

# National Bureau of Standards

## Certificate

### Standard Reference Material 4321

#### Alpha-Particle-Solution Standard

Radionuclide	Natural Uranium
Source identification	SRM 4321
Source description	Liquid in 5-mL flame-sealed glass ampoule
Source mass	Approximately 5.3 grams
Source composition	Natural uranium in 2-molar nitric acid
Uranium concentration	0.02133 g g <sup>-1</sup>
Reference time	1200 EST, 1 November 1986
Radioactivity concentration	U-238: 263.3 Bq g <sup>-1</sup> U-235: 12.12 Bq g <sup>-1</sup> U-234: 264.2 Bq g <sup>-1</sup>
Overall uncertainty	U-238: 0.36 percent (1)* U-235: 0.39 percent U-234: 1.53 percent
Measuring instrument	Mass spectrometer (2)
Half life	U-238: (4.468 ± 0.003) x10 <sup>9</sup> years (3) U-235: (7.038 ± 0.005) x10 <sup>8</sup> years U-234: (2.445 ± 0.010) x10 <sup>5</sup> years

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  
November, 1986

Stanley D. Rasberry, Chief  
Office of Standard Reference Materials

\*Notes on back

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>		
	<u>U-238</u>	<u>U-235</u>	<u>U-234</u>
a) original calibration of SRM 960	0.01	0.05	0.28
b) quantitative dissolution	0.07	0.07	0.07
c) gravimetric measurements	0.07	0.07	0.07
d) half life	0.07	0.07	0.41
Combined uncertainty	0.12	0.13	0.51
	* 3	* 3	* 3
Overall uncertainty	0.36	0.39	1.53

- (2) SRM 4321 was prepared by quantitatively dissolving a piece of natural uranium metal (SRM 960) that had been characterized by quantitative assay and by mass spectrometry.
- (3) Radioactive Decay Data Tables, D.C. Kocher, DOE/TIC-11026 (1981).

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

SRM 4321