

National Bureau of Standards

Certificate

Standard Reference Material 4218-E

Point-Source Standard

Radionuclide	Europium-152
Source identification	4218-E-
Source description	Point source on polyester tape (1)*
Activity	Bq
Reference time	1200 EST August 27, 1982
Random uncertainty	0.03 percent (2)
Systematic uncertainty	1.44 percent (3)
Total uncertainty (Random plus systematic)	1.47 percent
Photon-emitting impurities (Activity ratios at reference time)	$^{154}\text{Eu}/^{152}\text{Eu}: (3.5 \pm 0.4) \times 10^{-3}$ (4)
Half life	13.6 ± 0.1 years (5)
Measuring instrument	"4 π " γ pressurized ionization chamber previously calibrated using 20.32-cm diameter NaI(Tl) well crystals

This Standard Reference Material was prepared in the Center for Radiation Research,
Nuclear Radiation Division, Radioactivity Group, Dale D. Hoppes, Group Leader.

Washington, D.C.
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FOOTNOTES

- (1) The point source support is a 5.4-cm diameter by 1-mm thick aluminum annulus supporting a 0.006-cm-thick layer of polyester tape. The active source is a 3-mm diameter dried deposit of europium, as the chloride, covered with another layer of the same tape.
- (2) Half the 99-percent confidence interval of the mean (2.64 times the standard error computed from 80 ionization-chamber measurements).
- (3) Linear sum of estimated uncertainty limits due to:
- | | |
|------------------------------------|--------------|
| a) NaI(Tl) detector efficiency | 0.54 percent |
| b) fluorescence yield | 0.18 percent |
| c) impurities | 0.20 percent |
| d) decay correction | 0.02 percent |
| e) gravimetric measurements | 0.30 percent |
| f) ionization-chamber measurements | 0.20 percent |
- (4) The limit of detection, expressed as a percentage of the gamma-ray-emission rate of the 1408-keV gamma rays emitted in the decay of europium-152, is
- 0.1 percent between 90 and 1900 keV,
- provided that the impurity photons are separated in energy by 5 keV or more from photons emitted in the decay of europium-152 and europium-154.
- (5) NBS-measured half-life value. The value recommended by the Oak Ridge Nuclear Data Project is 13.6 ± 0.2 years [Radioactive Decay Data Tables, D.C. Kocher (ed.) DOE/TIC-11026, 157 (1981).].

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