

National Bureau of Standards

Certificate

Standard Reference Material 4208-B

Gamma-Ray Standard

Mercury-203

This Standard Reference Material consists of mercury-203 deposited, as the sulfide, on polyester tape approximately 0.006-cm thick and covered by another layer of the same tape. The tape is supported on an aluminum annulus 0.8-cm wide and 5.5-cm outside diameter.

The activity of the mercury-203 in nuclear transformations per second at 1200 EST November 13, 1973, was

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This Standard Reference Material is a dried deposit of an accurately weighed aliquot of a solution whose gamma-ray-emission rate was measured in the National Bureau of Standards $4\pi\gamma$ -ionization chamber which had previously been calibrated with mercury-203 solutions from which quantitative sources had been prepared and $4\pi\beta\text{-}\gamma$ coincidence counted. Using a total internal conversion coefficient, 0.2262 ± 0.0019 for the 279-keV transition following the beta decay of mercury-203, reported by J. G. V. Taylor, Canadian Journal of Physics, Vol. 40 (1962), the number of gamma rays emitted per second at 1200 EST November 13, 1973, would be

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The uncertainty in the activity, 1.03 percent, is the linear sum of 0.04 percent, which is the 99-percent confidence limit of the ionization-chamber measurements ($3.250 S_m$, where S_m is the weighted standard error computed from 6 groups of measurements, each containing 10 observations), and the estimated upper limits of conceivable systematic errors.

The uncertainty in the gamma-ray-emission rate, 1.23 percent, is the linear sum of 1.03 percent, which is the uncertainty in the activity, and 0.2 percent, which is the error associated with the γ/β ratio.

The material from which this standard was prepared was examined for impurities with a Ge(Li)-spectrometer and no impurities were observed.

(over)

A half-life of 46.613 ± 0.009 days is suggested. This value is the weighted mean of six half-life determinations on five different solutions which had been prepared either for standards or for international comparison work. The uncertainty, 0.009 day, is the 99-percent confidence limit. Half-life measurements and gamma-ray spectral analyses will be made periodically and users of this material will be notified if the measurements indicate departure from the previously found results.

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
November, 1973

J. Paul Cali, Chief
Office of Standard Reference Materials

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