U.S. Department of Commerce
Rogers C. B. Morton,
Secretary
National Bureau of Standards
[illegible]st Ambler, Acting Director

National Bureau of Standards Certificate

Standard Reference Material 4265

Photon-Emission-Rate Standard

Iodine-125

This Standard Reference Material consists of iodine-125, precipitated as silver iodide, onto polyester tape, approximately 0.006-cm thick, and covered by another layer of the same tape. The tape is supported on a thin aluminum annulus 4-cm inside diameter and 5.5-cm outside diameter.

The number of tellurium-125 35.46-keV gamma rays and K x rays emitted per second at 1200 EST, February 29, 1976, was

* ± 2.0%*.

This photon-emission rate was measured in the National Bureau of Standards low-geometry, sodium-iodide, x-ray-detector system, the overall efficiency of which was determined from measured geometrical and absorption factors. Confirmatory measurements of this calculated efficiency were performed using iron-55 sources, which had previously been calibrated for K-x-ray-emission rate by means of 4πx-high-pressure proportional counting. A further confirmation of the above certified number of gamma rays plus K x rays was obtained by sum-peak coincidence counting, using the probability per decay of gamma rays and K x rays, given in the attached sheet.

The uncertainty in the above quoted photon-emission rate, 2.0 percent, is the linear sum of 0.5 percent, which is the limit of the random error of the sodium-iodide measurements at the 99-percent confidence level (4.604 S_m, where S_m is the standard error computed from five measurements), and 1.5 percent, which is the sum of the estimated upper limits of conceivable systematic errors.

The solution from which this Standard Reference Material was prepared was examined with a Ge(Li)-spectrometer and no gamma-ray impurities were observed. The limit of detection for the 388.6-keV gamma ray of iodine-126 is less than 0.001 percent of the activity of the iodine-125; the corresponding limit for any other gamma rays with energies greater than 35 keV was 0.01 percent. Two sources similar to this standard were examined on a Si(Li) detector and found to emit silver K x rays produced by activation of the silver iodide by the photons emitted by the source. The number of silver K x rays was found to be approximately 0.15 percent of the total number of 35.46-keV gamma rays and tellurium K x rays.

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

J. Paul Cali, Chief
Office of Standard Reference Materials

Washington, D. C. 20234
February, 1976

SRM 4265-