Deutsche Akkreditierungsstelle GmbH

Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV

Accreditation

The Deutsche Akkreditierungsstelle GmbH attests that the reference material producer

Bundesanstalt für Materialforschung und -prüfung (BAM)
Reference Material Producer

at the sites

Unter den Eichen 87, 12205 Berlin
Richard-Willstätter-Straße 11, 12489 Berlin
Germany

is competent under the terms of DIN EN ISO 17034:2017 to produce reference materials in the area:

certified reference materials in the form of non-ferrous metals and alloys, ceramics and glass, soils and sediments, food, ethanol/water solutions, aqueous solutions of stable isotopes, lubricants and fuels as well as porous materials

The accreditation certificate shall only apply in connection with the notice of accreditation of 05.12.2018 with the accreditation number D-RM-11075-01 and is valid until 11.07.2021. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 3 pages.

Registration number of the certificate: D-RM-11075-01-00

Berlin,
05.12.2018
Dipl.-Ing. Andrea Valbuena
Head of Division

Translation issued:
05.12.2018
Head of Division

This document is a translation. The definitive version is the original German accreditation certificate. See notes overleaf.
Deutsche Akkreditierungsstelle GmbH

The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAkkS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf.

No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAkkS.

The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council setting out the requirements for accreditation and market surveillance relating to the marketing of products.
Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-RM-11075-01-00 according to DIN EN ISO 17034:2017

Period of validity: 05.12.2018 to 11.07.2021
Date of issue: 05.12.2018

Holder of certificate:
Bundesanstalt für Materialforschung und -prüfung (BAM)
Reference Material Producer

at the sites
Unter den Eichen 87, 12205 Berlin
Richard-Willstätter-Straße 11, 12489 Berlin
Germany

Reference material production in the fields:
certified reference materials in the form of non-ferrous metals and alloys, ceramics and glass, soils and sediments, food, ethanol/water solutions, aqueous solutions of stable isotopes, lubricants and fuels as well as porous materials

Abbreviations used: see last page
## Annex to the accreditation certificate D-RM-11075-01-00

<table>
<thead>
<tr>
<th>Product</th>
<th>Characteristic</th>
<th>Range</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-ferrous metals and alloys, e.g.</strong></td>
<td>Element contents</td>
<td>0,1 mg/kg – 997 g/kg</td>
<td>FAAS, ET AAS, HG AAS, CV AAS, ICP-OES, ICP-MS, IDMS, GDMS, XRF, spectrophotometry, gravimetry, titration</td>
</tr>
<tr>
<td></td>
<td>Aluminium*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Copper*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zinc</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lead</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ceramics and glass</strong></td>
<td>Element contents</td>
<td>0,05 mg/kg – 800 g/kg</td>
<td>FAAS, ET AAS, ICP-MS, ICP-OES, XRF, gravimetry, coulometry, Comb.-IR, TGHE, titration</td>
</tr>
<tr>
<td><strong>Soils and sediments</strong></td>
<td>Environmentally relevant element contents</td>
<td>(1 – 1000) mg/kg</td>
<td>CV AAS, CV AFS, ET AAS, FAAS, HG AAS, ICP-MS, ICP-OES</td>
</tr>
<tr>
<td></td>
<td>Total cyanide contents</td>
<td>(1 – 100) mg/kg</td>
<td>DIN ISO 11262</td>
</tr>
<tr>
<td></td>
<td>PAH contents (e.g. 16 PAH according to EPA)</td>
<td>(0,1 – 200) mg/kg</td>
<td>GC-MS, HPLC-DAD/FLD</td>
</tr>
<tr>
<td></td>
<td>Mineral oil contents (sum parameter according to ISO 16703)</td>
<td>(900 – 9000) mg/kg</td>
<td>GC-FID</td>
</tr>
<tr>
<td><strong>Food</strong></td>
<td>Contents of organic contaminants and residues (e.g. mycotoxins, acrylamide)</td>
<td>(0,5 – 1000) µg/kg</td>
<td>HPLC-MS/MS, HPLC-FLD, HPLC-UV</td>
</tr>
<tr>
<td><strong>Ethanol/water solutions</strong></td>
<td>Ethanol contents</td>
<td>(0,0 - 3,5) g/l</td>
<td>Gravimetry, GC-FID, Karl-Fischer-titration</td>
</tr>
<tr>
<td><strong>Aqueous solutions of stable isotopes (e.g. B</strong></td>
<td>Amount of substance ratios</td>
<td>(0,2 - 0,99) mol/mol</td>
<td>Gravimetry, TIMS, MC-ICP-MS</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Product Characteristic</th>
<th>Range</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cd, Mg, Pd, Pt, Pb) of stable isotopes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lubricants and fuels Mineral oil mass fractions</td>
<td>(10 – 995) mg/g</td>
<td>GC-FID, gravimetry</td>
</tr>
<tr>
<td>Porous materials * BET specific surfaces</td>
<td>(0.01 – 3000) m²/g</td>
<td>Gas adsorption</td>
</tr>
<tr>
<td>Porous materials * (e.g. oxides, glass, ceramics, zeolithe, carbon, metals, metal organic compounds) Specific pore volumes</td>
<td>(0.1 – 2.0) cm³/g</td>
<td>Gas adsorption</td>
</tr>
<tr>
<td></td>
<td>(100 – 3000) mm³/g</td>
<td>Hg intrusion</td>
</tr>
<tr>
<td></td>
<td>Pore diameters</td>
<td>(0.1 - 100) nm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5 – 100 000) nm</td>
</tr>
</tbody>
</table>

* entries present in CMC database

**Abbreviations used:**

- **BET**: Surface determination (according to Brunauer, Emmett and Teller)
- **CMC**: Calibration and measurement capability (entry in annex C of CIPM-MRA)
- **CV AAS**: Cold vapour atomic absorption spectrometry
- **CV AFS**: Cold vapour atomic fluorescence spectrometry
- **DAD**: Diode array detector
- **DIN**: Deutsches Institut für Normung e.V.
- **ET AAS**: Electrothermal atomic absorption spectrometry
- **FAAS**: Flame atomic absorption spectrometry
- **DIN**: Deutsches Institut für Normung e.V.
- **MD**: Molecularity detector
- **FID**: Flame ionization detector
- **FLD**: Fluorescence detector
- **GC**: Gas chromatography
- **GDMS**: Glow discharge mass spectrometry
- **HGAAS**: Hydride generation atomic absorption spectrometry
- **HPLC**: High pressure liquid chromatography
- **ICP-OES**: Optical emission spectrometry with inductively coupled plasma
- **ICP-MS**: Mass spectrometry with inductively coupled plasma
- **IDMS**: Isotope dilution mass spectrometry
- **IR**: Infrared
- **ISO**: International Standardisation Organisation
- **MC**: Multicup
- **PAH**: Polycyclic aromatic hydrocarbons
- **TGHE**: Carrier gas hot extraction
- **TIMS**: Thermal ions mass spectrometry
- **UV**: Ultraviolet
- **XRF**: X-Ray fluorescence spectrometry

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