U.S. Department of Commerce
Juanita M. Kreps
Secretary
National Bureau of Standards
Ernest Ambler, Acting Director

National Bureau of Standards Certificate

Standard Reference Material 4414L-B

Radioactivity Standard

Iodine-123

This Standard Reference Material consists of iodine-123 in grams of carrier solution in a flame-sealed borosilicate-glass ampoule. The solution, which contains approximately 0.9 milligram NaOH, 0.03 milligram LiOH, 0.03 milligram Na_2SO_3, 0.06 milligram KI per gram of solution, has a density of 0.998 ± 0.002 gram per milliliter at 20.6°C.

The radioactivity concentration of the iodine-123 as of 1300 EST November 9, 1977, was

$$*5.342 \times 10^{7}\ s^{-1}g^{-1} \pm 1.65\%*.$$

This Standard Reference Material was measured, relative to a radium-226 reference source, in the National Bureau of Standards "4π" γ pressure ionization chamber which had previously been calibrated, in terms of a radium-226 reference source, with iodine-123 solutions from which quantitative sources had been prepared and 4π(A,x)-γ coincidence counted using the efficiency extrapolation method.

The solution from which this Standard Reference Material was prepared was examined for photon-emitting impurities with a Ge(Li) spectrometer system and both tellurium-121 and iodine-125 were found to be present. As of the certification time, the ratios of each impurity to iodine-123 were:

tellurium-121	6×10^{-6} ± 50%
iodine-125	1.4×10^{-2} ± 5%.

Any other radionuclide emitting a gamma ray with an energy less than 159 keV and having a gamma-ray-emission rate greater than 10^{-3} that of the 159-keV gamma ray of iodine-123 would have been detected; the corresponding limit for any gamma ray with energy greater than 159 keV is 10^{-4}.

The uncertainty in the radioactivity concentration of the iodine-123, 1.65 percent, is the linear sum of 0.02 percent, which is the limit of the random error at the 99-percent confidence level (2.977 S_m, where S_m is the standard error computed from independent measurements of 15 samples) and 1.63 percent, which is the estimated upper limit of conceivable systematic errors.

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

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