



National Bureau of Standards

Certificate

Standard Reference Material 4242-B

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 grams of approximately 4N HCl in a flame-sealed borosilicate glass bottle of specified dimensions.

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 $4\pi\gamma$ ionization chamber, and assumed nuclear decay parameters.

The nuclear gamma-ray-emission rates at 1200 EST June 1, 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 \pm 0.2	271.76d		0.1	2.2	2.3
^{113}Sn - $^{113\text{m}}\text{In}$	0.392		115.31d		0.1	2.8	2.9
^{137}Cs - $^{137\text{m}}\text{Ba}$	0.662	84.6 \pm 0.4	29.93y		0.1	1.9	2.0
^{54}Mn	0.835	99.978 \pm 0.002	312.27d		0.1	2.5	2.6
^{60}Co	1.173	99.88 \pm 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 \pm 0.7	106.61d		0.1	2.9	3.0
	1.836	99.37 \pm 0.02			0.1	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 observed contaminants was less than 0.02 percent of the total gamma-ray-emission rate on June 1, 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