

National Bureau of Standards

Certificate

Standard Reference Material 4235-B

Gaseous Radioactivity Standard

Radionuclide	Krypton-85
Source identification	4235-B-
Source description	Gas in a flame-sealed borosilicate-glass ampoule (1)*
Gas composition	Krypton-85 and inactive krypton (2)
Activity	$\times 10^7$ Bq
Reference time	1200 EST October 15, 1986
Overall uncertainty	1.06 percent (3)
Photon-emitting impurities	None observed (4)
Half life	10.72 ± 0.01 years (5)
Measuring instrument	NBS pressurized ^{40}K γ ionization chamber "C" calibrated by internal gas-proportional counting

This Standard Reference Material was prepared in the Center for Radiation Research, Ionizing Radiation Division, Radioactivity Group, Dale D. Hoppes, Group Leader.

Gaithersburg, MD 20899
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NOTES

(1) Approximate ampoule specifications:

volume	5 cm ³
length	4.5 cm
diameter	1.5 cm
wall thickness	0.12 ± 0.02 cm

(2) Pressure - 4 kPa (30 Torr) ± 50%.

(3) The overall uncertainty was formed by taking three times the quadratic combination of standard deviations of the mean, or approximations thereof, for the following:

a) 20 ionization-chamber measurements on this sample	0.10 percent
b) two series of gas-counting measurements	0.10 percent
c) gram-mole measurements in original gas counting measurements	0.10 percent
d) efficiency extrapolation in original gas counting measurements	0.10 percent
e) dilution of sources in original gas counting measurements	0.20 percent
f) half-life correction in original gas counting measurements	0.02 percent
g) 20 ionization chamber measurements in ionization chamber "A" of source used to calibrate ionization chamber "C"	0.10 percent
h) 5 sets of ionization chamber measurements in ionization chamber "C" in calibration of chamber "C"	0.02 percent
i) gas transfer losses for source used to calibrate ionization chamber "C"	0.10 percent
j) half-life correction in calibration of ionization chamber "C"	0.06 percent
k) glass attenuation losses	0.10 percent
l) aluminum holder attenuation losses	<u>0.10 percent</u>
overall uncertainty	1.06 percent

(4) Limits of detection as a percentage of the gamma-ray-emission rate of the 513.99-keV gamma rays emitted in the decay of krypton-85 are:

0.1 percent between 40 keV and 509 keV,
0.01 percent between 519 keV and 1900 keV,

provided that impurity photons are separated in energy by 5 keV or more from photons emitted in the decay of krypton-85.

(5) NCRP Report No. 58, 2nd edition, February 1985, p. 401.