



National Institute of Standards & Technology

Certificate

Standard Reference Material 4325 Radioactivity Standard

Radionuclide	Beryllium-10/Beryllium-9
Source identification	SRM 4325
Source description	Beryllium chloride solution in screw-cap Teflon bottle (1)*
Nominal volume	50 mL
$^{10}\text{Be}/^9\text{Be}$ isotopic ratio	2.68×10^{-12}
Reference time	August, 1986
Overall isotopic-ratio uncertainty	5.1 percent (2)
Half life	$1.34 \pm 0.07 \times 10^6$ years (3)
Measuring instrument	Secondary ionization mass spectrometer 4 $\pi\beta$ liquid-scintillation counter

This standard reference material was prepared in the Center for Radiation Research, Ionizing Radiation Division, by Dale D. Hoppes, Bert M. Coursey, and Kenneth G.W. Inn, in collaboration with:

Center for Analytical Chemistry
Gas & Particulate Division, David S. Simons
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and

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Analytical Chemistry Division, Raymond L. Walker
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Gaithersburg, MD 20899
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William P. Reed, Acting Chief
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*Notes on back

NOTES

- (1) Teflon bottle contains approximately 50 mL of solution of 5.15 mg of beryllium per gram of 1 N hydrochloric acid.
- (2) Uncertainties have been estimated as standard deviations, or approximations thereof.

Mass Spectrometry: The overall uncertainty, twice the following uncertainties combined in quadrature, is 5.1 percent:

a) isotopic fractionation correction	0.5	percent
b) NIST and ORNL measurements discrepancies	1.91	percent
c) changes in concentration during preparation	1.5	percent
d) isotopic peak analysis	0.4	percent
e) hydride correction	0.0	percent
f) isobaric interferences	0.2	percent
g) mass measurements (n=16)	0.5	percent
h) cross contamination and memory effects	0.0001	percent
i) gravimetric measurements	0.1	percent

Liquid Scintillation: The overall uncertainty, twice the following uncertainties combined in quadrature, is 0.7 percent:

a) Liquid-scintillation measurements	0.06	percent
b) alpha particle measurements	0.05	percent
c) gravimetric measurements	0.1	percent
d) system live time	0.05	percent
e) background	0.01	percent
f) detector efficiency	0.25	percent
g) impurities	0.01	percent
h) scintillator stability	0.20	percent

- (3) In preparation for publication by participants in this standardization.
- (4) The initial solution for SRM 4325 was prepared by the Oak Ridge National Laboratory as reported by Inn, K.G.W., Raman, S., Coursey, B.M., Fassett, J.D., and Walker, R.L. Nucl. Inst. Meth. Phys. Res., B29, 27 (1987). Secondary Ionization Mass Spectrometry analyses of the ORNL A solution were conducted at the Oak Ridge National Laboratory and the National Institute of Standards and Technology. Agreement between the two laboratories for the total beryllium and the beryllium-10 concentrations were 2.4 and 2.7 percent, respectively. Subsequent dilutions were substantiated by liquid-scintillation counting and accelerator mass spectrometry by the Inst. f. Mittelenergiephysik, Zurich.

For further information please contact K.G.W. Inn at (301) 975-5541