

National Bureau of Standards

Certificate

Standard Reference Material 4240

Radioactivity Standard

Bismuth-207

This standard consists of bismuth-207, quantitatively deposited as the nitrate, on polyester tape approximately 0.006-centimeter thick and covered by another layer of the same tape.

The activity in nuclear transformations per second at 1200 EST on January 1, 1973, was:

$$* \qquad \qquad \qquad \pm 1.4\% *$$

This standard is a dried deposit of an accurately weighed aliquot of a solution whose activity was determined by sum-coincidence counting with the National Bureau of Standards two 8-inch-diameter, thallium-activated, sodium iodide well crystals.

The uncertainty in the activity, 1.4 percent, is the linear sum of 0.4 percent, which is the 99-percent confidence limit (i.e., $3.3 S_m$, where S_m is the standard error computed from 9 measurements), and 1.0 percent, which is the linear sum of the upper limits of conceivable systematic errors in the measurements.

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

A half life of 32.4₈ years \pm 3.9 percent, for this standard, has been derived from 30 sets of $4\pi\gamma$ -ionization-chamber measurements, made over a period of 1.03 years, on each of two samples of material from the master solution. The uncertainty, 3.9 percent, is the 99 percent confidence limit. 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 NBS Center for Radiation Research, Applied Radiation Division, Radioactivity Section, W. B. Mann, Chief.

Washington, D. C. 20234
May 22, 1973

J. Paul Cali, Chief
Office of Standard Reference Materials

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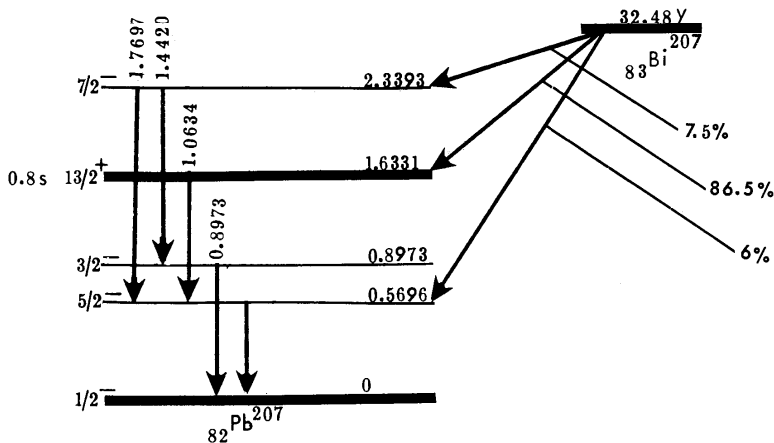
Decay Scheme Information

Recommended values for gamma-ray abundances, based on literature values and NBS measurements, are as follows:

Energy	γ /nuclear transformation	Δ
0.5696	0.9784	0.1%
0.8973	0.0015	-
1.0634	0.753	0.9%
1.4420	0.0015	-
1.7697	0.0709	0.8%

Δ is one standard error in the average value of equally-weighted measured-gamma-ray abundances.

The decay scheme of bismuth-207 given below is taken, in part, from C. M. Lederer et. al.¹ and P. Venugopala Rao et. al.²



¹C. M. Lederer, J. M. Hollander, and I. Perlman, Table of Isotopes, Sixth Edition, p. 397 (1967).

²P. Venugopala Rao, R. E. Wood, J. M. Palms and R. W. Fink, Phys. Rev. 178, No. 4, 178 (1969).