

CRM Certification

The Certificates of analysis of organic CRM are designed and the certified value(s) and uncertainty(ies) are determined in accordance with ISO Guide 31, ISO Guide 35.

The CoAs provide full traceability. The dissolution of the raw materials (with their purity), passing through the preparation of the intermediate solutions and reaching to the preparation of the final solutions is described in section Additional Information. The uncertainties refer to each of the components separately and not to the uncertainty of the mixture.



Each solution is barcode identified

Certificate of Analysis

CERTIFIED REFERENCE MATERIAL Organic Standard Solution

This document is designed and the certified value(s) and uncertainty(ies) are determined in accordance with ISO Guide 31^[1], ISO Guide 35^[2], and Eurachem / CITAC Guides^[3]

Lot N: C41800

Batch Number (Barcode): 92238930

Certification Date: 10.11.2015
Date of stability last check:

Certification Date and Stability check date

Description of the Reference Material (CRM):

Solution of: PAH Standard Solution - 16 components; 2000mg/l each of Acenaphthene [CAS:83-32-9] ; Acenaphthylene [CAS:208-96-8] ; Anthracene [CAS:120-12-7] ; Benzo(a)anthracene [CAS:56-55-3] ; Benzo(a)pyrene [CAS:50-32-8] ; Benzo(b)fluoranthene [CAS:205-99-2] ; Benzo(g,h,i)perylene [CAS:191-24-2] ; Benzo(k)fluoranthene [CAS:207-08-9] ; Chrysene [CAS:218-01-9] ; Dibenzo(a,h)anthracene [CAS:53-70-3] ; Fluoranthene [CAS:206-44-0] ; Fluorene [CAS:86-73-7] ; Indeno(1,2,3-c,d)pyrene [CAS:193-39-5] ; Naphthalene [CAS:91-20-3] ; Phenanthrene [CAS:85-01-8] ; Pyrene [CAS:129-00-0] in Acetonitrile
Storage conditions: To be stored in a refrigerator at temperature below 4°C

Ref N:

F128611

The uncertainties are given separately for each component

Certified value/ Uncertainty:

Component

Chem. Formula

CAS No

Certified Value /
Uncertainty
(mg/l)*

Acenaphthene	C ₁₂ H ₁₀	83-32-9	1995.0 ± 27.9
Acenaphthylene	C ₁₂ H ₈	208-96-8	2002.9 ± 26.0
Anthracene	C ₁₄ H ₁₀	120-12-7	1995.0 ± 27.9
Benzo(a)anthracene	C ₁₈ H ₁₂	56-55-3	1986.6 ± 26.1
Benzo(a)pyrene	C ₂₀ H ₁₂	50-32-8	2003.9 ± 26.8
Benzo(b)fluoranthene	C ₂₀ H ₁₂	205-99-2	1989.0 ± 26.7
Benzo(g,h,i)perylene	C ₂₂ H ₁₂	191-24-2	1997.9 ± 27.9
Benzo(k)fluoranthene	C ₂₀ H ₁₂	207-08-9	2000.9 ± 26.3
Chrysene	C ₁₈ H ₁₂	218-01-9	2007.6 ± 33.0
Dibenzo(a,h)anthracene	C ₂₂ H ₁₄	53-70-3	2007.7 ± 28.0
Fluoranthene	C ₁₆ H ₁₀	206-44-0	1989.0 ± 27.8
Fluorene	C ₁₃ H ₁₀	86-73-7	1998.8 ± 26.3
Indeno(1,2,3-c,d)pyrene	C ₂₂ H ₁₂	193-39-5	2009.5 ± 26.7
Naphthalene	C ₁₀ H ₈	91-20-3	2018.9 ± 26.5
Phenanthrene	C ₁₄ H ₁₀	85-01-8	2001.6 ± 26.3
Pyrene	C ₁₆ H ₁₀	129-00-0	2002.5 ± 27.9

Concept of Certification and traceability statement:

This certified reference material is produced by gravimetric measurement and dissolving the individual substances in Acetonitrile.



C.P.A. chem Ltd is accredited to ISO Guide 34 and ISO/IEC 17025

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Method of certification:

CRM's calibration procedure (WQP 5.15.1/2)

The certified value was obtained gravimetrically and confirmed experimentally by GC/MS or HPLC

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA 4/02 and incorporates the uncertainties of the raw-material purity, the mass and the volume.

Property of the result of a measurement whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties (ISO VIM^[5])
The metrological traceability is assured through gravimetric measurement and dissolving the certified reference material from accredited according to ISO/IEC 17025^[6] and/or ISO Guide 34^[7] laboratories/producers and traceable to SI.

The measurement results are traceable to SI. All analytical balances used for the preparation of the solution are calibrated yearly under an in-house procedure with class E1 and class E2 analytical weights, traceable to SI (DKD) and are daily checked.

Class A laboratory glassware is used.

The results from temperature measurement are traceable to SI. The thermometers used for solution's calibration are calibrated from an ISO 17025 accredited laboratory. The ambient conditions are controlled with a hygrometer calibrated from an ISO 17025 accredited laboratory.

Both, purity of the starting materials and solvent were checked using appropriate analytical instrument.

Starting material, purity (Lot N):**Purity of Each
Starting material**

Acenaphthene	99.5% (41131220)
Acenaphthylene	91.5% (41179642)
Anthracene	99.5% (41132784)
Benzo(a)anthracene	98.3% (41131350)
Benzo(a)pyrene	99.4% (41180051)
Benzo(b)fluoranthene	99.8% (41179482)
Benzo(g,h,i)perylene	99.3% (41180242)
Benzo(k)fluoranthene	99.3% (41178164)
Chrysene	98.7% (41182765)
Dibenzo(a,h)anthracene	99% (41178850)
Fluoranthene	99.3% (41089675)
Fluorene	95% (41059357)
Indeno(1,2,3-c,d)pyrene	98.6% (41180631)
Naphthalene	99.7% (41179710)
Phenanthrene	98.6% (41176481)
Pyrene	98.5% (41099001)

**Density for weight/weight
calculation****Density:**0.9356 g/cm³ at 21.3 °C**Intended Usage****Expiry date:**

until 12.2017

Intended use:**For Laboratory Use Only**

This CRM is intended for:

Calibration of TLC, GC/FID, GC/TCD, GC/ECD, GC/MS, GC/MS/MS, LC/UV, LC/MS and LC/MS/MS

Validation of analytical methods

Preparation of "working reference samples"

Detection limit and linearity studies

This statement is not intended to restrict the use for other purposes.

Instructions for the correct use of this reference material:

This certified reference material can be used directly or can be diluted in an appropriate solvent. Only a clean class A glassware should be used. Do not pipet from container. Obtained concentration (in mg/l) after dilution is a result from the multiplication of certified value of CRM concentration and the CRM's volume used for dilution and divided into the flask's volume used for dilution.

Stability and storage:

This CRM is with a guaranteed stability until $\pm 5\%$ of the certified concentration for a period of 24 months.

Stability is guaranteed of an unopened ampoule stored in a refrigerator at temperature 4°C or below.

Product should be used shortly after opening to avoid concentration changes due to evaporation. Warranty does not apply to ampoules stored after opening.

Hazardous situation:

The normal laboratory safety precautions should be observed when working with this RM. Further details for the handling of this RM are available as safety data sheet.

Level of homogeneity

This solution was mixed according to an in-house procedure (OQP 5.13.1) and is guaranteed to be homogeneous.

To ensure sufficient homogeneity of the sample prior to use thoroughly mix by inversion or sonicate.

This Certified Reference Material was produced under a quality management system that is:

- Registered to ISO 9001 Quality Management System (Lloyd's Register Quality Assurance Ltd Cert No SOF0368072)
- Accredited according to ISO/IEC 17025 – Testing (ANAB Cert No AT-1836)
- Accredited according to ISO Guide 34 - Reference Material Producer (ANAB Cert No AR-1835)

Names of certifying officers:

Laboratory: Yordan Uzunov

Manager: Krassimira Taralova

**This certificate has been computer generated and does not signated*

[1] ISO Guide 31: Reference materials - Contents of certificates and labels

[2] ISO Guide 35: Reference materials - General and statistical principles for certification

[3] EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement

[4] EA 4/02: Expression of the Uncertainty of Measurement in Calibration

[5] ISO/IEC Guide 99: International Vocabulary of Metrology-Basic and general concepts and associated terms (VIM)

[6] ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories

[7] ISO Guide 34: General Requirements for the Competence of Reference Material Producers

This certificate relates solely to the lot number given above.

All processes (including generating of this certificate) are completely controlled by the specialized Computer-Aided-Manufacturing (CAM) software.

Full data from the
gravimetric preparation

Additional Information Gravimetric Data

Component	Purity %	Source Lot No	Weighed quantity, g	Final quantity, kg.10 ³	Bulk/ Standard Solution lot No	Concen- tration mg/kg	Chemist ID
Acenaphthene	99.5	41131220	0.02005	9.3564	92238930	2132.21	VV
Acenaphthylene	91.5	41179642	0.02189	9.3564	92238930	2140.72	VV
Anthracene	99.5	41132784	0.02005	9.3564	92238930	2132.21	VV
Benzo(a)anthracene	98.3	41131350	0.02021	9.3564	92238930	2123.30	VV
Benzo(a)pyrene	99.4	41180051	0.02016	9.3564	92238930	2141.74	VV
Benzo(b)fluoranthene	99.8	41179482	0.01993	9.3564	92238930	2125.83	VV
Benzo(g,h,i)perylene	99.3	41180242	0.02012	9.3564	92238930	2135.35	VV
Benzo(k)fluoranthene	99.3	41178164	0.02015	9.3564	92238930	2138.54	VV
Chrysene	98.7	41182765	0.02034	9.3564	92238930	2145.65	VV
Dibenzo(a,h)anthracene	99	41178850	0.02028	9.3564	92238930	2145.83	VV
Fluoranthene	99.3	41089675	0.02003	9.3564	92238930	2125.80	VV
Fluorene	95	41059357	0.02104	9.3564	92238930	2136.29	VV
Indeno(1,2,3-c,d)pyrene	98.6	41180631	0.02038	9.3564	92238930	2147.70	VV
Naphthalene	99.7	41179710	0.02025	9.3564	92238930	2157.81	VV
Phenanthrene	98.6	41176481	0.0203	9.3564	92238930	2139.26	VV
Pyrene	98.5	41099001	0.02033	9.3564	92238930	2140.26	VV