U. S. Department of Commerce
Rogers C.B. Morton
Secretary

al Bureau of Standards
rd W. Roberts, Director

# National Bureau of Standards Certificate

## Standard Reference Material 4335

### Plutonium-242

### Alpha-Particle Solution Standard

This Standard Reference Material consists of carrier-free plutonium-242 in approximately 5 milliliters of 5 M $HNO_3$ in a borosilicate-glass ampoule.

The activity of plutonium-242 plus alpha-particle-emitting impurities in nuclear transformations per second per gram of solution, in March 1975, was

*2.474 ± 1.1%*.

This Standard Reference Material was prepared by quantitative dilutions of a master solution that had been calibrated by liquid-scintillation counting. Confirmatory measurements were made using the NBS "0.8π" defined-solid-angle, alpha-particle counter with scintillation detector.

The uncertainty in the activity, 1.1 percent, is the linear sum of 0.2 percent, which is the limit of the random error of the liquid-scintillation counter measurements at the 99-percent confidence level (2.977 $S_m$, where $S_m$ is the standard error computed from 15 determinations), and 0.9 percent which is the estimated upper limit of conceivable systematic errors.

A half life of $3.87 \times 10^5$ years is suggested, and is the value adopted by the compilers of the Nuclear Data Sheets (Section B, Vol. 4, No. 6, Sept. 1970).

The alpha-particle spectrum of an evaporated drop of the master solution was examined with a silicon surface-barrier detector over the energy region of 4.43 to 5.79 MeV, and alpha particles with energies corresponding to those of americium-241 and plutonium-238, and to plutonium-244 were detected. The $(^{238}Pu+^{241}Am)/^{242}Pu$ and $^{244}Pu/^{242}Pu$ activity ratios were each approximately 0.0002 in March 1975.

This Standard Reference Material was prepared and calibrated in the NBS Center for Radiation Research, Radioactivity Section, W. B. Mann, Chief.

Washington, D.C. 20234
April, 1975

J. Paul Cali, Chief
Office of Standard Reference Materials

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