Certificate of Analysis

PAHs in Soil

Certified Reference Material

Product ID **SQC017-40G**
Lot **LRAB5137**
Expiration Date December 31, 2020
Storage Conditions Store at 2 - 8ºC

Analyte	*Units*	*Certified Value* [1,4]	***k*** [5]	*Standard Deviation* [2]	*Acceptance Interval* [3]
Naphthalene	ug/Kg	369 ± 114	2.00	126	74.6 to 663
Acenaphthene	ug/Kg	692 ± 286	2.00	314	0.00 to 1,430
Acenaphthylene	ug/Kg	336 ± 96.6	2.00	106	83.3 to 588
Anthracene	ug/Kg	90.7 ± 9.98	2.00	11.0	64.2 to 117
Benzo(a)anthracene	ug/Kg	88.2 ± 18.5	2.00	20.3	39.3 to 137
Benzo(a)pyrene	ug/Kg	279 ± 20.6	2.00	22.6	225 to 332
Benzo(b)fluoranthene	ug/Kg	335 ± 93.1	2.00	102	91.0 to 579
Benzo(g,h,i)perylene	ug/Kg	224 ± 29.6	2.00	32.6	146 to 302
Benzo(k)fluoranthene	ug/Kg	278 ± 49.8	2.00	54.8	150 to 406
Chrysene	ug/Kg	356 ± 27.9	2.00	30.7	283 to 430
Dibenzo(a,h)anthracene	ug/Kg	349 ± 4.59	2.00	5.05	336 to 361
Fluoranthene	ug/Kg	275 ± 65.7	2.00	72.2	101 to 449
Fluorene	ug/Kg	270 ± 90.0	2.00	99.0	34.8 to 505
Indeno(1,2,3-cd) pyrene	ug/Kg	313 ± 62.7	2.00	68.9	150 to 477
Phenanthrene	ug/Kg	341 ± 26.0	2.00	28.6	274 to 408
Pyrene	ug/Kg	375 ± 85.2	2.00	93.6	149 to 602

Sample Information

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

SIGMA-ALDRICH®
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DESCRIPTION

This product consist of a 4 vials each containing 10g of soil for analysis of PAHs. Each vial is identical and has been tested show homogeneity.

Four samples have been provided for your convenience (multiple methods, multiple analysts, etc.)

The soil has been chemically stabilized with 1 mL of acetone to minimize degradation of the sample.

SAMPLE PREPARATION

Extract the complete contents of a single vial. Transfer entire contents of one vial to extraction vessel. Rinse vial and cap with extraction solvent.

Note: Sample extracts and calibration solutions should be in the same solvent.

All values are based on a wet weight basis, do not correct for moisture.

Assume a 10g sample size for all calculations.

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1 Certified value - based on the robust mean of round robin, interlaboratory study and analytically verified by RTC with associated uncertainties from the preparation and analytical procedures.
2 The standard deviation is the robust statistical standard deviation from the round robin interlaboratory study.
3 Acceptance limits are based on Interlaboratory Study Results. These ranges are recommendations only.
4 Ucrm - Uncertainty values in this document are expressed as Expanded Uncertainty (Ucrm) corresponding to the 95% confidence interval. Ucrm is derived from the combined standard uncertainty multiplied by the coverage factor k, which is obtained from a *t*-distribution and degrees of freedom. The components of combined standard uncertainty include the uncertainties due to characterization, homogeneity, long term stability, and short term stability (transport). The components due to stability are generally considered to be negligible unless otherwise indicated by stability studies. The mathematical representation of the Ucrm calculation is as follows:

$$u_{CRM} = \sqrt{u_{char}^2 + u_{\text{hom}\ ogeneity}^2 + u_{stability}^2}$$

5 ***k*:** Coverage factor derived from a t-distribution table, based on the degrees of freedom of the data set. **Confidence interval = 95%**

Traceability: The standard was manufactured under an ISO/IEC 17025:2005 certified quality system. The balance used to weigh raw materials is accurate to +/- 0.0001g and calibrated regularly using mass standards traceable to NIST. All dilutions were preformed gravimetrically. Additionally, individual analytes are traceable to NIST SRMs where available and specified above.

Homogeneity: Homogeneity was assessed in accordance with ISO Guide 35. Completed units were sampled using a random stratified sampling protocol. The results of chemical analysis were then compared using a one-way analysis of variance approach as described by TNI EL-V3-2009 Appendix A.2. See Instructions for minimum sub-sample size.

THIS PRODUCT WAS DESIGNED, PRODUCED AND VERIFIED FOR ACCURACY AND STABILITY IN ACCORDANCE WITH ISO/IEC 17025:2005 (ANAB Cert AT-1467) and ISO GUIDE 34:2009 (ANAB Cert AR-1470).

Robert O'Brien - QC Supervisor

Mark Pooler - QA Supervisor

Certification Date June 21, 2017
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