European Commission

ERM European Reference Materials

JOINT RESEARCH CENTRE
Institute for Reference Materials and Measurements

CERTIFICATE OF ANALYSIS

ERM®- AE701

Ca in 0.6 M HNO_3		
	Isotope amount ratio $n(^{41}Ca)/n(^{40}Ca)$	
Material number	Certified value (1)	Uncertainty (2)
AE701/1	$1.011\,4 \cdot 10^{-6}$	$0.006\,8 \cdot 10^{-6}$
AE701/2	$1.023\,5 \cdot 10^{-7}$	$0.006\,9 \cdot 10^{-7}$
AE701/3	$1.018\,1 \cdot 10^{-8}$	$0.006\,9 \cdot 10^{-8}$
AE701/4	$1.047\,9 \cdot 10^{-9}$	$0.007\,1 \cdot 10^{-9}$
AE701/5	$1.052\,0 \cdot 10^{-10}$	$0.007\,1 \cdot 10^{-10}$
AE701/6	$1.091\,3 \cdot 10^{-11}$	$0.007\,4 \cdot 10^{-11}$
AE701/7	$1.054\,9 \cdot 10^{-12}$	$0.007\,2 \cdot 10^{-12}$
AE701/8	$1.052\,4 \cdot 10^{-13}$	$0.007\,1 \cdot 10^{-13}$

1) The values reported in this certificate result from measurements performed at IRMM, and are traceable to the SI via the values of the isotopic reference material IM-6010.

2) Estimated expanded uncertainty U with a coverage factor k=2, corresponding to a level of confidence of about 95 %, as defined in the Guide to the Expression of Uncertainty in Measurement (GUM), ISO, 1995.

This certificate is valid for three years after purchase.

Sales date:

The material can be regarded as a homogenous solution.

Accepted as CRM, Geel, November 2003

Signed: _____

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Accepted as an ERM®, Geel, June 2004
Latest revision: November 2013

Signed: _____

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NOTE

European Reference Material **ERM®-AE701** was originally certified as **IRMM-3701**. It was produced and certified under the responsibility of the IRMM according to the principles laid down in the technical guidelines of the European Reference Materials® co-operation agreement between BAM-IRMM-LGC. Information on these guidelines is available on the Internet (http://www.erm-crm.org). A detailed technical report on the certification procedure can be found in IRMM Internal Report GE/R/IM/19/2003/05/26, available from IRMM on explicit request.

DESCRIPTION OF THE SAMPLE

The isotopic reference material ERM®-AE701 is a set of calcium isotope mixtures with certified $n(^{41}Ca)/n(^{40}Ca)$ ratios. The set consists of 8 units. Each unit has a calcium amount content of approximately $50 \cdot 10^{-6}$ mol Ca per gram solution. The matrix is subboiled nitric acid. The molarity is about 0.6 M.The material is supplied in polypropylene bottles containing approximately 25 mL solution.

Atomic masses used in calculations:*

* G. Audi and A.H. Wapstra, The 1993 atomic mass evaluation, *Nucl Phys* A565 (1993) 1-65.

Isotope	g · mol^{-1}	Uncertainty (1)
^{40}Ca:	39.962 591 2	0.000 000 3
^{41}Ca:	40.962 278 3	0.000 000 4
^{42}Ca:	41.958 618 3	0.000 000 4
^{43}Ca:	42.958 766 8	0.000 000 5
^{44}Ca:	43.955 481 1	0.000 000 9
^{46}Ca:	45.953 692 7	0.000 002 5
^{48}Ca:	47.952 533	0.000 004

1 Estimated expanded uncertainty U with a coverage factor k=2, corresponding to a level of confidence of about 95 %, as defined in the Guide to the Expression of Uncertainty in Measurement (GUM), ISO, 1995.

ANALYTICAL METHOD USED FOR CERTIFICATION

The ERM®-AE701 set was prepared by gravimetric mixing of IM-6010 and a calcium solution with natural isotopic composition.

PARTICIPANTS

Not applicable

SAFETY INFORMATION

Not applicable

INSTRUCTIONS FOR USE

The material is intended for calibration of mass spectrometer measurements.

STORAGE

Not applicable

LEGAL NOTICE

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