

Certificate of Analysis

CERTIFIED REFERENCE MATERIAL

16 components; Benzo(a)pyrene [CAS:50-32-8] 1mg/l ; Naphthalene [CAS:91-20-3] 10mg/l ; Acenaphthylene [CAS:208-96-8] 10mg/l ; Acenaphthene [CAS:83-32-9] 10mg/l ; Fluorene [CAS:86-73-7] 10mg/l ; Phenanthrene [CAS:85-01-8] 10mg/l ; Anthracene [CAS:120-12-7] 10mg/l ; Fluoranthene [CAS:206-44-0] 10mg/l ; Pyrene [CAS:129-00-0] 10mg/l ; Benzo(a)anthracene [CAS:56-55-3] 10mg/l ; Chrysene [CAS:218-01-9] 10mg/l ; Benzo(b)fluoranthene [CAS:205-99-2] 10mg/l ; Benzo(k)fluoranthene [CAS:207-08-9] 10mg/l ; Dibenzo(a,h)anthracene [CAS:53-70-3] 10mg/l ; Benzo(g,h,i)perylene [CAS:191-24-2] 10mg/l ; Indeno(1,2,3-c,d)pyrene [CAS:193-39-5] 10mg/l in Acetonitrile

Lot N: 772967
Barcode: 92799745

Ref N: RD0551922

Certification Date: 16.09.2021

Component	Certified Value* and uncertainty [$\mu\text{g/ml}$]	CAS	Chemical Formula
Benzo(a)pyrene	1.007 \pm 0.012	50-32-8	C ₂₀ H ₁₂
Naphthalene	10.140 \pm 0.172	91-20-3	C ₁₀ H ₈
Acenaphthylene	10.078 \pm 0.211	208-96-8	C ₁₂ H ₈
Acenaphthene	10.093 \pm 0.152	83-32-9	C ₁₂ H ₁₀
Fluorene	10.029 \pm 0.143	86-73-7	C ₁₃ H ₁₀
Phenanthrene	10.086 \pm 0.158	85-01-8	C ₁₄ H ₁₀
Anthracene	10.076 \pm 0.151	120-12-7	C ₁₄ H ₁₀
Fluoranthene	10.020 \pm 0.185	206-44-0	C ₁₆ H ₁₀
Pyrene	10.070 \pm 0.138	129-00-0	C ₁₆ H ₁₀
Benzo(a)anthracene	10.040 \pm 0.263	56-55-3	C ₁₈ H ₁₂
Chrysene	9.963 \pm 0.133	218-01-9	C ₁₈ H ₁₂
Benzo(b)fluoranthene	10.101 \pm 0.273	205-99-2	C ₂₀ H ₁₂
Benzo(k)fluoranthene	10.043 \pm 0.198	207-08-9	C ₂₀ H ₁₂
Dibenzo(a,h)anthracene	10.049 \pm 0.210	53-70-3	C ₂₂ H ₁₄
Benzo(g,h,i)perylene	10.046 \pm 0.183	191-24-2	C ₂₂ H ₁₂
Indeno(1,2,3-c,d)pyrene	10.085 \pm 0.124	193-39-5	C ₂₂ H ₁₂

* WQP 5.15.1/2 The certified value was obtained gravimetrically and confirmed experimentally by GC/MS or HPLC

Density 0.8038 g/cm³ at 20°C

Starting Material	Purity, Batch
Benzo(a)pyrene	96.9% (41391495)
Naphthalene	98.8% (41327357)
Acenaphthylene	95.3% (41397305)
Acenaphthene	99.9% (41385715)
Fluorene	98.8% (41397367)
Phenanthrene	98.5% (41401460)
Anthracene	99.3% (41384121)
Fluoranthene	98.9% (41353592)
Pyrene	99.9% (41396773)
Benzo(a)anthracene	98.4% (41411209)
Chrysene	99.4% (41378045)
Benzo(b)fluoranthene	99.9% (41394786)
Benzo(k)fluoranthene	98.9% (41370339)
Dibenzo(a,h)anthracene	99.0% (41412473)
Benzo(g,h,i)perylene	98.5% (41368213)



Indeno(1,2,3-c,d)pyrene

99.2% (41386576)

Storage Conditions: Store in a refrigerator at temperatures between 2°C to 8°C

Expiry Date: 16.10.2022

Concept of Certification and traceability statement:

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

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.

The metrological traceability is defined as the "property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty".

The metrological traceability is ensured through gravimetric measurement and dissolving of certified reference material/s (traceable to SI) from laboratories/producers, accredited according to ISO 17034.

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 checked daily.

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.

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 certified reference material:

This CRM 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. For quantitative analysis, we recommend analyzing this mixture separately, without mixing it with other solutions, to ensure accurate results for every compound.

Stability and storage:

This CRM is with a guaranteed stability until $\pm 5\%$ of the certified concentration for a period of 12 months. Stability is guaranteed of an unopened original packaging stored, as written in the section: Storage Conditions. Even if the product is stable at normal laboratory conditions, in order to increase its stability, we highly recommend it to be stored in a refrigerator.

The product should be used shortly after opening to avoid concentration changes due to evaporation. Warranty does not apply to a product stored after opening.

Hazardous situation:

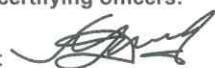
The normal laboratory safety precautions should be observed when working with this RM. Further details for the handling of this RM are available in a safety data sheet.

Level of homogeneity

This solution was mixed according to an in-house procedure (MQP 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.

Names of certifying officers:

Laboratory:  Margarita Dimitrova

Manager:  Krassimira Taralova

This document QF 5.17.1/1 version 1 is designed and the certified value(s) and uncertainty(ies) are determined in accordance with ISO Guide 31, ISO Guide 35, and Eurachem / CITAC Guides

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.

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 0039638)

- Accredited according to ISO/IEC 17025 – Testing (ANAB Cert No AT-1836)

- Accredited according to ISO 17034 - Reference Material Producer (ANAB Cert No AR-1835)

Additional Information**Gravimetric Data**

Component	Purity %	Source Lot No	Weighed quantity, g	Final quantity, kg.10 ⁻³	Bulk/Standard Solution lot No	Concentration mg/kg	Chemist ID
Benzo(a)pyrene	96.9	41391495	0.02898	5.1625	91749765	5439.5	AS
		91749765	0.2653	3.6307	91769640	397.47	AS
		91769640	0.2527	9.8377	92799684	10.2098	NN
		92799684	0.9866	8.0375	92799745	1.2533	NN
Naphthalene	98.8	41327357	0.01283	2.5263	91732583	5017.6	AS
		91732583	0.2015	9.8377	92799684	102.773	NN
		92799684	0.9866	8.0375	92799745	12.6154	NN
Acenaphthylene	95.3	41397305	0.00967	3.0374	91764393	3033.99	AS
		91764393	0.3312	9.8377	92799684	102.144	NN
		92799684	0.9866	8.0375	92799745	12.5381	NN
Acenaphthene	99.9	41385715	0.01542	3.5620	91764577	4324.7	AS
		91764577	0.2327	9.8377	92799684	102.295	NN
		92799684	0.9866	8.0375	92799745	12.5568	NN
Fluorene	98.8	41397367	0.017	5.6952	91769657	2949.15	AS
		91769657	0.3391	9.8377	92799684	101.656	NN
		92799684	0.9866	8.0375	92799745	12.4783	NN
Phenanthrene	98.5	41401460	0.01453	4.6907	91734761	3051.15	AS
		91734761	0.3296	9.8377	92799684	102.225	NN
		92799684	0.9866	8.0375	92799745	12.5482	NN
Anthracene	99.3	41384121	0.01558	4.2407	91767851	3648.2	AS
		91767851	0.2754	9.8377	92799684	102.129	NN
		92799684	0.9866	8.0375	92799745	12.5362	NN
Fluoranthene	98.9	41353592	0.01138	4.4520	91766403	2528.04	AS
		91766403	0.3952	9.8377	92799684	101.556	NN
		92799684	0.9866	8.0375	92799745	12.4661	NN
Pyrene	99.9	41396773	0.01833	4.3183	91766410	4240.5	AS
		91766410	0.2368	9.8377	92799684	102.072	NN
		92799684	0.9866	8.0375	92799745	12.5293	NN
Benzo(a)anthracene	98.4	41411209	0.00739	4.7236	91771049	1539.45	AS
		91771049	0.6503	9.8377	92799684	101.762	NN
		92799684	0.9866	8.0375	92799745	12.4912	NN
Chrysene	99.4	41378045	0.01937	5.5082	91760722	3495.5	AS
		91760722	0.2842	9.8377	92799684	100.981	NN
		92799684	0.9866	8.0375	92799745	12.3954	NN
Benzo(b)fluoranthene	99.9	41394786	0.02237	4.4730	91765574	4996.1	AS
		91765574	0.2016	9.8377	92799684	102.384	NN
		92799684	0.9866	8.0375	92799745	12.5676	NN
Benzo(k)fluoranthene	98.9	41370339	0.01043	3.7763	91767943	2731.62	AS
		91767943	0.3666	9.8377	92799684	101.793	NN
		92799684	0.9866	8.0375	92799745	12.4951	NN
Dibenzo(a,h)anthracene	99.0	41412473	0.0097	4.6203	91769664	2078.44	AS
		91769664	0.4821	9.8377	92799684	101.855	NN
		92799684	0.9866	8.0375	92799745	12.5028	NN
Benzo(g,h,i)perylene	98.5	41368213	0.01167	4.7219	91766885	2434.39	AS
		91766885	0.4115	9.8377	92799684	101.828	NN
		92799684	0.9866	8.0375	92799745	12.4994	NN
Indeno(1,2,3-c,d)pyrene	99.2	41386576	0.0233	4.8268	91755759	4788.6	AS
		91755759	0.21	9.8377	92799684	102.220	NN
		92799684	0.9866	8.0375	92799745	12.5476	NN