U. S. Department of Commerce
Philip M. Klutznick
Secretary

National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards Certificate

Standard Reference Material 4421L

Radioactivity Standard

Gold-195

This Standard Reference Material consists of gold-195 in grams of carrier solution in a flame-sealed borosilicate-glass ampoule. The solution, which contains approximately 0.2 mg $KAu(CN)_4$, 0.7 mg KCN and 0.7 mg KCl per gram of solution, has a density of 0.999 ± 0.002 gram per milliliter at 22.1°C.

The radioactivity concentration of the gold-195 at 1600 EST December 14, 1979, was

$$*5.109 \times 10^5\ s^{-1}g^{-1} \pm 2.32\%*.$$

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 gold-195 solutions from which quantitative sources had been prepared and $4\pi(e,x)$-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 germanium-spectrometer systems and only gold-196 was found to be present. At the time of certification, 1600 EST December 14, 1979, the ratio of the activity of gold-196 to that of gold-195 was $(8.5 \pm 1.7) \times 10^{-4}$. The detection limits for other impurity photons may be expressed as a percentage of the gamma-ray-emission rate of the 99-keV gamma rays emitted in the decay of gold-195. These limits are approximately 0.1 percent for gamma rays with energies greater than 20 keV and less than 95 keV, and 0.01 percent for those between 105 and 1900 keV, provided that the impurity photons are separated in energy by 5 keV or more from photons emitted in the decay of gold-195.

The uncertainty in the radioactivity concentration of the gold-195, 2.32 percent, is the linear sum of 0.03 percent, which is the limit of the random error at the 99-percent confidence level (2.807 S_m, where S_m is the standard error of the mean computed from independent measurements of 24 samples) and 2.29 percent, which is the estimated upper limit of conceivable systematic errors.

This Standard Reference Material was prepared in the Center for Radiation Research, Nuclear Radiation Division, Radioactivity Group, W.B. Mann, Principal Scientist.

Washington, D.C. 20234
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George A. Uriano, Chief
Office of Standard Reference Materials

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