

Certificate

Standard Reference Material 4922-E Radioactivity Standard Sodium-22

This standard consists of sodium-22 and carrier in $5.139 \pm 0.006^*$ grams of solution in a flame-sealed glass ampoule. The carrier solution contains 1.01 grams NaCl per liter of 1N HCl.

*The uncertainty, 0.006 gram, is the statistical tolerance limit computed from a sample size of 20, with 95 percent probability for coverage of 95 percent of the population. See Handbook 91 (Experimental Statistics), U.S. Department of Commerce, National Bureau of Standards, pp. 1-14, 1-15, T-11.

The total number of positrons emitted per second at 1000 EST March 31, 1967, was

$$* \quad \times 10^5 \pm 1.4\% *$$

Assuming a ratio of electron capture to positron emission of 0.104 [Nuclear Physics 52 (1964) 324-332, A. Williams], the number of 1.28-MeV gamma rays emitted per second at 1000 EST March 31, 1967, was

$$* \quad \times 10^6 \pm 1.4\% *$$

This standard was calibrated by measurement in the National Bureau of Standards calibrated $4\pi\gamma$ ionization chamber.

The value reported above is based on five measurements, but the uncertainty, 1.4, percent, is the sum of 0.2, percent, which is the pooled estimate, at the 99.73 percent confidence level, of the standard errors of 68 similar standards, and 1.1, percent, which is the linear sum of the systematic errors considered to be possible in the calibration of the $4\pi\gamma$ ionization chamber and in this measurement.

The gamma-ray spectrum was examined using a lithium-drifted germanium detector and no radioactive impurities were found.

A half-life of 2.602 ± 0.003 years is suggested. This value is the weighted mean of two determinations on two preceding series of standards and is based on 57 sets of $4\pi\gamma$ ionization-chamber measurements. The uncertainty, 0.003 years, is the standard error, at the 99.73 percent confidence level, of the weighted mean. Half-life and radioactive-purity measurements are being made periodically on the material from which this standard was prepared. Users of the material will be notified if the measurements indicate any significant impurities, or departure from the previously accepted data.

This standard was prepared and calibrated by the Institute for Basic Standards, Radiation Physics Division, by members of the Radioactivity Section, W. B. Mann, Chief.