

CERTIFICATE OF ANALYSIS

Certified Reference Material

BAM-B001

Polycyclic aromatic hydrocarbons in rubber toy

Certified Values

Measurand ¹⁾	Mass fraction ²⁾ in mg kg ⁻¹	Uncertainty ³⁾ in mg kg ⁻¹
Fluorene	1.71	0.22
Phenanthrene	15.4	1.2
Anthracene	2.9	1.1
Fluoranthene	4.3	0.5
Pyrene	11.4	1.1
Benz[<i>a</i>]anthracene	2.17	0.22
Chrysene	2.08	0.15
Benzo[<i>b</i>]fluoranthene	0.57	0.05
Benzo[<i>k</i>]fluoranthene	0.213	0.022
Benzo[<i>j</i>]fluoranthene	0.40	0.04
Benzo[<i>e</i>]pyrene	1.21	0.16
Benzo[<i>a</i>]pyrene	1.41	0.10
Indeno[1,2,3- <i>cd</i>]pyrene	0.28	0.06
Benzo[<i>ghi</i>]perylene	1.43	0.09

¹⁾ PAH congener determined using sample preparation (extraction, clean-up), gas chromatographic separation and mass spectrometric detection applying stable isotopic dilution analysis according to AfPS GS 2019:01 PAK method as specified in Section 3 of this certification report.

²⁾ Unweighted mean value of 3 BAM workplace mean values (total of 98 individual results)

³⁾ 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).

Values for Information (not certified) ^{a)}

Measurand ¹⁾	Mass fraction ²⁾ in mg kg ⁻¹	Uncertainty ³⁾ in mg kg ⁻¹
Naphthalene	0.09	0.08
Acenaphthylene	1.6	1.6
Acenaphthene	0.63	0.28
Dibenz[<i>a,h</i>]anthracene	0.118	0.020

^{a)} For details see the certification report.
^{1,2,3)} See description in table above

This certificate is valid for a period of 24 months starting with the dispatch of BAM-B001 from BAM. The minimum sample intake for one determination is 0.5 g.

Sample No.:

Date of dispatch:

Material Description

The certified reference material (CRM) BAM-B001 is available as ground rubber from a commercial toy product contaminated with polycyclic aromatic hydrocarbons (PAHs).

After several cryo-milling steps, sieving and homogenisation, the particle fraction of < 500 µm was subdivided into 778 units of (10.1 ± 0.1) g which were filled in 50 mL amber glass bottles with screw caps equipped with PTFE inserts. The units were numbered in the order of leaving the bottling process and were stored at -20 °C directly after bottling until dispatch from BAM. Details on the preparation and characterisation procedures are specified in the certification report.

Transport and Storage

BAM-B001 can be shipped at ambient temperature. On receiving, it must be stored at a temperature equal to or lower than +4 °C. The stability of the reference material is not affected by short periods of handling at ambient temperature during transport and use. However, BAM cannot be held responsible for any alteration of the material occurring during handling and storage at the customer's premises, especially of opened samples.

Instructions for Use

BAM-B001 is intended to be used for performance control and validation of analytical methods for the determination of PAH in rubber toys. The reference material may also be applicable for other similar consumer products. BAM-B001 is explicitly meant only to be used in analytical laboratories.

Before taking a subsample, the bottle must have reached ambient temperature. Thereafter, the bottle is to be closed tightly and stored at a temperature equal to or lower than +4 °C. The stability of the reference material is not affected by short periods of handling at ambient temperature during transport and use.

Safety Information

The usual laboratory safety precautions must be applied. No hazardous effects are to be expected when the material is used under conditions usually adopted for the analysis of rubber toy materials low or moderately contaminated with PAHs. Any use other than the intended one should be avoided. The personnel handling the material must be trained adequately and follow the regular safety precautions of the laboratory. It is strongly recommended to handle and disposed of the reference material in accordance with the guidelines for hazardous materials legally in force at the site of end use and disposal.

Metrological Traceability

All certified values refer to the extractable amounts of the PAH congeners applying the AfPS GS 2019:01 PAK method and are conventional to this extent. However, different sample preparation methods have been used such that systematic biases will (at least partially) be cancelled out. In order to ensure traceability of the extractable contents as defined above, the gravimetrically prepared certified calibration standard SRM 2260a (NIST) was employed for the in-house certification study. Traceability was further established by using stable isotope dilution analysis using isotopically labelled PAHs internal standards for GC-MS measurements.

Note

The certified reference material BAM-B001 was produced and certified under the responsibility of Bundesanstalt für Materialforschung und -prüfung (BAM). In addition to the in-house study at BAM, two interlaboratory comparison studies were conducted to support and confirm the certification of BAM-B001. For details see the certification report.

Technical Report

A detailed technical report describing the preparation, the analytical procedures and the treatment of the analytical data used to certify BAM-B001 is available on request or can be downloaded from the BAM website (www.bam.de).

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Bundesanstalt für Materialforschung und -prüfung (BAM)

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