



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 π 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.

Washington, D.C. 20234
May 1972

J. Paul Cali, Chief
Office of Standard Reference Materials

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