

National Bureau of Standards

Certificate

Standard Reference Material 4242

Mixed Radionuclide Gamma-Ray Emission-Rate Standard

This sample consists of manganese-54, cobalt-57, cobalt-60, yttrium-88, cadmium-109, tin-113-indium-113m, and cesium 137-barium-137m in approximately 450 ml of approximately 4N HCl in a flame-sealed soft-glass bottle.

This sample was made by weighing an aliquot of a calibrated radionuclide mixture into the bottle containing the acid, and flame sealing. The gamma-ray-emission rates of the solutions used to prepare the radionuclide mixture were determined by means of the NBS calibrated 4πγ ionization chamber, and assumed nuclear decay parameters.

The nuclear gamma-ray-emission rates at 1200 EST January 15, 1972, are shown in the table below.

Nuclide	γ-Ray Energy (MeV)*	γ-Ray Intensity (%)*	Half Life	γ/s	Errors %		
					Random	System.	Total
¹⁰⁹ Cd	0.0877		1.2727y		0.3	2.7	3.0
⁵⁷ Co	0.122	85.6±0.2	271.76d		0.1	2.2	2.3
¹¹³ Sn- ^{113m} In	0.392		115.31d		0.1	2.8	2.9
¹³⁷ Cs- ^{137m} Ba	0.662	84.6±0.4	29.93y		0.1	1.9	2.0
⁵⁴ Mn	0.835	99.978±0.002	312.27d		0.1	2.5	2.6
⁶⁰ Co	1.173	99.88±0.02	5.261y		0.1	1.3	1.4
	1.333	100.			0.1	1.3	1.4
⁸⁸ Y	0.898	93.4±0.7	106.61d		0.1	2.9	3.0
	1.836	99.37±0.02				2.2	2.3

*Nuclear Data Tables, A8, Nos. 1-2 (Oct. 1970).

The total uncertainties in the gamma-ray-emission rates are the linear sums of the respective random errors (limit of random error at the 99 percent confidence level), the above-stated errors in the gamma-ray intensities, and the estimated upper limits of conceivable systematic errors.

The gamma-ray-emission rate of all other contaminants was less than 0.06 percent of the total gamma-ray-emission rate on January 15, 1972.

This standard was prepared in the NBS Center for Radiation Research, Nuclear Radiation Division, Radioactivity Section, W. B. Mann, Chief.

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Office of Standard Reference Materials

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