

Certificate

STANDARD REFERENCE MATERIAL 4208

Gamma-Ray Standard

Mercury-203

This standard consists of mercury-203 deposited, as the sulfide, on polyester tape approximately 0.006-centimeter thick and covered by another layer of the same tape.

The activity of the mercury-203 in nuclear transformations per second at 1200 EST June 11, 1969, was

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This standard is a dried deposit of an accurately weighed aliquot of a solution whose activity was measured in the National Bureau of Standards $4\pi\gamma$ ionization chamber which had previously been calibrated by means of sources calibrated by $4\pi\beta\text{-}\gamma$ coincidence counting.

Using the 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 total number of gamma rays emitted per second at 1200 EST June 11, 1969, would be

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The uncertainty in the activity, 1.1₇ percent, is the sum of 0.1₀ percent, which is the limit of the random error at the 99-percent confidence level (i.e. $2.98 s_m$, where s_m is the standard error computed from fifteen groups of measurements), and 1.0₇ percent, which is the maximum uncertainty due to the estimated systematic errors in the calibration of the $4\pi\gamma$ ionization chamber and in these measurements.

The uncertainty in the gamma-ray-emission rate, 1.3₇ percent, is the linear sum of 1.1₇ 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 both NaI(Tl)- and Ge(Li)-gamma-ray spectrometers and no impurities were observed.

A half life of 46.58 ± 0.01 days is suggested. This value is the weighted mean of three determinations on three preceding series of standards and is based on fifty-two sets of $4\pi\gamma$ ionization-chamber measurements. The error, 0.01 day, is the weighted standard error. Half-life measurements and gamma-ray-spectrum 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 was prepared and calibrated in the Center for Radiation Research, Nuclear Radiation Division, by members of the Radioactivity Section, W. B. Mann, Chief.

Washington, D. C. 20234
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J. Paul Cali, Acting Chief
Office of Standard Reference Materials