

National Bureau of Standards

Certificate

Standard Reference Material U-005a

Uranium Isotopic Standard

	^{234}U	^{235}U	^{236}U	^{238}U
Atom Percent	0.00340 ± 0.00007	0.5064 ± 0.0003	0.00118 ± 0.00001	99.4890 ± 0.0003
Weight Percent	0.00334 ± 0.00007	0.5000 ± 0.0003	0.00117 ± 0.00001	99.4955 ± 0.0003

This Standard Reference Material (SRM) is certified for use as an isotopic standard. The primary intended use is for the evaluation of mass discrimination effects encountered in the operation of a mass spectrometer.

SRM U-005a is a highly purified uranium oxide, U_3O_8 . The atomic weight of the uranium is calculated to be 238.035 using the nuclidic masses 234.0409, 235.0439, 236.0456, and 238.0508.

The certified isotopic compositions are based on measurements made at the National Bureau of Standards using a thermal ionization mass spectrometer equipped with a triple-filament ion source and Faraday cage collector. The observed isotopic ratios were corrected for mass discrimination effects by intercomparison with synthetic mixtures prepared from high-purity ^{235}U and ^{238}U separated isotopes, and blended to closely bracket the $^{235}\text{U}/^{238}\text{U}$ ratio of the SRM.

The abundances of the minor isotopes, ^{234}U and ^{236}U , were determined by isotope dilution after spiking with ^{233}U (SRM 995) to provide a $^{233}\text{U}/^{234}\text{U}$ ratio that approximates unity.

The relative standard deviation for the $^{238}\text{U}/^{235}\text{U}$ ratio is calculated to be 0.000234 with nine degrees of freedom.

The uncertainty of the certified values is the 95% confidence interval for the mean. For the minor isotopes, ^{234}U and ^{236}U , the uncertainty is the 95% confidence interval for the mean and a bound on the systematic error associated with the use of SRM 960 and SRM 995.

Measurements leading to the certification of this SRM were made by J.W. Gramlich, L.A. Machlan, and J.R. Moody of the Inorganic Analytical Research Division.

The statistical analyses were performed by W.S. Liggett of the Statistical Engineering Division.

The overall direction and coordination of the technical measurements leading to certification were performed under the chairmanship of E.L. Garner, Chief, Inorganic Analytical Research Division.

The technical and support aspects in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by T.E. Gills.

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Gaithersburg, MD 20899

Stanley D. Rasberry, Chief
Office of Standard Reference Materials