Secretary
National Bureau of Standards
Richard W. Roberts, Director

National Bureau of Standards Certificate

Standard Reference Material 4246

Radioactivity Standard

Carbon-14

This Standard Reference Material consists of carbon-14-labelled sodium carbonate and carrier in approximately 5 grams of solution in a flame-sealed borosilicate glass ampoule. The carrier solution contains 2.12 grams of sodium carbonate per liter of 0.001 M sodium hydroxide, and its density is 0.999 ± 0.005 gram per milliliter at 22.4°C.

The activity in nuclear transformations per second per gram of solution in May, 1974, was

$$*3.87_8 \times 10^4 \pm 0.9_4\%*.$$

This Standard Reference Material is one of a series prepared from a direct dilution of the master solution. Three ampoules from this series were used to prepare $^{14}CO_2$ samples which were measured in the National Bureau of Standards length-compensated internal gas counters, and the value of the activity was corroborated through liquid-scintillation and ionization-chamber comparisons of this material with the first NBS $Na_2{}^{14}CO_3$ Standard Reference Material, 4924.

The uncertainty in the activity, 0.9_4 percent, is the linear sum of 0.3_4 percent, which is the limit of the random error at the 99-percent confidence level (i.e., $3.250\ S_m$, where S_m is the standard error computed from 10 measurements), and the estimated upper limit of conceivable systematic errors.

The material from which this Standard Reference Material was prepared was examined with anthracene and NaI(Tl)-spectrometer systems and no radioactive impurities were observed.

The recommended half life, 5730 ± 40 years, is the value adopted at the Fifth Radiocarbon Dating Conference, Cambridge, England, 1962 [Nature 195, 984 (1962)].

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

Washington, D.C. 20234
May, 1974

J. Paul Cali, Chief
Office of Standard Reference Materials