

National Bureau of Standards

Certificate

Standard Reference Material 4308-B

Krypton-85

Gaseous Radioactivity Standard

This Standard Reference Material consists of krypton-85 and inactive krypton gas in a flame-sealed, almost spherical, borosilicate-glass ampoule having a volume of approximately 32.5 cm³, an approximate outside diameter of 4.2 cm, and wall thickness of approximately 0.12 cm. The pressure of the gas in the ampoule is approximately 2.67×10^4 pascals (200 torrs).

The activity of the krypton-85 in the ampoule as of 1200 EST November 1, 1979, was

$$* \quad s^{-1} \pm 3.06%*$$

Fifty-six ampoules were mounted on a gas-handling system, filled with krypton-85 and inactive krypton, and flame-sealed. These ampoules were intercompared in an automated pressure-ionization-chamber system. The contents of three of these ampoules were transferred cryogenically to the National Bureau of Standards length-compensated internal gas proportional counters, and the activities of the gas in each of them measured.

The krypton-85 from which this Standard Reference Material was prepared was examined on a Ge(Li)-spectrometer system and no gamma-ray-emitting impurities were found. The detection limits for impurity gamma-rays may be expressed as a percentage of the gamma-ray-emission rate of the 513.99-keV gamma ray of krypton-85. These limits are approximately 0.1 percent for gamma rays with energies greater than 40 keV and less than 509 keV, and 0.01 percent for those between 519 keV and 1900 keV.

The uncertainty in the activity of the krypton-85, 3.06 percent, is the linear sum of 0.86 percent, which is the limit of the random error at the 99-percent confidence level ($2.861 S_m$, where S_m is the standard error computed from 20 intercomparison measurements), and the estimated upper limit of conceivable systematic errors, 2.20 percent, which includes the uncertainty in the gas-counting measurements. There is also an uncertainty of ± 0.25 mm in the location of the center of the spherical ampoule, due to possible nonsphericity.

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.
November, 1979

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