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Certificate of Analysis

CERTIFIED REFERENCE MATERIAL

n-Alkane Standard Solution 16 components C10-C40 (all even) (ISO 9377-2-Mod)
50mg/l each of n-Decane [CAS:124-18-5] ; n-Dodecane [CAS:112-40-3] ; n-Tetradecane [CAS:629-59-4] ; n-Hexadecane [CAS:544-76-3] ; n-Octadecane [CAS:593-45-3] ; n-Eicosane [CAS:112-95-8] ; n-Docosane [CAS:629-97-0] ; n-Tetracosane [CAS:646-31-1] ; n-Hexacosane [CAS:630-01-3] ; n-Octacosane [CAS:630-02-4] ; n-Triacontane [CAS:638-68-6] ; n-Dotriacontane [CAS:544-85-4] ; n-Tetratriacontane [CAS:14167-59-0] ; n-Hexatriacontane [CAS:630-06-8] ; n-Octatriacontane [CAS:7194-85-6] ; n-Tetracontane [CAS:4181-95-7] in n-Hexane

Lot N: XXXXXX
Barcode: XXXXXXXX

Ref N: F109781.1

Certification Date:XXXXXX

Component	Certified Value* and uncertainty [µg/ml]	CAS	Chemical Formula
n-Decane	49.76 ± 0.66	124-18-5	$C_{10}H_{22}$
n-Dodecane	50.10 ± 0.64	112-40-3	$C_{12}H_{26}$
n-Tetradecane	50.31 ± 0.56	629-59-4	$C_{14}H_{30}$
n-Hexadecane	50.81 ± 0.60	544-76-3	$C_{16}H_{34}$
n-Octadecane	49.94 ± 0.54	593-45-3	$C_{18}H_{38}$
n-Eicosane	49.95 ± 0.73	112-95-8	$C_{20}H_{42}$
n-Docosane	50.09 ± 0.74	629-97-0	$C_{22}H_{46}$
n-Tetracosane	50.06 ± 0.69	646-31-1	$C_{24}H_{50}$
n-Hexacosane	50.17 ± 0.64	630-01-3	$C_{26}H_{54}$
n-Octacosane	50.03 ± 0.67	630-02-4	$C_{28}H_{58}$
n-Triacontane	50.01 ± 0.55	638-68-6	$C_{30}H_{62}$
n-Dotriacontane	50.28 ± 0.69	544-85-4	$C_{32}H_{66}$
n-Tetratriacontane	50.15 ± 0.66	14167-59-0	$C_{34}H_{70}$
n-Hexatriacontane	50.22 ± 0.85	630-06-8	$C_{36}H_{74}$
n-Octatriacontane	50.43 ± 0.71	7194-85-6	$C_{38}H_{78}$
n-Tetracontane	50.13 ± 0.89	4181-95-7	$C_{40}H_{82}$

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

Density 0.6535 g/cm^3 at 20°C

Starting Material	Purity, Batch
n-Decane	98.9% (41365632)
n-Dodecane	99.5% (41319307)
n-Tetradecane	99.6% (41346068)
n-Hexadecane	98.0% (41313664)
n-Octadecane	99.9% (41318454)
n-Eicosane	99.9% (41351079)
n-Docosane	99.9% (41377789)
n-Tetracosane	99.9% (41375761)
n-Hexacosane	99.7% (41335727)
n-Octacosane	98.3% (41368008)
n-Triacontane	99.3% (41375600)
n-Dotriacontane	99.9% (41309957)
n-Tetratriacontane	99.9% (41341308)
n-Hexatriacontane	99.9% (41371534)
n-Octatriacontane	99.6% (41297452)
n-Tetracontane	98.4% (41368510)

DO NOT DISTRIBUTE

CERTIFIED ISO 9001

ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

C.P.A. chem Ltd is accredited to ISO 17034 and ISO/IEC 17025

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

Expiry Date: XXXXXXXXXX

Concept of Certification and traceability statement:
This certified reference material is produced by gravimetric measurement and dissolving the individual substances in n-Hexane .
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.

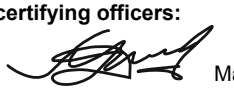
Instructions for the correct use of this certified reference material:
This CRM can be used directly or can be diluted in an appropriate solvent. Only a clean class A glassware should be used. Do not pipet from container. Obtained concentration (in mg/l) after dilution is a result from the multiplication 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 ±5% of the certified concentration for a period of 24 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)

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Additional Information

Analytical Data:

GC Conditions:

Column	Agilent HP- 5MS 30m, 0.25mm, 0.25µm	Oven	Temperature	Hold
Flow rate	0.7 ml/min	Initial	35°C	7
Injector	250 °C	8°C/min	300°C	30

Injection volume	1µl split (split ration 10:1)
Carrier gas	He, constant flow

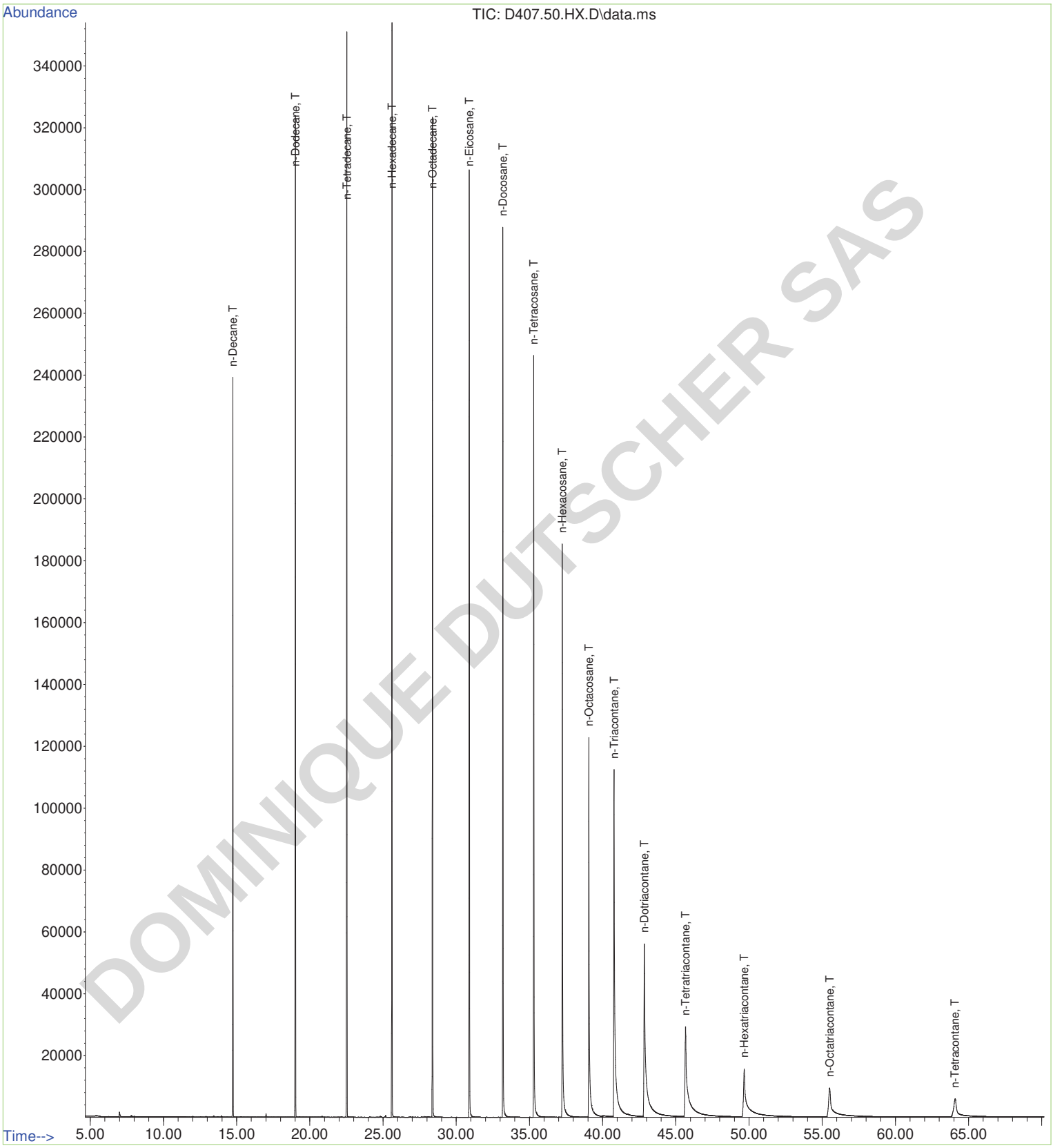
MS Conditions:

Transfer line	300°C	Ionization mode	EI
MS Source	230°C	Mode	SIM: m/z 71.1
MS Quad	150°C		

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
n-Decane	98.9	41365632	0.01886	2.1885	91659057	8523.0	AS
		91659057	0.2919	32.673	XXXXXXXX	76.145	ER
n-Dodecane	99.5	41319307	0.0204	2.3321	91659330	8703.7	AS
		91659330	0.2878	32.673	XXXXXXXX	76.667	ER
n-Tetradecane	99.6	41346068	0.02984	2.4598	91666666	12082.5	AS
		91666666	0.2082	32.673	XXXXXXXX	76.997	ER
n-Hexadecane	98.0	41313664	0.02458	2.4094	91659354	9997.8	AS
		91659354	0.2541	32.673	XXXXXXXX	77.755	ER
n-Octadecane	99.9	41318454	0.03323	2.4159	91666659	13741.0	AS
		91666659	0.1817	32.673	XXXXXXXX	76.417	ER
n-Eicosane	99.9	41351079	0.0161	2.7221	91651051	5908.5	AS
		91651051	0.4227	32.673	XXXXXXXX	76.440	ER
n-Docosane	99.9	41377789	0.0157	2.7645	91615893	5673.5	AS
		91615893	0.4414	32.673	XXXXXXXX	76.649	ER
n-Tetracosane	99.9	41375761	0.01769	2.2899	91659323	7717.5	AS
		91659323	0.3243	32.673	XXXXXXXX	76.603	ER
n-Hexacosane	99.7	41335727	0.0208	2.7183	91651013	7629.0	AS
		91651013	0.3288	32.673	XXXXXXXX	76.774	ER
n-Octacosane	98.3	41368008	0.019	1.9561	91666635	9548.1	AS
		91666635	0.262	32.673	XXXXXXXX	76.566	ER
n-Triacontane	99.3	41375600	0.0309	2.7759	91648839	11053.5	AS
		91648839	0.2262	32.673	XXXXXXXX	76.529	ER
n-Dotriacontane	99.9	41309957	0.01782	2.5756	91634658	6911.9	AS
		91634658	0.3637	32.673	XXXXXXXX	76.941	ER
n-Tetratriacontane	99.9	41341308	0.01919	2.2623	91666642	8474.0	AS
		91666642	0.2959	32.673	XXXXXXXX	76.745	ER
n-Hexatriacontane	99.9	41371534	0.01271	2.5263	91666611	5026.0	AS
		91666611	0.4996	32.673	XXXXXXXX	76.854	ER
n-Octatriacontane	99.6	41297452	0.01723	2.4691	91634610	6950.3	AS
		91634610	0.3628	32.673	XXXXXXXX	77.177	ER
n-Tetracontane	98.4	41368510	0.01204	2.5366	91659347	4670.6	AS
		91659347	0.5366	32.673	XXXXXXXX	76.708	ER

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