
PRODUCTS FOR EDUCATION AND TRAINING

This section gives
detailed information

about products to support training in radiation protection, applications of radioactivity and handling radioactive materials.

The demonstration set AktivLab™ can be used to show the basic properties of radioactivity. Alpha, beta and gamma sources have been also specifically designed for demonstration purposes during training sessions.



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| Cs-137/Ba-137m isotope generator | 128 |
| Demonstration sources | 129 |

8.1 AktivLab - Demonstration set for experiments on radioactivity

Applications

AktivLab™ contains everything needed to carry out experiments to demonstrate the fundamental properties of radioactivity. The kit includes detailed descriptions of experiments which are suitable for physics courses and for training professional health physicists. The radioactive source used is a radionuclide generator, similar in principle to generators used in nuclear medicine.



Experiments that are performed with AktivLab include:

- Measuring the half life of Ba-137m
- The absorption of gamma rays in lead
- The inverse square law
- Estimating the activity of a radioactive source
- The statistics of radioactive decay
- Measuring the plateau of a detector

Technical description



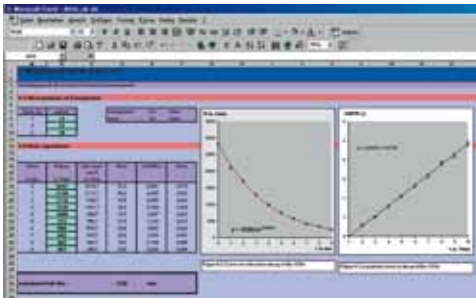
AktivLab comprises

- 1 Isotrak ratemeter
- 2 1 Geiger-Müller tube
- 3 1 Optical bench with holders
- 4 1 Cs-137/Ba-137m isotope generator (see page 136)
- 5 1 Flask with eluting solution for generator
- 6 Vials for the generator eluate
- 7 1 Jig for the vials
- 8 1 Set of lead and aluminium absorbers
- 9 1 Flask of potassium chloride (K-40)
- 10 1 Holder for demonstration sources (see also pages 137, 138)

Storage case with booklet of experiments and handling instructions

8.1 AktivLab - Demonstration set for experiments on radioactivity

Isotrak ratemeter



The ratemeter can be operated under computer control via the RS 232 interface.

| | |
|-----------------------------------|-----------------------------------|
| Power supply | 9V battery or mains adaptor |
| Selectable count times | 1s, 10s, 60s, 100s and continuous |
| Counter tube voltage range | 250 - 600V |
| Display | 4 digit LCD |
| Memory | up to 50 counting results |
| Dimensions | 220 x 108 x 60mm |
| Output | RS 232 interface |



Geiger-Müller tube

| | |
|----------------------------------|-----------------------------|
| Radiations detected | alpha, beta and gamma |
| Window thickness | 1.5 - 2.0mg/cm ² |
| Effective window diameter | 9mm |

Ordering information

AktivLab (ratemeter with RS232 interface)

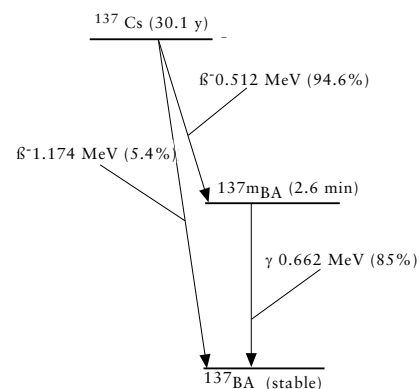
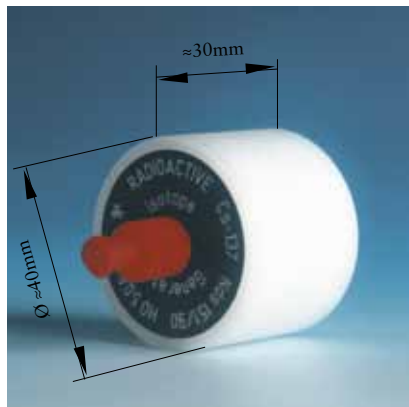
CDRB5645

ex-stock

8.2 Cs-137/Ba-137m isotope generator

Applications

The Eckert & Ziegler Nuclitec Cs-137/Ba-137m Isotope generator has been specifically designed for use in experiments in schools, universities and training centres to demonstrate the properties of radioactivity including half life.



Technical description

The Isotope generator (Drawing VZ-1390 License number ¹⁾Nds 151/90) can be eluted up to 1,000 times to produce small aliquots of a short lived radioactive solution. A flask containing 250ml of the necessary eluting solution is supplied with each generator, and the eluting solution is also available separately.

The generator contains 33kBq or 370kBq of Cs-137 as the long-lived parent nuclide (half life 30.1 years).

The decay scheme of Cs-137 is shown above.

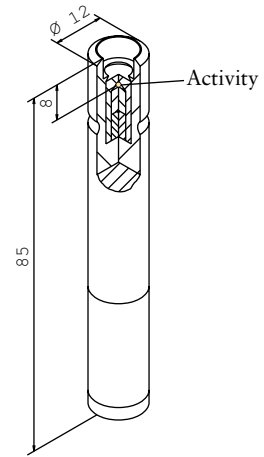
Ordering information

| Radionuclide/Product | Nominal activity | Product code |
|------------------------------------|------------------|--------------|
| Cs-137 | 33 kBq | CDRB5215 |
| Cs-137 | 370 kBq | CDRB1385 |
| Eluting solution 250ml (0.9% NaCl) | inactive | NQB1948 |

¹⁾The design of this source has been tested by the Physikalisch-Technische Bundesanstalt (PTB) and has been approved by the German authorities.

Applications

A set of easy-to-handle sources of different radionuclides is available for further experiments on radioactivity. The design of the sources and their activities have been selected to permit effective experiments while minimising the potential hazard.¹⁾



Construction

The radioactive substance is housed in a recess in an aluminium holder 85mm long and 12mm in diameter. The activity is either sealed in a stainless steel capsule (Cs-137, Co-60), incorporated in a metal foil (Sr-90, Am-241) or fixed on a disc (Na-22). The mixed source consists of a stainless steel capsule containing Cs-137, in front of which foils incorporating Sr-90 and Am-241 are placed.

For reference the construction of the sources is shown in drawing VZ-2297.

Ordering information - Source sets

| Radionuclide | Nominal activity | Product code | |
|---|------------------|--------------|----------|
| Set 1 | | QCRB8149 | ex-stock |
| Am-241 | 74 kBq | | |
| Co-60 | 74 kBq | | |
| Na-22 | 74 kBq | | |
| Sr-90 | 74 kBq | | |
| Set 2 | | QCRB7471 | ex-stock |
| Am-241 | 74 kBq | | |
| Co-60 | 74 kBq | | |
| Na-22 | 74 kBq | | |
| Sr-90 | 74 kBq | | |
| Cs-137 | 74 kBq | | |
| Set 3 | | QCRB8150 | ex-stock |
| Am-241 | 74 kBq | | |
| Co-60 | 74 kBq | | |
| Na-22 | 74 kBq | | |
| Sr-90 | 74 kBq | | |
| Mixed nuclide source Am-241, Sr-90, Cs-137 | 342 kBq | | |

¹⁾ The design of these sources has been tested by the Physikalisch-Technische Bundesanstalt (PTB) and has been approved by the German authorities (Licence Nds 002/99).

8.3 Demonstration sources



Ordering information - Single sources

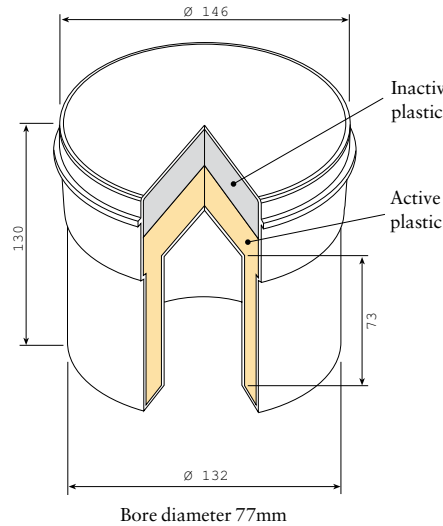
all
ex-stock

| Radionuclide | Nominal activity | License ¹⁾ | Product code |
|----------------------|------------------|-----------------------|--------------|
| Am-241 | 74 kBq | Nds 002/99 | AMRB8151 |
| Cs-137 | 74 kBq | Nds 002/99 | CDRB8151 |
| | 370 kBq | Nds 155/78 | CDR82902 |
| Co-60 | 3.7 kBq | | CKRB8153 |
| | 74 kBq | Nds 002/99 | CKRB8151 |
| Na-22 | 74 kBq | Nds 002/99 | SKRB8151 |
| Sr-90 | 74 kBq | Nds 002/99 | SIRB8151 |
| Mixed nuclide source | | Nds 002/99 | QCRB7472 |
| Am-241 | 4.4 kBq | | |
| Sr-90 | 4.4 kBq | | |
| Cs-137 | 333 kBq | | |

¹⁾ The design of these sources has been tested by the Physikalisch-Technische Bundesanstalt (PTB) and has been approved by the German authorities.

Applications

Samples measured by environmental monitoring laboratories usually contain very low levels of radioactivity. Marinelli beakers are used for large volume samples, for example, water samples, so that the sample is placed as close as possible to the detector for maximum sensitivity. This source can be used to calibrate a gamma-ray spectrometer. Empty beakers are also available.



Technical description

The Marinelli beaker is constructed from polypropylene and is resistant to acids and most organic solvents.

The radioactive material is homogeneously incorporated in a special water-equivalent plastic matrix. The matrix density is 1g/cm^3 . The bore diameter is 77mm.

ISO classification

C.22323

Drawing: VZ-1262

Ordering information

| Radionuclide/Product | Nominal activity | License ¹⁾ | Product code |
|-----------------------------|------------------|-----------------------|--------------|
| Cs-137 | 5 kBq | Nds 152/96 | CDRB5072 |
| Empty beakers ²⁾ | inactive | | NQ7013 |

¹⁾ The design of these sources has been tested by the Physikalisch-Technische Bundesanstalt (PTB) and has been approved by the German authorities.

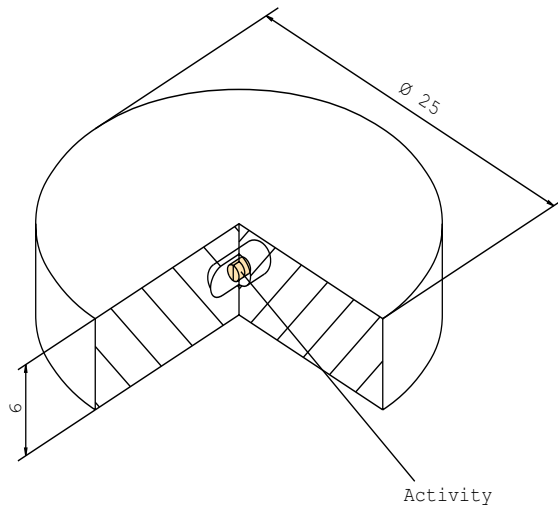
²⁾ The minimum order quantity is 30 empty beakers.

8.5 Point radium source

Applications

Ra-226 emits a wide range of gamma-rays from 53keV to 2.2MeV, and has a long half life (1600 years).

This is a useful, general purpose, demonstration source for gamma-ray spectrometers and gamma counters.



Construction

The Ra-226 activity is incorporated in a ceramic pellet which is encapsulated in glass. The glass capsule is mounted into an plastic disc. The Ra-226 is in radioactive equilibrium with its radioactive decay products.

ISO classification

C.34313

Drawing: VZ-590

Ordering information

| Radionuclide | Nominal activity | Product code |
|--------------|------------------|--------------|
| Ra-226 | 10 kBq | RARB2543 |