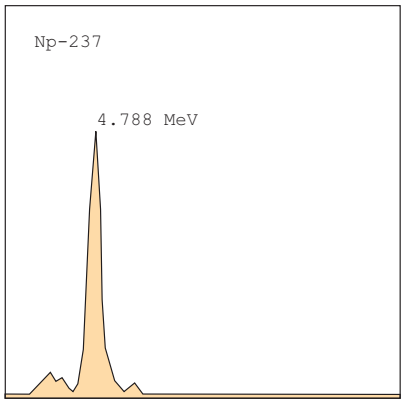
Selection chart

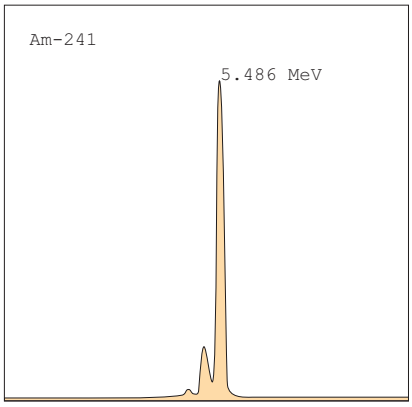
To help select the source needed, the energies and intensities of the most intense alpha particles emitted by the different nuclides are shown in the table.

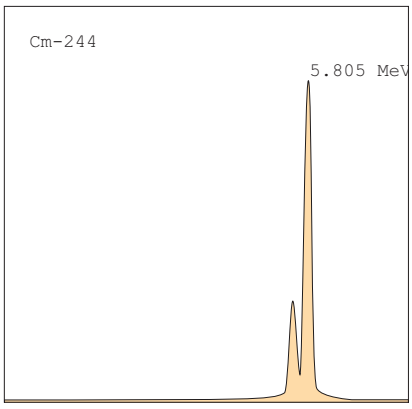
Radionuclide	Alpha particle energy [MeV]	Intensity [%]
Np-237	4.640	6.2
	4.766	8.0
	4.772	25.0
	4.788	47.0
Pu-239	5.105	11.5
	5.143	15.1
	5.155	73.4
Am-241	5.388	1.4
	5.443	12.8
	5.486	85.2
Pu-238	5.456	28.3
	5.499	71.6
Cm-244	5.763	23.3
	5.805	76.7

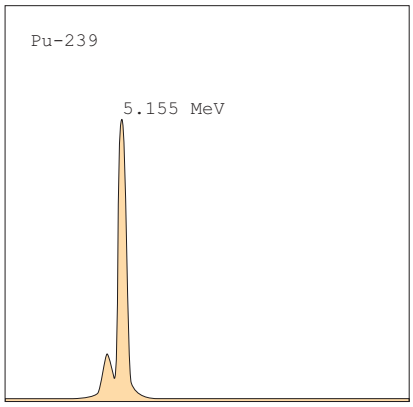
4.2 Reference sources

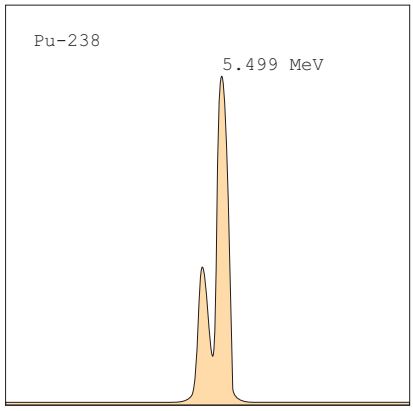












Ordering information

Radionuclide	Nominal activity	Energy of most intense alpha particle [MeV]	Product code uncalibrated [1]	Product code calibrated [2]
Am-241	50 Bq	5.486	AMR11	AMR21
Am-241	500 Bq	5.486	AMR12	AMR22
Am-241	5000 Bq	5.486	AMR13	AMR23
Am-241	40000 Bq	5.486	AMR14	not available
Pu-238	1000 Bq	5.499	PPRB2505	PPRB2497
Pu-239	1000 Bq	5.155	PIRB2506	PIRB2498
Cm-244	1000 Bq	5.805	CLRB2507	CLRB2499
mixed nuclide				
Pu-239	1000 Bq	5.155	QCRB2508	QCRB2500 [3]
Am-241	1000 Bq	5.486		
Cm-244	1000 Bq	5.805		
mixed nuclide				
Np-237	150 Bq	4.788	QCRB4020	QCRB4021 [3]
Am-241	100 Bq	5.486		
Cm-244	100 Bq	5.805		

[1] For energy calibration only - no certificate of calibration is included
[2] For energy and efficiency calibration - certificate of calibration included
[3] The certificate of calibration states the total α emission rate and the nominal activities of individual radionuclides