



Control Material CS-C-1

Cs-137 in Quartz Sand

General Information

Intended use Checking the performance of analytical laboratories engaged in the determination of Cs-137 in environmental samples

Produced and certified by:

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Description of the material

Quartz river sand of the particle diameter range of 0.1-0.5 mm, containing Cs-137 was prepared by spiking the homogenized raw material (sand) with the standard solution of Cs-137. After spiking, sand was homogenized by mixing for 15 hrs. in a plastic drum rotated in three directions in a homogenizer and then distributed into appropriate PE bags. All bags were firmly closed and sterilized by electron beam radiation from linear accelerator LA-13 with a dose of 28 kGy. Homogeneity was examined by measuring of activity concentration of Cs-137 in randomly selected bags. Assigning of reference values for activity concentration was carried out by interlaboratory comparison in which 13 radiochemical laboratories took part.

Determination of moisture content

In order to express the activity concentration of Cs-137 on a dry-weight basis, moisture content should be determined on a separate subsample of 5 g mass by drying in an oven at 105°C for 1 hour.

Assigning of reference values

Reference values were assigned on the basis of the results provided by several radiochemical laboratories. The radionuclide Cs-137 has to be determined by at least two procedures in order to assign reference value. A reference value was calculated using the HISTO software delivered by the IAEA, an uncertainty was evaluated according to ISO 13528:2005 [1], ISO GUM [2] and IUPAC harmonized protocol [3].

Reference value for activity concentration of Cs-137 in Quartz Sand CS-C-1

Radionuclide **Reference value + expanded uncertainty (k=2)**

$$X_{\text{ref}} \pm U^*$$

[Bq kg⁻¹ dry mass]

Cs-137 **1.17 ± 0.08**

* on 1 November 2010 for ¹³⁷Cs

The traceability of this Control Material to the SI units is ensured by the use of certified standard solution by NPL (the UK's National Measurement Institute) for calibration of measurement equipments.

Long-time stability is monitored during storage. The shelf life of the quartz sand material has been established to be 31 December 2020.

References

1. ISO 13528:2005 Statistical methods for the use in proficiency testing by interlaboratory comparison, Geneva, 2005
 2. International Organization for Standardization (ISO), Guide to the Expression of Uncertainty in Measurement, ISO, Geneva, 1993 (corrected and reprinted 1995)
 3. M. Thompson, S.L.R. Ellison, R. Wood, The International Harmonized Protocol for the Proficiency Testing of Analytical Chemistry Laboratories (IUPAC Technical Report), Pure Appl. Chem., 78 (2006) 145
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