

National Bureau of Standards Certificate

Standard Reference Material 4336

Alpha-Particle Solution Standard

Polonium-210

This Standard Reference Material consists of carrier-free polonium-210 in approximately 3.3 grams of approximately 2 molar nitric acid in a flame-sealed borosilicate-glass ampoule.

The number of alpha particles emitted per second per gram of solution at 1200 EST September 23, 1975, was

$$*164.4 \pm 0.9%*$$

This Standard Reference Material was calibrated by means of liquid-scintillation counting. Confirmatory measurements were performed on sources that were deposited and dried on platinum discs, using the NBS 0.8 π defined-solid-angle alpha-particle counter. The mean of these agreed with the calibration value to within 0.1 percent.

The uncertainty in the alpha-particle-emission rate, 0.9 percent, is the linear sum of 0.1 percent, which is the limit of the random error at the 99-percent confidence level ($2.70 S_m$, where S_m is the standard error computed from 47 determinations), and 0.8 percent, which is the estimated upper limit of conceivable systematic errors.

A half life of 138.378 ± 0.007 days is suggested^(a).

The alpha-particle spectrum of an evaporated source prepared from this Standard Reference Material was examined over the energy region of 4.0 to 8.0 MeV with a silicon surface-barrier detector system, and no alpha-particle-emitting impurities were detected. The detection limits for alpha particles from contaminants can be expressed as a percentage of the alpha-particle-emission rate of polonium-210 on the calibration date. For contaminant alpha particles with energies less than 5.3 MeV the detection limit would be approximately 0.1 percent, and for those with energies greater than 5.3 MeV the detection limit would be approximately 0.01 percent.

The gamma-ray-emission rate due to contaminants in this Standard Reference Material over the energy region of 0.01 to 1.85 MeV is estimated to be less than 2 gamma rays per second per gram of solution on the calibration date.

(over)

The emission rate from this Standard Reference Material of beta particles with energies greater than 0.15 MeV is estimated to be less than 2 beta particles per second per gram of solution on the calibration date.

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

(a) M. B. Lewis, Nuclear Data Sheets, B5(6), 631 (1971).

J. Paul Cali, Chief
Office of Standard Reference Materials

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