

TO: Farrah Gaskins  
DATE: 02/21/05

MS-16

L-4

Re: Renewal of License application 45-08373-01

Enclosed are the Data Sheets for:

03001105

1. Mixed preparation Cs-137, Am-241 and Sr-90.
2. Cs-137 preparation

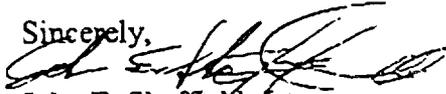
Both sources are manufactured by LEYBOLD.

Both sources were ordered through Klinger Educational Product Corp. in New York. I believe both sources are exempt quantities.

You had requested a statement that the maximum activity would not exceed the maximum action listed on the certificate. I do not understand the question.

Should you need additional information, please let me know (phone # 804-289-8721).

Sincerely,



John E. Sheffield, Jr.

RSO and

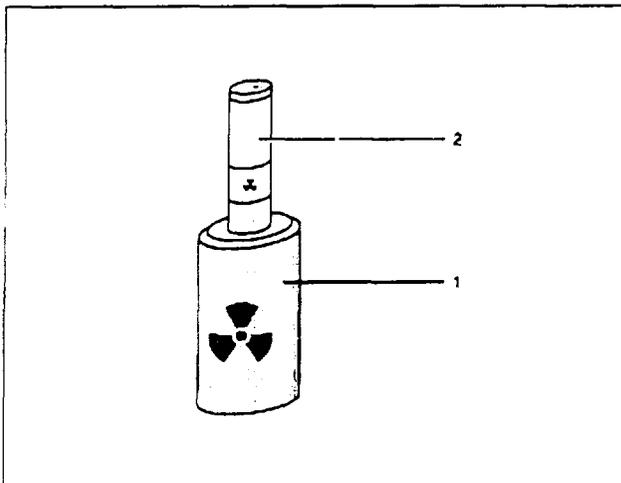
Director of Safety and Risk Management

135979

NMSS/RGNI MATERIALS-002



03/00-V5-Pr/Sel



### Instruction sheet 559 84

### Mixed preparation $\alpha$ , $\beta$ , $\gamma$ (559 84)

- 1 guard vessel  
2 radioactive preparation

### Regulations

When the mixed preparation  $\alpha$ ,  $\beta$ ,  $\gamma$  is used, country specific regulations such as the Radiation Protection Regulation (StriSchV) in Germany have to be observed.

The preparation has been submitted to a prototype test and is approved for teaching purposes at schools without special permit in accordance with the StriSchV. Use of the preparations has, nevertheless, to be notified to the relevant authority.

The preparation is subject to the conditions quoted in the type certification, which is delivered together with the preparations. This certification has to be kept by the owner of the device.

Radioactive preparations have to be protected against being lost and against access by unauthorized persons. This can be achieved by keeping the preparations in a lockable case used only for this purpose.

According to § 31 Abs. 4 StriSchV, only teachers who are appointed radiation protection officers are in general allowed to handle the radioactive preparations. According to § 58 Abs. 3 StriSchV, students are allowed to take part when the preparations are used only in the presence of a teacher who is appointed radiation protection officer.

### Administrative measures

The mixed preparation  $\alpha$ ,  $\beta$ ,  $\gamma$  is a type certified device with the type reference Nds. 0 0 2 /99.

- Keep the copies of the type certification and the quality certificate as documents.
- In Germany, purchase of the preparation has to be notified to the relevant authority. After a period of at most 10 years, a leak test has to be made by an authorized office.
- In other countries, observe the legal regulations.

Important: As required by § 77 Abs. 2 StriSchV, LEYBOLD DIDACTIC has notified the sale of the radioactive preparation to the authority relevant to the purchaser. However, the purchaser is thereby not released from his own duty to notify his purchase.

### Safety notes

The mixed preparation  $\alpha$ ,  $\beta$ ,  $\gamma$  is approved for teaching purposes at schools according to StriSchV. As the preparation produces ionizing radiation, the following safety rules have nevertheless to be observed when the preparations are used:

- Prevent access to the preparation by unauthorized persons.
- Before using the preparation, make sure that it is intact.
- To ensure *minimum exposure time*, take the preparation out of the guard vessel only as long as is necessary for carrying out the experiment.
- To ensure *maximum distance*, take hold of the preparation only at the upper end of the aluminium rod.
- With the object of *shielding* keep the preparation in the guard vessel.
- To ensure *minimum activity*, lay only the preparation needed in the experiment on the table.

**1 Description**

With the mixed preparation  $\alpha$ ,  $\beta$ ,  $\gamma$ , which consists of the nuclides Cs-137, Am-241 und Sr-90, an energy analysis can be performed using the semiconductor detector ( $\alpha$  radiation) and the scintillation counter ( $\gamma$  and  $\beta$  radiation). It consists of a cylindrical aluminium rod with the radioactive substance inserted in a blind hole at one end. At the other end of the aluminium rod, there is a nameplate with the name of the nuclides and a colour code.

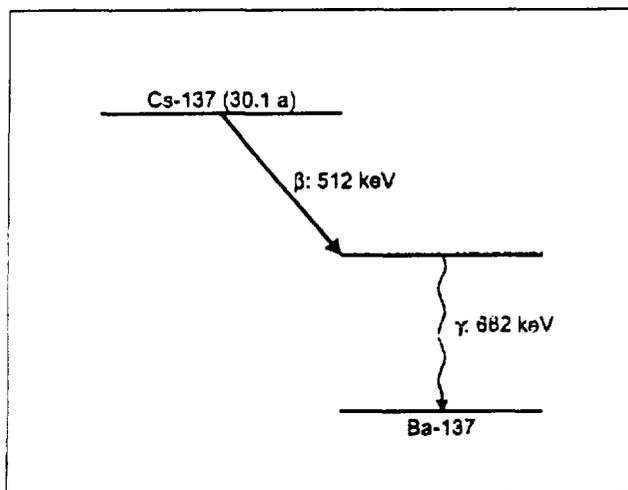
The preparation is classified as a free preparation with type certification. In Germany, it is approved as a device for teaching purposes with the type reference Nds. 0 0 2/99

**2 Technical data**

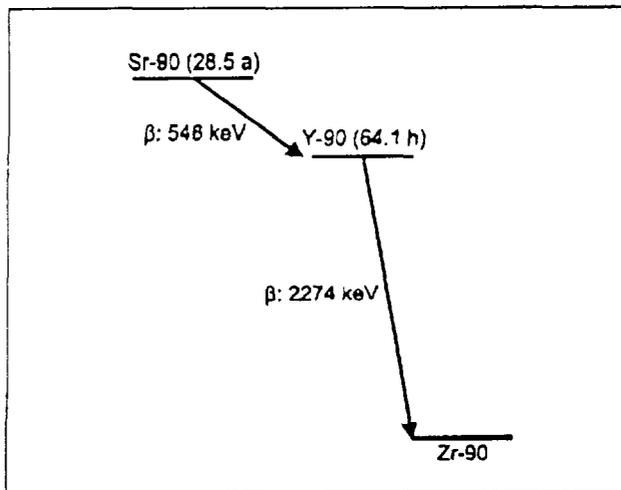
Mass:	120 g
Dimensions:	100 mm x 30 mm $\varnothing$
Preparation:	85 mm x 12 mm $\varnothing$
<b>Cs-137:</b>	
Activity:	333 kBq
Depth of the blind hole:	8 mm
Cover:	1200 mg cm <sup>-2</sup> refined-steel foil
<b>Am-241:</b>	
Activity:	4.44 kBq
Depth of the blind hole:	7 mm
Cover:	4 mg cm <sup>-2</sup> refined-steel foil
<b>Sr-90:</b>	
Activity:	4.44 kBq
Depth of the blind hole:	7 mm
Cover:	250 mg cm <sup>-2</sup> refined-steel foil

**3 Simplified energy-level diagrams**

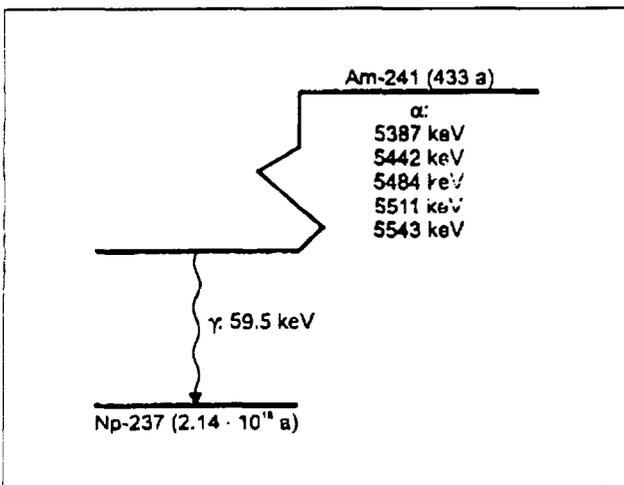
**3.1 Cs-137**



**3.3 Sr-90**

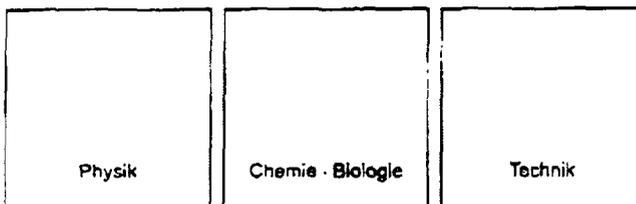


**3.2 Am-241**



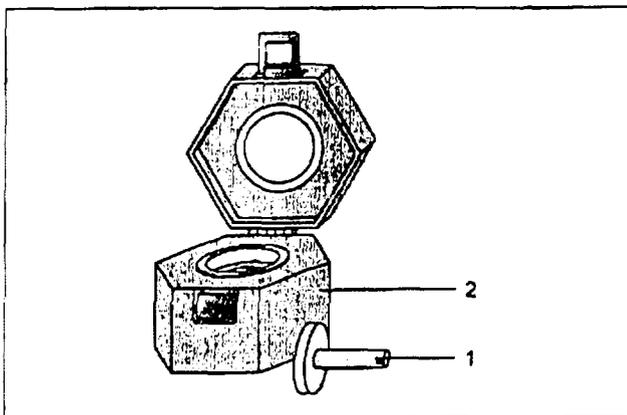
The low-energy  $\beta$  particles emitted by Sr-90 are completely absorbed in the cover. Therefore, only the energetic  $\beta$  particles emitted by the daughter nuclide Y-90 escape from the preparation.

The cover reduces the energy of the emitted  $\alpha$  radiation to 4.5 MeV.



Leybold Didactic GmbH  
Lehr- und Didaktiksysteme

04/02-W97-Wf



## Instruction sheet 559 809

Cs-137 preparation, 3.7 MBq (559 809)

- 1 Safety container
- 2 Radioactive preparation

### Regulations

When the Cs-137 preparation is handled, country specific regulations concerning protection from damage caused by ionizing radiation must be observed, for example, the Radiation Protection Regulation (Strahlenschutzverordnung or StrSchV from October 13, 1976) in Germany.

This preparation is type-approved and may be used without authorisation for teaching purposes at schools in accordance with the StrSchV. In general, however, use of the preparation has to be notified to the appropriate authority.

The preparation is subject to the rules quoted in the enclosed type approval. This approval has to be kept by the owner of the approved appliance.

Radioactive preparations have to be protected against being lost and against access by unauthorised persons. This can be achieved by storing the preparations in a lockable cabinet which is only used for this purpose.

In general, only teachers who are appointed radiation protection officers are authorised to handle radioactive preparations according to § 31 Abs. 4 StrSchV. According to § 56 Abs. 3 StrSchV, students are only allowed to take part in the experiments if a teacher who is appointed radiation protection officer is present and supervises them.

### Administrative measures

The Cs-137 preparation 3.7 MBq is a type approved appliance with the type mark Nds. 151/96.

- Keep the copy of the type approval and the certificate of quality as they are important documents.
- In the Federal Republic of Germany, purchase of the preparations has to be notified to the appropriate authority and after a period of at most 10 years their tightness has to be checked by an expert body.
- In other countries, the corresponding regulations have to be observed.

Important: according to § 77 Abs. 2 StrSchV, LEYBOLD DIDACTIC has notified delivery of purchased radioactive preparations to the authority appropriate for the purchaser. However, this does not release the purchaser from his duty of notifying the purchase.

### Safety notes

The Cs-137 preparation 3.7 MBq is type approved for teaching purposes at school in accordance with StrSchV. Since the preparation produces ionizing radiation, the following safety rules must nevertheless be kept to:

- Prevent access to the preparation by unauthorised persons.
- Before using the preparation make sure that it is intact.
- To ensure *minimum exposure time*, take the preparation out of the safety container only as long as is necessary for carrying out the experiment.
- To ensure *maximum distance*, hold the preparation only at the upper end of the metal holder and keep it away from your body as far as possible.
- For the purpose of *shielding*, keep the preparation in its safety container.
- To ensure *minimum activity*, only put that preparation on the experiment table that is needed for the current experiment.

## 1 Description

The Cs-137 preparation 3.7 MBq is a relatively strong radiator with a source that is almost pointlike. The diameter of the active ball is approx. 1 mm.

Because of the pointlike source, an energy of the order of magnitude of an electron's rest mass and a relatively high radiant flux, this preparation is particularly suited for experiments on Compton scattering. In particular, in conjunction with the apparatus set Compton (559 800).

The preparation is classified as a preparation with type approval. In the Federal Republic of Germany, it is approved as an appliance for teaching purposes with the type mark Nds. 151/96.

## 2 Scope of supply

1 preparation Cs-137 3.7 MBq  
1 safety container

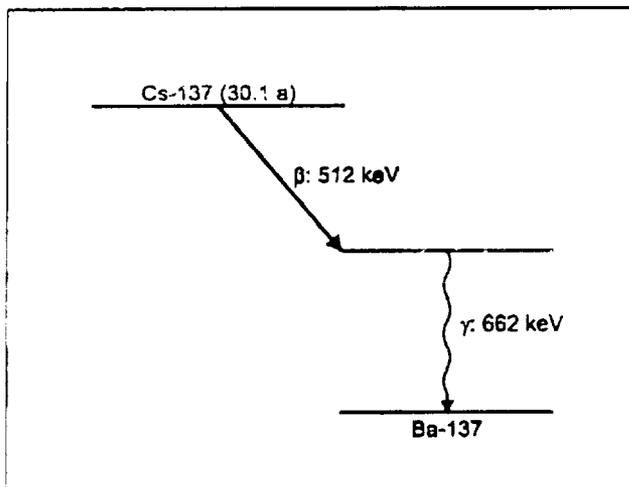
## 3 Technical data

Weight: 1000 g  
Dimensions: 100 mm x 100 mm x 80 mm  
(safety container included)  
Activity: 3.7 MBq

## 4 Remark

Due to the high radiant flux, the maximum counting rate that is meaningful for the detector is prone to be exceeded

## 5 Energy-level diagram



Simplified energy-level diagram of Cs-137