

U. S. Department of Commerce  
Frederick B. Dent  
Secretary

National Bureau of Standards  
Richard W. Roberts, Director

# National Bureau of Standards Certificate

## Standard Reference Material 4217

### Gamma-Ray Standard

### Silver-110m-Silver-110

This Standard Reference Material consists of silver-110m-silver-110 deposited, as the nitrate, on polyester tape approximately 0.006-cm thick and covered by another layer of the same tape. The tape is supported on an aluminium annulus 3.9-cm internal and 5.5-cm external diameter.

The activity of the silver-110m in nuclear transformations per second as of 1200 EST August 30, 1974, was

\* ± 0.9<sub>8</sub>%\*

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 "4π" γ ionization chamber which had previously been calibrated with solutions from which quantitative sources had been prepared and 4πβ-γ coincidence counted using the method of efficiency extrapolation. In the direct measurement, correction was made for an extra contribution from the subsequent decay of the 25-second silver-110 ground state, assuming that this decay represents (1.4 ± 0.13) percent of that of silver-110m.

The uncertainty in the value, 0.9<sub>8</sub> percent, is the linear sum of 0.04 percent, which is the limit of the random error at the 99-percent confidence level (2.7 S<sub>m</sub>, where S<sub>m</sub> is the standard error computed from 60 ionization-chamber measurements), and the upper limit of conceivable systematic error in the calibration of the "4π" γ ionization chamber, including the decay-scheme correction made, and in the preparation of this Standard Reference Material.

The solution from which this Standard Reference Material was prepared was examined for impurities with a Ge(Li)-spectrometer and no gamma-ray impurities were observed. The limit of the gamma-ray-emission rate at any given energy due to impurities is estimated to be less than 0.1 percent of the 658-keV gamma-ray-emission rate of silver-110m.

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

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A half life of  $(250.07 \pm 0.19)$  days is suggested. This value is the result of a least-squares fit of 52 sets of "4 $\pi$ "  $\gamma$  ionization-chamber measurements made over a period of 658 days on the material from which this Standard Reference Material was prepared. The uncertainty, 0.19 day, is the limit of the random error at the 99-percent confidence level ( $2.7 S_m$ , where  $S_m$  is the standard error).

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