U.S. Department of Commerce
Elliot L. Richardson,
Secretary

National Bureau of Standards
Ernest Ambler, Acting Director

# National Bureau of Standards Certificate

## Standard Reference Material 4418L

### Radioactivity Standard
### Mercury-203

This Standard Reference Material consists of mercury-203 in grams of carrier solution in a flame-sealed borosilicate glass ampoule. The solution, which contains approximately 0.18 milligrams of mercuric nitrate per gram of approximately 0.1 molar nitric acid, has a density of 1.001 ± 0.002 grams per milliliter at 20.8°C.

The radioactive concentration of the mercury-203 as of 0001 EST November 10, 1976, was

$$*1.228 \times 10^{6}\ s^{-1}g^{-1} \pm 0.97\%*.$$

This Standard Reference Material was measured, relative to a radium-226 reference source, in the National Bureau of Standards "$4\pi$"$\gamma$ pressure ionization chamber which had previously been calibrated, in terms of a radium-226 reference source, with mercury-203 solutions from which quantitative sources had been prepared and $4\pi\beta$-$\gamma$ coincidence counted.

The solution from which this Standard Reference Material was prepared was examined for photon-emitting impurities with germanium and silicon spectrometer systems and none was observed. It is estimated that any photon with energy less than 279 keV and having an emission rate greater than $10^{-3}$ that of the 279-keV gamma ray of mercury-203 would have been detected; the corresponding limit for any gamma ray with energy greater than 279 keV is $10^{-4}$.

The uncertainty in the radioactive concentration of the mercury-203, 0.97 percent, is the linear sum of 0.05 percent, which is the limit of the random error at the 99-percent confidence level (2.947 $S_m$, where $S_m$ is the standard error computed from independent measurements of 16 samples) and 0.92 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.

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