

National Bureau of Standards Certificate

Standard Reference Material 4234

Radioactivity Standard Strontium-Yttrium-90

This Standard Reference Material consists of strontium-90, in equilibrium with its daughter, yttrium-90, in grams of carrier solution in a flame-sealed borosilicate glass ampoule. The carrier solution contains 73 micrograms each of strontium and yttrium per gram of approximately 1 M HCl and its density is 1.015 ± 0.002 g/ml at 23.4°C .

The activity of strontium-90 plus yttrium-90 in nuclear transformations per second per gram of solution on August 4, 1975, was

$$*1.25_2 \times 10^6 \pm 1.4_7\%*.$$

The solution from which this Standard Reference Material was prepared was calibrated by $4\pi\beta$ proportional counting of sources prepared from dilutions of the ampoule solution. Confirmatory measurements were made by $2\pi\beta$ ionization-chamber measurements of sources prepared directly from the ampoule solution.

The uncertainty in the value of the activity, 1.47 percent, is the linear sum of 0.37 percent, which is the limit of the random error of the $4\pi\beta$ measurements at the 99-percent confidence level ($2.763 S_m$, where S_m is the standard error computed from the measurements on 29 sources) and 1.10 percent, which is the estimated upper limit of conceivable systematic errors.

The material from which this Standard Reference Material was prepared was examined with both Ge(Li) and n-type silicon-surface-barrier spectrometers for photon- and alpha-particle-emitting impurities and none was observed. Any photon with an energy in the range of 137 to 1900 keV and an emission rate greater than 10^{-4} that of the beta-ray-emission rate of the strontium-yttrium-90 would have been detected; any alpha-particle-emitting impurity with an emission rate greater than 10^{-6} that of the emission rate of the strontium-yttrium-90 would have been detected.

A half life of 28.97 ± 0.29 years for strontium-yttrium-90 has been derived from 2^4 measurements on each of four sources over a period of 18 to 22 years by $4\pi\beta$ -proportional counting. The uncertainty in the half life, 0.29 year, is at the 99-percent confidence level.

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

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

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