

# National Bureau of Standards

## Certificate

### Standard Reference Material 4323

#### Alpha-Particle-Solution Standard

Radionuclide	Plutonium-238
Source identification	SRM 4323
Source description	Liquid in 5-mL flame-sealed glass ampoule
Source mass	Approximately 5.8 grams
Source composition	Plutonium-238 in 5-molar nitric acid
Reference time	1200 EST, 1 November 1986
Radioactivity concentration	32.73 Bq g <sup>-1</sup>
Overall uncertainty	0.51 percent (1)*
Alpha-particle-emitting impurities (Activities at reference time)	<sup>239</sup> Pu: 0.0001 Bq g <sup>-1</sup> (2)
Measuring instrument	NBS "0.1π"α defined-solid-angle counter with scintillation detector and two 4π liquid-scintillation counters
Half life	87.74 ± 0.04 years (3)

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

Gaithersburg, MD 20899  
November, 1986

Stanley D. Rasberry, Chief  
Office of Standard Reference Materials

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NOTES

- (1) Individual uncertainties have the significance of one standard deviation of the mean, or an approximation thereof. The combined uncertainty is the individual uncertainties shown below added in quadrature. The overall uncertainty is taken to be three times the combined uncertainty.

<u>Source of uncertainty</u>	<u>Uncertainty (%)</u>
a) alpha-particle-emission-rate measurements	0.04
b) gravimetric measurements	0.05
c) deadtime	0.05
d) background	0.02
e) detection efficiency	0.10
f) count-rate-vs-energy extrapolation to zero energy	0.10
g) half life	0.00
h) alpha-particle-emitting impurities	0.00
Combined uncertainty	<u>0.17</u>
	* 3
Overall uncertainty	0.51

- (2) As stated by the supplier, based upon mass-spectrometric measurements. Plutonium-239 was the only radionuclidic impurity detected. Measurements at NBS did not detect any alpha-particle-emitting impurity above our detection limit, which corresponds to  $0.001 \text{ } \mu\text{s}^{-1}\text{g}^{-1}$ .
- (3) NCRP Report No. 58, Second Edition (1985) p. 365.

For further information call Larry Lucas at (301) 975-5546