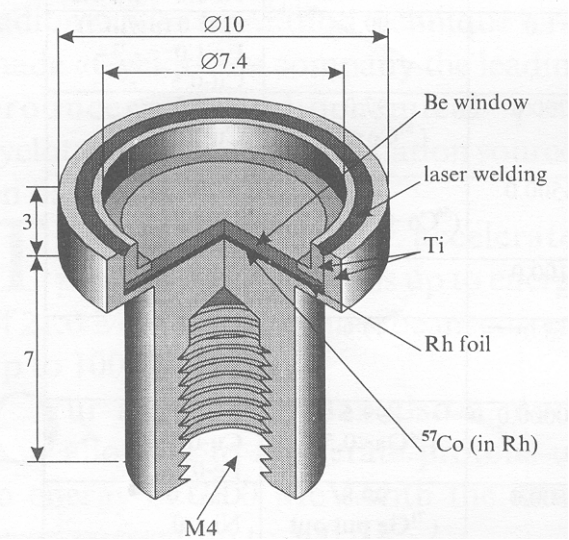
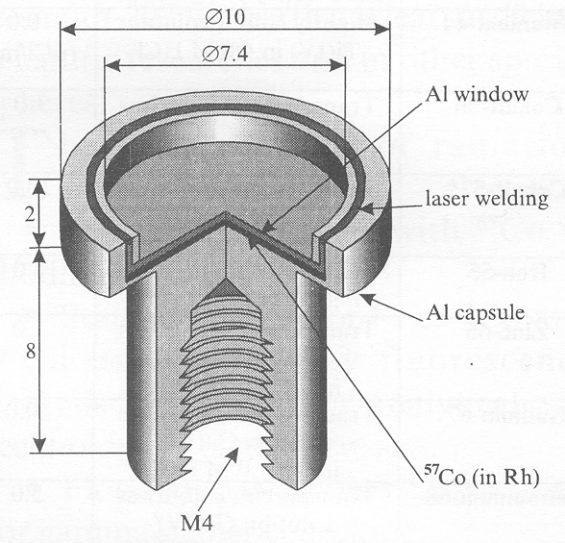
Product Information

Mössbauer Sources [i] with Co-57 in Rhodium matrix



MSCRT – Titanium Capsule



MSCRA – Aluminium Capsule

Introduction

Rhodium is a good matrix for most applications and is suitable for use in the vicinity of magnetic fields. Recommended for applications requiring high activity as high cobalt-57 loading is possible at ambient temperatures.

Cobalt-57 of high specific activity and high chemical purity is uniformly diffused into a rhodium foil matrix by annealing. Laser welding is used to seal the foil into aluminium or titanium capsules. Aluminium capsules may be used at liquid helium temperatures but capsules are not designed to be immersed in the cooling liquid.

The use of high purity materials and high specific activity cobalt-57 (>6000 Ci/g) permits the production of sources with single Lorentzian lines with near natural line width (0.11 – 0.13 mm/s)

Specification of ^{57}Co(Rh) Mössbauer Sources

Source Type	Activity / mCi (5 mCi sources can be supplied on special request)	Diameter of Active Area / mm	Full width at half maximum of resonance line / mms^{-1}	Probability of resonance photons f-fraction	Percentage emission efficiency for 14.4 keV gamma
MSCRA	10[ii]	5	≤ 0.110	≥ 0.75	≥ 75
MSCRA	25	5	≤ 0.110	≥ 0.75	≥ 75
MSCRA	50	5	≤ 0.115	≥ 0.75	≥ 75
MSCRA	100	5	≤ 0.125	≥ 0.75	≥ 75

HQ & European Sales Office
REVISS Services (UK) Ltd
6 Chiltern Court, Asheridge Road
CHESHAM, Buckinghamshire, England HP5 2PX

T: +44 (0)1494 777 443 or 451
F: +44 (0)1494 777457
E: isotopes@reviss.co.uk
Datasheet QS241i2

Nuclear data

parent nuclide	Cobalt-57
half-life	271.7 days[iii]

Gamma and X-radiation emitted by 57Co/57Fe

energy / keV	Gamma Emission Probability %	relative intensity
692	0.16	0.19
136.5	10.6	12.4
122.1	85.6	100
14.4 (Mőssbauer gamma)	9.19	10.7
6.4 (Iron K_α X-rays)	50.3	58.8
7.06 (Iron K_β X-rays)	6.8	7.9

Safety performance testing

ISO classification – C32231

Technical Background

Rhodium can confidently be recommended as the best all-round matrix, suitable for most applications. It is particularly suitable for sources used at liquid helium temperatures (4.2 K), since the magnetic ordering temperature is only 4K/atomic % of iron in rhodium, and sources of up to about 300 mCi/cm^2 in 7 µm foil can be expected to give un-split lines. The high loadings of cobalt that are possible at ambient temperatures before magnetic splitting occurs make rhodium matrix well suited for the preparation of concentrated sources. A high-resolution detector is required if K X-rays are to be excluded from the Mőssbauer gamma peak.

Matrix Thickness

Thickness / µm	Rh: 14.4 keV photon emission efficiency
7	84%
12	76%

i These sources are produced by leading Russian manufacturers outside the REVISS ISO9001 quality management system.
ii Note: 5 mCi sources can be supplied on special request
[iii] Lederer: Table of Isotopes 7th Edition – Wiley-Interscience

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