

# Accurate Copper Isotope Measurements of a Reference Material NIM- RM2707 by Calibrated Mass Spectrometry

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## Objective

As a transition metal element, copper is widely involved in planetary differentiation, mineralization and biological processes. Accurate Cu isotopic composition measurements would provide valuable information to these research areas. Therefore, in this study, we developed a calibrated mass spectrometry method for accurate determination of Cu isotopic compositions. Meanwhile, a reference material of Cu isotope ratios NIM-RM2707 was prepared to ensure the traceability and transmission for the measured Cu isotope values of different laboratories and samples.

## Results and Discussion

The calibrated mass spectrometry for the measurement of Cu isotopic composition was investigated using a Thermo Fisher Scientific Neptune Plus (Bremen, Germany) MC-ICPMS. Seven synthetic isotope mixtures with Cu isotope ratios close to natural Cu material were gravimetrically prepared by isotopically enriched Cu-63 and Cu-65. The instrumental mass bias correction factor  $K$  was obtained by the MC-ICPMS measurement data of isotopically enriched Cu solutions and synthetic isotope mixtures using a mathematical iteration method.

For the determination of Cu isotope ratio, NIM-RM2707 solution was analyzed along with seven synthetic mixtures under the same instrument conditions. As a result, the determined Cu isotope ratio for NIM-RM2707 was displayed in Table 1, which showed improved uncertainty compared with those of IRMM Cu isotope ratio reference materials AE-633 and AE-647.

**Table 1:** Copper isotope ratios for reference materials NIM-RM2707, AE-633 and AE-647

	$R_{63/65}$	
	AE-633	AE-647
NIM-RM 2707	2.2440(21)	2.2442(37)
	2.2442(9)	

<sup>a</sup> The expanded standard uncertainties of  $k=2$  are given in parentheses.