JOINT RESEARCH CENTRE
Institute for Reference Materials and Measurements

CERTIFICATE OF ANALYSIS

ERM®- DB001

HUMAN HAIR		
	Mass fraction based on dry mass	
	Certified value [1] [mg/kg]	Uncertainty [2] [mg/kg]
As	0.044	0.006
Cd	0.125	0.007
Cu	33	4
Hg	0.365	0.028
Pb	2.14	0.20
Se	3.24	0.24
Zn	209	12

1) Unweighted mean value of the means of accepted sets of data, each set being obtained in a different laboratory and/or with a different method of determination. The certified values are traceable to the SI.

2) The certified 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.

This certificate is valid for one year after purchase.

Sales date:

The minimum amount of material to be used is 200 mg for As, Cd, Cu, Pb, Se and Zn and 10 mg for Hg.

NOTE

European Reference Material ERM®-DB001 was produced and certified under the responsibility of the Institute for Reference Materials and Measurements of the European Commission's Joint Research Centre 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).

Accepted as an ERM®, Geel, May 2013

Signed:

Prof. Dr. Hendrik Emons
European Commission
Joint Research Centre
Institute for Reference Materials and Measurements
Retieseweg 111
B-2440 Geel, Belgium

DESCRIPTION OF THE MATERIAL

The amber glass bottle, provided in aluminium sachet, contains a minimum amount of 3.5 g of a human hair homogeneous powder.

ANALYTICAL METHODS USED FOR CERTIFICATION

Atomic absorption spectrometry (AAS)

Atomic fluorescence spectrometry (AFS)

Direct mercury analyser (DMA)

Inductively coupled plasma mass spectrometry (ICP-MS)

Inductively coupled plasma optical emission spectrometry (ICP-OES)

Instrumental neutron activation analysis (INAA)

Isotope dilution inductively coupled plasma mass spectrometry (ID-ICP-MS)

PARTICIPANTS

ALS Laboratory Group, ALS Scandinavia AB, Luleå, SE (measurements performed under the scope of ISO/IEC 17025 accreditation, SWEDAC-2030)

BAM Bundesanstalt für Materialforschung und -prüfung, Berlin, DE (measurements performed under the scope of ISO/IEC 17025 accreditation, DAP-PL-261412)

Comisión Nacional de Energía Atómica (CNEA), Laboratorio de Análisis por Activación Neutrónica, Bariloche, AR

Doctor's Data Inc., St. Charles, Illinois, USA (measurements performed under the scope CLIA (USA) accreditation, 14D06646470)

Energy research Centre of the Nederlands (ECN), Petten, NL (measurements performed under the scope of ISO/IEC 17025 accreditation, L-135)

European Commission, Joint Research Centre, Institute for Reference Materials and Measurements (IRMM), Geel, BE (accredited to ISO Guide 34 for production of certified reference materials BELAC No 268-RM, and measurement performed under the scope of ISO/IEC 17025 accreditation, BELAC No 268-TEST)

Helmholtz Zentrum München, Deutsches Forschungszentrum für Gesundheit und Umwelt GmbH, Neuherberg, DE

INRIM – Unità di Radiochimica e Spettroscopia, Dipartimento di Chimica, Pavia, IT

Institut "Jozef Stefan" (IJS), Department of Environmental Sciences, Ljubljana, SI (measurements performed under the scope of ISO/IEC 17025 accreditation, Slovenka Akreditacija-LP090)

Institut National de Santé Publique du Québec, Centre de Toxicologie du Québec, Québec, CA (measurements (except Hg) under the scope of ISO/IEC 17025 accreditation, Accredited laboratory No. 416; M559)

Studiecentrum voor Kernenergie, SCK, Mol, BE (measurements performed under the scope of ISO/IEC 17025 accreditation; BELAC No 015-TEST)

Sympatec Benelux, Clausthal-Zellerfeld, DE

TÜBITAK – UME, Gebze Yerleşkesi, Gebze/Kocaeli, TR

Umweltbundesamt GmbH, Wien, AT (measurements performed under the scope of ISO/IEC 17025 accreditation; No. 200)

Università di Ferrara, Dipartimento di Chimica, Ferrara, IT

University of Aberdeen, Department of Chemistry, Aberdeen, UK

VAR-CODA-CERVA, Centrum voor Onderzoek in Diergeneeskunde en Agrochemie, Tervuren, BE (measurements performed under the scope of ISO/IEC 17025 accreditation, BELAC No 172-TEST)

Vlaamse instelling voor technologisch onderzoek (VITO), Mol, BE (measurements performed under the scope of ISO/IEC 17025 accreditation, BELAC No 045-TEST)

SAFETY INFORMATION

The usual laboratory safety precautions apply.

INSTRUCTIONS FOR USE AND INTENDED USE

The bottle shall be shaken by turning it upside down for at least 2 minutes before opening to ensure the material re-homogenisation.

The certified values refer to dry mass. Dry mass determination shall be carried out on a separate portion of at least 0.2 g of material by drying in an oven at 105 °C ± 2 °C until constant mass (separate weighing should not differ by more than 0.2 mg). Weighing of the samples for dry mass determination and weighing for the analysis shall be done at the same time to avoid differences due to possible take up of moisture by the material.

STORAGE

The material shall be stored at 18 °C ± 5 °C in the dark. Care shall be taken to avoid change of the moisture content once the bottle is open, as the material is hygroscopic. Storage in a desiccator is recommended.

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.

LEGAL NOTICE

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NOTE

A detailed technical report is available on www.irmm.jrc.be. A paper copy can be obtained from the Joint Research Centre, Institute for Reference Materials and Measurements on request.

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