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BAM
Bundesanstalt für Materialforschung und -prüfung

Certified Reference Material

BAM-U116/CGL306

Total Cyanide in Soil

Certified Value

Measurand	**Mass fraction** [1] in mg/kg	**Uncertainty *U*** [2] in mg/kg
Total cyanide acc. to ISO 11262:2011	12.0	0.8

[1] Unweighted mean value of 14 laboratory means which were corrected to the dry mass content of the material at (105 ± 2) °C.

[2] Estimated expanded uncertainty *U* with a coverage factor of $k = 2$, corresponding to a level of confidence of approximately 95%, as defined in the Guide to the Expression of Uncertainty in Measurement (GUM, ISO/IEC Guide 98-3:2008).

Reference material BAM-U116/CGL306 was certified in the course of a joint project organized by Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin/Germany, in close cooperation with the Central Geological Laboratory (CGL), Ulaanbaatar/Mongolia. Both institutions are accredited as reference material producers according to ISO Guide 34.

The certified reference material (CRM) is available as a powder with particle sizes below 125 µm and is supplied in 100 mL plastic (HDPE) bottles containing (100 ± 3) g.

The minimum amount of sample to be used for the determination of total cyanide is 5 g.

This certificate is valid for a period of two years beginning with the dispatch of the reference material from BAM or CGL.

Date of dispatch:

Material Description

The CRM BAM-U116/CGL306 represents a mixture of a sandy soil collected from a contaminated former gasworks area in the Berlin region (Germany) and an unpolluted sandy soil from Nalaikh region (Mongolia). The raw materials were dried at ambient air to constant mass, and afterwards the fractions passing a 2 mm screen were ground to particle sizes below 125 µm. Before bottling, the two fractions were mixed and homogenized.
For the main matrix constituents of the bottled material the following non-certified results were obtained by X-ray fluorescence analysis (WD-XRF):

Element	Si	Al	K	Na	Ca	Fe
Mass fraction in %	35.6	6.9	2.9	2.5	0.8	0.8

Mass fractions of other elements detectable with WD-XRF were less than 0.2 %.

Further informative analytical results characterizing the sample matrix:

Parameter	Mass fraction in %	Analytical method
Dry mass content at 105 °C	99.8	ISO 11465:1993
Loss on ignition at 550 °C	0.9	EN 15935:2012
Total carbon (TC)	0.2	ISO 10694:1995

Recommended Use

The intended purpose of CRM BAM-U116/CGL306 is the verification of analytical results obtained for the mass fraction of total cyanide in soils and soil-like materials applying the standardized procedure ISO 11262:2011. As any reference material, it can also be used for routine performance checks (quality control charts) or validation studies.

Handling

The material should be used as it is from the bottle. However, before taking a sub-sample a re-homogenization by manual shaking of the closed bottle is strongly recommended.
When determining the content of total cyanide, the analytical protocol prescribed by ISO 11262:2011 must be followed. All measurement results have to be corrected for dry mass content of the material which should be determined according to ISO 11465:1993 using a separate sub-sample. The value given in the table above (99.8 %) should be regarded as being indicative only.

Transport and Storage

CRM BAM-U116/CGL306 can be shipped at ambient temperature. Upon receipt the material has to be stored at a temperature below 25 °C in its original tightly closed bottle. Although the stability of the reference material is not affected by short periods of handling at ambient temperature, the bottle shall be left unclosed as short as possible. Care should be taken to avoid moisture absorption once the bottle is opened.

Participants in the Certification Project

(in alphabetic order)

AGROLAB Labor GmbH, Bruckberg (Germany)

ALS Analytik Labor Schirmacher GmbH, Hamburg (Germany)

BEGA.tec GmbH, Abteilung Labor, Berlin (Germany)

Bundesanstalt für Materialforschung und -prüfung (BAM), Division 1.6, Berlin (Germany)

Central Geological Laboratory (CGL), Department of Chemical and Physical Methods, Ulaanbaatar (Mongolia)

Chemlab – Gesellschaft für Analytik und Umweltberatung mbH, Bensheim (Germany)

Chemisches Labor Dr. Wirts + Partner, Sachverständigen GmbH, Hannover (Germany)

CLG Chemisches Labor Dr. Graser KG, Schonungen (Germany)

Eurofins Umwelt Ost GmbH, NL Freiberg, Bobritzsch-Hilbersdorf (Germany)

ICA – Institut für Chemische Analytik GmbH, Leipzig (Germany)

IHU – Geologie und Analytik, Gesellschaft für Ingenieur-, Hydro- und Umweltgeologie mbH, Stendal (Germany)

IUS Institut für Umweltanalytik und Schadstoffchemie GmbH, Stuttgart (Germany)

M&S Umweltprojekt GmbH, Labor Bad Muskau, Bad Muskau (Germany)

Umweltlabor ACB GmbH, Münster (Germany)

SGL Spezial- und Bergbau-Servicegesellschaft Lauchhammer mbH, Analytisches Labor, Lübbenau (Germany)

SGS Institut Fresenius GmbH, Herten (Germany)

Metrological Traceability

It is important to note that the certified mass fraction of total cyanide in CRM BAM-U116/CGL306 is operationally-defined referring to the analytical protocol prescribed by ISO 11262:2011. The photometric determination of the liberated cyanide is traceable to the International System of Units (SI) via calibration using substances with certified analyte content.

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References

Certification Report „CRM BAM-U116/CGL306“ (January 2017)
(Download: https://www.bam.de via link *Specialized Portals*)

ISO Guide 34:2009:
General requirements for the competence of reference material producers

ISO Guide 35:2006:
Reference materials – General and statistical principles for certification

ISO/IEC Guide 98-3:2008:
Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM)

ISO 10694:1995:
Soil quality – Determination of organic and total carbon after dry combustion (elementary analysis)

ISO 11262:2011:
Soil quality – Determination of total cyanide

ISO 11465:1993:
Soil quality – Determination of dry matter and water content on a mass basis. Gravimetric method

EN 15935:2012:
Sludge, treated biowaste, soil and waste – Determination of loss on ignition

Accepted as BAM-CRM on February 22, 2017

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BAM holds an accreditation as a reference material producer according to ISO Guide 34 in combination with ISO/IEC 17025.
This accreditation is valid only for the scope as specified in the certificate D-RM-11075-01-00.
DAkkS is a signatory of the multilateral agreement (MLA) between EA, ILAC and IAF for mutual acceptance.

DAkkS Deutsche Akkreditierungsstelle D-RM-11075-01-00