

National Bureau of Standards Certificate

Standard Reference Material 4250B

Radioactivity Standard

Radionuclide	Cesium-134
Source identification	4250B-
Source description	Liquid in NBS borosilicate-glass ampoule (1)*
Solution composition	Approximately 63 micrograms of cesium chloride per gram of 0.1 molar hydrochloric acid (2)
Mass	grams
Radioactivity concentration	1.742×10^6 Bq g ⁻¹
Reference time	1200 EST March 23, 1982
Random uncertainty	0.02 percent (3)
Systematic uncertainty	1.14 percent (4)
Total uncertainty (Random plus systematic)	1.16 percent
Photon-emitting impurities	None observed (5)
Half life	2.065 ± 0.001 years (6)
Measuring instrument	NBS pressurized "4π"γ ionization chamber calibrated by liquid scintillation coincidence efficiency-extrapolation technique

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. 20234
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*Notes on back

FOOTNOTES

(1) Approximately five milliliters of solution. Ampoule specifications:

body diameter	16.5 ± 0.5 mm
wall thickness	0.60 ± 0.04 mm
barium content	less than 2.5 percent
lead oxide content	less than 0.02 percent
other heavy elements	trace quantities

(2) Solution density 1.000 ± 0.002 g/ml at 22.6°C.

(3) Half the 99-percent confidence interval of the mean (2.7 times the standard error computed from 42 ionization-chamber measurements).

(4) Estimated uncertainty limits due to calibration of the pressurized "4π"γ ionization chamber, which is the linear sum of estimated uncertainty limits due to:

a) half the 99-percent confidence interval of the mean of five coincidence measurements	0.06 percent
b) dead time	0.09 percent
c) resolving time	0.15 percent
d) background	0.05 percent
e) gravimetric measurements	0.10 percent
f) half the 99-percent confidence interval of the mean of the ionization-chamber measurements	0.11 percent
g) radium-226 reference sources ratios	0.31 percent
h) efficiency extrapolation	0.06 percent
i) modification of curve-fitting formula	0.20 percent
j) spurious pulses	0.01 percent

(5) Limits of detection as a percentage of the gamma-ray-emission rate of the 605-keV gamma rays emitted in the decay of cesium-134 are

0.1 percent between 90 and 790 keV

0.01 percent between 807 and 1900 keV

provided that the impurity photons are separated in energy by five keV or more from photons emitted in the decay of cesium-134.

(6) NBS-measured half-life value. NBS Special Publication No. 626, January 1982, p. 93.