



JOINT RESEARCH CENTRE
Directorate F – Health, Consumers and Reference Materials

CERTIFICATE OF ANALYSIS

IRMM-018a

SiO ₂			
	Certified value ¹⁾	Certified uncertainty ²⁾	Unit
$n(^{29}\text{Si})/n(^{28}\text{Si})$	0.050 827 2	0.000 004 0	mol/mol
$n(^{30}\text{Si})/n(^{28}\text{Si})$	0.033 532 0	0.000 004 2	mol/mol
$\delta^{29}\text{Si}_{\text{IRMM018a/NBS28}}$	0.08	0.11	‰
$\delta^{30}\text{Si}_{\text{IRMM-018a/NBS28}}$	-0.05	0.18	‰
<p>1) The certified values were obtained using a "differential comparator" technique against the WASO 17.2 "Avogadro crystal". The certified values for the isotope amount ratios are traceable to the International System of Units (SI); the delta values are traceable to NBS28.</p> <p>2) The uncertainty is the expanded uncertainty of the certified value with a coverage factor $k = 2$ corresponding to a level of confidence of about 95 % estimated in accordance with ISO/IEC Guide 98-3, Guide to the Expression of Uncertainty in Measurement (GUM:1995), ISO, 2008.</p>			

This certificate is valid for five years after purchase.

Sales date:

The material is a true solution and is therefore regarded homogeneous.

Geel, November 2005
Latest revision: August 2018

Signed:

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Indicative Values			
	Value	Uncertainty ³⁾	Unit
Isotope amount fractions ¹⁾			
$n(^{28}\text{Si})/n(\text{Si})$	0.922 203 6	0.000 004 9	mol/mol
$n(^{29}\text{Si})/n(\text{Si})$	0.046 873 0	0.000 003 6	mol/mol
$n(^{30}\text{Si})/n(\text{Si})$	0.030 923 4	0.000 003 7	mol/mol
Isotope mass fractions ²⁾			
$m(^{28}\text{Si})/m(\text{Si})$	0.918 637 6	0.000 005 2	g/g
$m(^{29}\text{Si})/m(\text{Si})$	0.048 360 0	0.000 003 7	g/g
$m(^{30}\text{Si})/m(\text{Si})$	0.033 002 4	0.000 004 0	g/g
<p>1) Calculated from certified amount ratios.</p> <p>2) Calculated from the certified amount ratios and the atomic masses given in "Additional Material Information".</p> <p>3) The uncertainty is the expanded uncertainty with a coverage factor $k = 2$ corresponding to a level of confidence of about 95 % estimated in accordance with ISO/IEC Guide 98-3, Guide to the Expression of Uncertainty in Measurement (GUM:1995), ISO, 2008.</p>			

Additional Material Information		
	Molar mass [g/mol]	Uncertainty [g/mol]
Si	28.085 528 3	0.000 008 0
^{28}Si	27.976 926 49	0.000 000 44
^{29}Si	28.976 494 68	0.000 000 44
^{30}Si	29.973 770 18	0.000 000 44
<p>The molar mass and uncertainty of Si was calculated from 1) and the certified isotopic amount composition. Molar masses of the individual isotopes were taken from: G Audi and A H Wapstra, The 1993 atomic mass evaluation, Nucl Phys A565 (1993) 1-65.</p> <p>Uncertainties given are two times the standard deviation error listed in , Nucl Phys A565 (1993) 1-65.</p>		

DESCRIPTION OF THE SAMPLE

The Isotopic Reference Material IRMM-018a consists of SiO_2 and is supplied in about 5 g units, packed in teflon vials with screw cap.

ANALYTICAL METHODS USED FOR CERTIFICATION

Differential comparator technique as described in S. Valkiers, K. Russe, P. Taylor, T. Ding, M. Inkret, Silicon isotope amount ratios and molar masses for two silicon isotope reference materials: IRMM-018a and NBS28, Letter to the editor, International Journal of Mass Spectrometry 242 (2005) 319-321

PARTICIPANTS

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SAFETY INFORMATION

Not classified as dangerous according to the criteria of Regulation (EC) No 1272/2008.
The usual laboratory safety measures apply.

INSTRUCTIONS FOR USE AND INTENDED USE

This material is intended to be used as isotopic spike for isotope-dilution mass spectrometry.
Dispose in accordance with good laboratory practice.

STORAGE

The material should be stored at $18\text{ °C} \pm 5\text{ °C}$ in the dark.
However, the European Commission cannot be held responsible for changes that happen during storage of the material at the customer's premises, especially of opened samples.

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