

การเปรียบเทียบ APMP.RI(I)-S1 ของมาตรฐานสำหรับปริมาณรังสีที่ดูดกลืนในน้ำในรังสีแกมมา 60Co ที่
ระดับปริมาณรังสีในการประมวลผล

Supplementary comparison APMP.RI(I)-S1 of standards for absorbed dose to water in 60Co
gamma radiation at radiation processing dose levels

ช่วงเวลาดำเนินการ ปี พ.ศ. 2553

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รายละเอียดสรุป

Four national standards for absorbed dose to water in 60Co gamma radiation at the dose levels used in radiation processing have been compared over the range 0.1 kGy to 50 kGy using alanine dosimeters of the Office of Atoms for Peace (OAP) as transfer dosimeters. The comparison was piloted by the OAP who also participated. Two laboratories from the original six were forced to withdraw due to equipment problems. The results at low doses (0.1 kGy) showed a much wider spread (up to 17%) than at the other doses, most likely as a result of random variations in the alanine readout at OAP at these dose levels. Results in the 0.1 kGy range were excluded from the analysis because the variation between the laboratories' doses is overshadowed by the variation in the readout of the alanine. Above 1 kGy the results indicated reasonable agreement between the laboratories, with the majority of results within 2 % of the reference value. All of these results were within two combined standard uncertainties of the reference value, with the exception of the INER at 50 kGy point which was within three combined standard uncertainties. Within the stated uncertainties, the results establish the equivalence of the laboratories at radiation processing levels, for the range in which they participated: NIS (3 - 10) kGy, NIM (3 - 30) kGy, INER (3 - 50) kGy, OAP (3 - 50) kGy.

NMI	⁶⁰ Co irradiator type	Irradiation phantom material and size	Nominal dose rate (Gy/s)	Traceability	u_{lab} (%)
INER	Custom pool irradiator (3,000 TBq in 2010)	Irradiated in air* with 3 mm of buildup	0.98	NIST	1.7
NIM	480 TBq (2010) pool irradiator	Polystyrene water phantom, 30 cm x 30 cm x 30 cm	0.33	NIM	1.0
NIS	Theratron 780E radiotherapy unit	PTW water phantom 30 cm x 30 cm x 30 cm	0.06	BIPM, via NE 2561 chamber	1.8
OAP	Gammacell 220 Excel, MDS Nordion	Polymethyl methacrylate, 7 cm in diameter, 8.5 cm in length	2.1	OAP	2.0

*See explanation in Section 2

