



National Bureau of Standards

Certificate

Standard Reference Material 4339 Radioactivity Standard

Radionuclide	Radium-228
Source identification	4339-
Source description	Liquid in flame-sealed NBS borosilicate-glass ampoule ^{(1)*}
Solution composition	Radium-228 and progeny plus approximately 13 μg of non-radioactive barium per gram of 1-molar nitric acid ⁽²⁾
Mass	grams
Radioactivity concentration	287.0 Bq g ⁻¹
Reference time	1200 EST July 1, 1988
Overall uncertainty	2.76 percent ⁽³⁾
Photon-emitting impurities	²²⁶ Ra: 0.9 \pm 0.1 Bq g ⁻¹ ⁽⁴⁾
Half life	5.75 \pm 0.03 years ⁽⁵⁾
Measuring instrument	Calibrated germanium spectrometer systems

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

Gaithersburg, MD 20899
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Stanley D. Rasberry, Chief
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*Notes on back

NOTES

- (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 1.030 ± 0.003 g/mL at 24.4 °C.

- (3) The overall uncertainty was formed by taking three times the quadratic combination of standard deviations of the mean, or assumed approximations thereof, for the following:

a) photon-emission-rate measurements	0.26 percent
b) gravimetric measurements	0.05 percent
c) source positioning	0.20 percent
d) detector efficiency	0.50 percent
e) decay-scheme data	0.61 percent
f) half-life	0.33 percent

- (4) The limit of detection for photon-emitting impurities is:

0.3 γ s⁻¹ g⁻¹ for energies between 50 and 1900 KeV, provided that the impurity photons are separated in energy by 5 keV or more from photons emitted in the decay of radium-228 and progeny.

- (5) NCRP Report No. 58, 2nd edition, February 1985, p. 365.

For further information please contact Dr. Larry Lucas, (301) 975-5546.