U. S. Department of Commerce
Frederick B. Dent
Secretary

National Bureau of Standards
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National Bureau of Standards Certificate

Standard Reference Material 4215

Mixed Radionuclide Gamma-Ray Emission-Rate Point-Source Standard

This standard consists of cobalt-57, cobalt-60, strontium-85, yttrium-88, cadmium-109, tin-113-indium-113m, cesium-137-barium-137m, cerium-139, and mercury-203, deposited as the chlorides and sulfides, on polyester tape approximately 0.006-centimeter thick and covered by another layer of the same tape.

The point source was prepared by depositing a weighed aliquot of a calibrated radionuclide mixture on the tape and exposing it to hydrogen sulfide gas to precipitate the mercuric sulfide.

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, using, where necessary, assumed nuclear decay parameters.

The nuclear gamma-ray emission rates at 1200 EST June 1, 1973 are shown in the table below (reverse).

The cobalt-57 contains cobalt-56 and cobalt-58 as impurities. The activity ratios, $^{56}Co/^{57}Co$ and $^{58}Co/^{57}Co$, were approximately 7.7×10^{-4} and 4.5×10^{-4}, respectively, at 1200 EST June 1, 1973. The cesium-137-barium-137m contains cesium-134 as an impurity. The activity ratio, $^{134}Cs/^{137}Cs$, was approximately 1.3×10^{-4} at 1200 EST June 1, 1973. The gamma-ray spectrum of each component was examined using a Ge(Li) detector and no other impurities were found.

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

June 14, 1973
Washington, D. C. 20234

J. Paul Cali, Chief
Office of Standard Reference Materials

(over)

Radionuclide	γ-Ray Energy (MeV)[a]	γ-Ray Intensity (%)[a]	Half-Life[b]	γ/s	Error % Random	System	Total
^{109}Cd	0.0877		1.2727y		0.1	2.7	2.8
^{57}Co	0.122	85.6±0.2	271.41d		0.1	2.2	2.3
^{139}Ce	0.166	79.9±0.3[b]	137.87d		0.1	3.0	3.1
^{203}Hg	0.279	81.5±0.2	46.61d		0.1	1.1	1.2
^{113}Sn-^{113m}In	0.392		115.31d		0.1	2.8	2.9
^{85}Sr	0.514	99.28±0.01	64.86d		0.1	1.6	1.7
^{137}Cs-^{137m}Ba	0.662	85.0±0.3[c]	30y		0.1	2.0	2.1
^{60}Co	1.173	99.88±0.02	5.261y		0.1	1.3	1.4
	1.333	100			0.1	1.3	1
^{88}Y	0.898	93.4±0.7	106.63d		0.1	2.9	3
	1.836	99.37±0.02			0.1	2.2	2.3

[a] Nuclear Data Tables, A8, Nos. 1-2 (Oct. 1970).

[b] NBS measured values.

[c] The latest recommended value for this intensity was obtained from Dr. Murray Martin, Oak Ridge National Laboratory.