

U. S. Department of Commerce
Frederick B. Dent
Secretary
Bureau of Standards
W. Roberts, Director

National Bureau of Standards Certificate Standard Reference Material 4228-B Radioactivity Standard Selenium-75

This Standard Reference Material consists of selenium-75 and carrier in 5.0865 ± 0.0117 grams of solution in a flame-sealed glass ampoule. The solution, which contains 0.223 gram of selenous acid per liter of approximately 1 N nitric acid, has a density of 1.026 ± 0.001 g/ml at 21.3°C .

Eighteen ampoules were prepared: each was measured in the NBS "4π" γ-ionization chamber; the solution in five of the ampoules was weighed, giving an average weight of 5.0865 grams. The uncertainty, 0.0117 gram, or 0.23 percent, is half the range of the ionization-chamber measurements on the eighteen ampoules.

The total activity in nuclear transformations per second at 1200 EST April 15, 1974, was

$$*7.37_6 \times 10^6 \pm 2.6_3\%*.$$

This Standard Reference Material was measured in the National Bureau of Standards "4π" γ-ionization chamber, which had previously been calibrated with selenium-75 solutions from which quantitative sources had been prepared and x-γ coincidence counted.

The uncertainty in the activity, 2.6₃ percent, is the linear sum of 0.23 percent, which is half the range of the ionization-chamber measurements on all the ampoules, and the estimated upper limits of conceivable systematic errors.

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. It is estimated that one gamma ray above 400 keV, associated with an impurity in the selenium-75 solution, could be detected in every 10^4 264.7-keV gamma rays of selenium-75 observed; for gamma rays less than 400 keV, the ratio would be one in 10^3 .

A half life of 119.84 ± 0.15 days is suggested. This value is the weighted mean of two sets of "4 π " γ -ionization-chamber measurements on each of two samples of selenium-75. The half lives were measured over a period of 488 days for one sample and 354 days for the other. The uncertainty, 0.15 day, is the limit of the random error at the 99-percent confidence level ($2.62 S_m$, where S_m is the standard error).

Half-life measurements and gamma-ray spectrum analyses will be made periodically on material from which this Standard Reference Material was prepared, and users will be notified if the measurements indicate departure from previously found results.

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

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

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