

CERTIFIED REFERENCE MATERIAL

21 components: 2.5g/l each of Camphene [CAS:79-92-5] ; beta-Pinene [CAS:127-91-3] ; alpha-Phellandrene [CAS:99-83-2] ; alpha-Terpinene [CAS:99-86-5] ; Ocimene [CAS:13877-91-3] ; Eucalyptol [CAS:470-82-6] ; gamma-Terpinene [CAS:99-85-4] ; Sabinene Hydrate [CAS:546-79-2] ; Linalool [CAS:78-70-6] ; (-)-Isopulegol [CAS:89-79-2] ; Isoborneol [CAS:124-76-5] ; (+)-Borneol [CAS:464-43-7] ; Pulegone [CAS:89-82-7] ; Geranyl acetate [CAS:105-87-3] ; (-)-a-Cedrene (major, contains (+)-alpha-cedrene) [CAS:469-61-4] ; trans-beta-Farnesene [CAS:18794-84-8] ; Valencene [CAS:4630-07-3] ; trans-Nerolidol [CAS:40716-66-3] ; Caryophyllene Oxide [CAS:1139-30-6] ; (-)-a-Bisabolol [CAS:23089-26-1] ; a-Terpineol [CAS:98-55-5] in 2-Propanol / Toluene (1/1)

Lot N: 0811433
Barcode: 93407137

Ref N: 40527

Certification Date: 17.09.2025

Component	Certified Value* and uncertainty [µg/ml]	CAS	Chemical Formula
Camphene	2544.4 ± 25.1	79-92-5	C ₁₀ H ₁₆
beta-Pinene	2504.7 ± 27.2	127-91-3	C ₁₀ H ₁₆
alpha-Phellandrene	2488.4 ± 23.5	99-83-2	C ₁₀ H ₁₆
alpha-Terpinene	2526.8 ± 26.8	99-86-5	C ₁₀ H ₁₆
Ocimene	2594.9 ± 27.4	13877-91-3	C ₁₀ H ₁₆
Eucalyptol	2539.5 ± 24.0	470-82-6	C ₁₀ H ₁₈ O
gamma-Terpinene	2526.5 ± 29.8	99-85-4	C ₁₀ H ₁₆
Sabinene Hydrate	2535.4 ± 24.0	546-79-2	C ₁₀ H ₁₈ O
Linalool	2539.3 ± 24.4	78-70-6	C ₁₀ H ₁₈ O
(-)-Isopulegol	2533.7 ± 27.0	89-79-2	C ₁₀ H ₁₈ O
Isoborneol	2517.2 ± 28.0	124-76-5	C ₁₀ H ₁₈ O
(+)-Borneol	2492.1 ± 23.7	464-43-7	C ₁₀ H ₁₈ O
Pulegone	2541.1 ± 24.4	89-82-7	C ₁₀ H ₁₆ O
Geranyl acetate	2506.5 ± 23.7	105-87-3	C ₁₂ H ₂₀ O ₂
(-)-a-Cedrene (major, contains (+)-alpha-cedrene)	2514.7 ± 27.0	469-61-4	C ₁₅ H ₂₄
trans-beta-Farnesene	2516.4 ± 23.8	18794-84-8	C ₁₅ H ₂₄
Valencene	2500.2 ± 27.6	4630-07-3	C ₁₅ H ₂₄
trans-Nerolidol	2528.3 ± 24.6	40716-66-3	C ₁₅ H ₂₆ O
Caryophyllene Oxide	2497.6 ± 79.9	1139-30-6	C ₁₅ H ₂₄ O
(-)-a-Bisabolol	2546.4 ± 35.7	23089-26-1	C ₁₅ H ₂₆ O
a-Terpineol	2488.1 ± 30.0	98-55-5	C ₁₀ H ₁₈ O

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

Density 0.8306 g/cm³ at 20°C

Starting Material	Purity, Batch
Camphene	98.39% (41630938)
beta-Pinene	95.02% (41616468)
alpha-Phellandrene	89.9% (41559925)
alpha-Terpinene	88.35% (41611388)
Ocimene	95.61% (41605516)
Eucalyptol	99.2% (41534007)
gamma-Terpinene	97.7% (41556948)
Sabinene Hydrate	98.12% (41632260)



CPAchem Ltd. is
ISO 17034 (Cert No AR-1835)
and
ISO/IEC 17025 (Cert No AT-1836)
accredited by ANAB

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Linalool	96.7% (41574843)
(-)-Isopulegol	99.36% (41632253)
Isoborneol	94.99% (41599334)
(+)-Borneol	96.37% (41629383)
Pulegone	98.34% (41601549)
Geranyl acetate	99.94% (41632208)
(-)- α -Cedrene (major, contains (+)- α -cedrene)	95.4% (41632123)
trans-beta-Farnesene	99.7% (41556788)
Valencene	85.1% (41632086)
trans-Nerolidol	95.48% (41608357)
Caryophyllene Oxide	98.1% (41607671)
(-)- α -Bisabolol	95.8% (41566954)
α -Terpineol	96.29% (41618035)

Storage Conditions: Store in a freezer at -18°C and protected from light

Expiry Date: 17.10.2027

Concept of Certification and traceability statement:

This certified reference material is produced by gravimetric measurement and directly dissolving the individual substances in the corresponding solvent, when such is needed. In case direct dissolution is not possible, the individual substances are pre-dissolved in a suitable solvent and then gravimetrically added into the solution.

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 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:

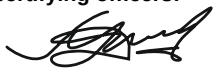
The normal laboratory safety precautions should be observed when working with this RM. Further details for the handling of this RM are available in a safety data sheet.

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 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

- Accredited according to ISO 17034

Additional Information

Analytical Data:

GC Conditions:

Column	PerkinElmer Elite 5-MS 30m, 0.25mm, 0.25µm	Oven	Temperature	Hold
Flow rate	1.0 ml/min	Initial	50°C	2
Injector	250 °C	7°C/min	280°C	2
Injection volume	1µl split (split ratio 10:1)			
Carrier gas	He, constant flow			

MS Conditions:

Transfer line	250°C	Ionization mode	EI
MS Source	230°C	Mode	Scan
MS Quad	150°C		

Gravimetric Data

Component	Purity %	Source Lot No	Weighed quantity, g	Final quantity, g	Bulk/Standard Solution lot No	Concentration mg/kg	Chemist ID
Camphene	98.39	41630938	0.1293	41.528	93407137	3063.48	DG
beta-Pinene	95.02	41616468	0.1318	41.528	93407137	3015.75	DG
alpha-Phellandrene	89.9	41559925	0.1384	41.528	93407137	2996.12	DG
alpha-Terpinene	88.35	41611388	0.143	41.528	93407137	3042.33	DG
Ocimene	95.61	41605516	0.1357	41.528	93407137	3124.27	DG
Eucalyptol	99.2	41534007	0.128	41.528	93407137	3057.64	DG
gamma-Terpinene	97.7	41556948	0.1293	41.528	93407137	3041.98	DG
Sabinene Hydrate	98.12	41632260	0.1292	41.528	93407137	3052.70	DG
Linalool	96.7	41574843	0.1313	41.528	93407137	3057.42	DG
(-)-Isopulegol	99.36	41632253	0.1275	41.528	93407137	3050.61	DG
Isoborneol	94.99	41599334	0.1325	41.528	93407137	3030.81	DG
(+)-Borneol	96.37	41629383	0.1293	41.528	93407137	3000.58	DG
Pulegone	98.34	41601549	0.1292	41.528	93407137	3059.55	DG
Geranyl acetate	99.94	41632208	0.1254	41.528	93407137	3017.88	DG
(-)-a-Cedrene (major, contains (+)-alpha-cedrene)	95.4	41632123	0.1318	41.528	93407137	3027.80	DG
trans-beta-Farnesene	99.7	41556788	0.1262	41.528	93407137	3029.84	DG
Valencene	85.1	41632086	0.1469	41.528	93407137	3010.34	DG
trans-Nerolidol	95.48	41608357	0.1324	41.528	93407137	3044.14	DG
Caryophyllene Oxide	98.1	41607671	0.1273	41.528	93407137	3007.20	DG
(-)-a-Bisabolol	95.8	41566954	0.1329	41.528	93407137	3065.87	DG
a-Terpineol	96.29	41618035	0.1292	41.528	93407137	2995.76	DG

