Cayman Chemical
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CERTIFIED REFERENCE MATERIAL

35 components: Benzene [CAS:71-43-2] 250mg/l ; Naphthalene [CAS:91-20-3] 250mg/l ; 2-Propanol [CAS:67-63-0] 1000mg/l ; n-Pentane [CAS:109-66-0] 1000mg/l ; 1,1-Dichloroethene [CAS:75-35-4] 1000mg/l ; Dichloromethane [CAS:75-09-2] 1000mg/l ; Carbon disulfide [CAS:75-15-0] 1000mg/l ; Methyl-tert.butylether [CAS:1634-04-4] 1000mg/l ; n-Hexane [CAS:110-54-3] 1000mg/l ; Chloroform [CAS:67-66-3] 1000mg/l ; Ethyleneglycol-monomethyl ether [CAS:109-86-4] 1000mg/l ; 1,1,1-Trichloroethane [CAS:71-55-6] 1000mg/l ; Tetrachloromethane [CAS:56-23-5] 1000mg/l ; 1-Methoxy-2-propanol [CAS:107-98-2] 1000mg/l ; Trichloroethene [CAS:79-01-6] 1000mg/l ; Dioxan [CAS:123-91-1] 1000mg/l ; Ethyleneglycol-monoethyl ether [CAS:110-80-5] 1000mg/l ; Toluene [CAS:108-88-3] 1000mg/l ; Tetrachloroethene [CAS:127-18-4] 1000mg/l ; 4-Vinylcyclohexene [CAS:100-40-3] 1000mg/l ; Chlorobenzene [CAS:108-90-7] 1000mg/l ; Ethylbenzene [CAS:100-41-4] 1000mg/l ; Styrene [CAS:100-42-5] 1000mg/l ; Acetic acid-2-ethoxyethyl ester [CAS:111-15-9] 1000mg/l ; Phenol [CAS:108-95-2] 1000mg/l ; 1,4-Dichlorobenzene [CAS:106-46-7] 1000mg/l ; Isophorone [CAS:78-59-1] 1000mg/l ; 4-Phenyl-1-cyclohexene [CAS:4994-16-5] 1000mg/l ; n-Hexadecane [CAS:544-76-3] 1000mg/l ; n-Heptadecane [CAS:629-78-7] 1000mg/l ; m-Xylene [CAS:108-38-3] 1000mg/l ; o-Xylene [CAS:95-47-6] 1000mg/l ; p-Xylene [CAS:106-42-3] 1000mg/l ; Dimethylformamide [CAS:68-12-2] 1500mg/l ; Ethylene glycol [CAS:107-21-1] 5000mg/l in Methanol

Lot N: 0820515 Ref N: 9004781 Certification Date: 23 Apr 2026
Barcode: 93522274

Component	Certified Value* and uncertainty [µg/ml]	CAS	Chemical Formula
Benzene	250.82 ± 2.60	71-43-2	C_6H_6
Naphthalene	250.64 ± 4.29	91-20-3	$C_{10}H_8$
2-Propanol	1006.7 ± 11.2	67-63-0	C_3H_7OH
n-Pentane	1000.8 ± 9.6	109-66-0	C_5H_{12}
1,1-Dichloroethene	1010.6 ± 9.6	75-35-4	$C_2H_2Cl_2$
Dichloromethane	1015.6 ± 9.7	75-09-2	CH_2Cl_2
Carbon disulfide	1010.5 ± 9.7	75-15-0	CS_2
Methyl-tert.butylether	1013.5 ± 11.6	1634-04-4	$C_5H_{12}O$
n-Hexane	1005.4 ± 9.7	110-54-3	C_6H_{14}
Chloroform	1001.4 ± 9.4	67-66-3	$CHCl_3$
Ethyleneglycol-monomethyl ether	1003.0 ± 11.4	109-86-4	$C_3H_8O_2$
1,1,1-Trichloroethane	986.2 ± 23.1	71-55-6	$C_2H_3Cl_3$
Tetrachloromethane	1021.1 ± 9.7	56-23-5	CCl_4
1-Methoxy-2-propanol	1003.7 ± 9.6	107-98-2	$C_4H_{10}O_2$
Trichloroethene	1005.5 ± 10.9	79-01-6	C_2HCl_3
Dioxan	1030.6 ± 10.4	123-91-1	$C_4H_8O_2$
Ethyleneglycol-monoethyl ether	1017.8 ± 10.2	110-80-5	$C_4H_{10}O_2$
Toluene	1012.2 ± 10.9	108-88-3	$C_6H_5CH_3$
Tetrachloroethene	1017.8 ± 10.1	127-18-4	C_2Cl_4
4-Vinylcyclohexene	996.7 ± 9.5	100-40-3	C_8H_{12}
Chlorobenzene	1002.8 ± 10.0	108-90-7	C_6H_5Cl
Ethylbenzene	1008.6 ± 9.6	100-41-4	C_8H_{10}
Styrene	1029.0 ± 9.8	100-42-5	C_8H_8
Acetic acid-2-ethoxyethyl ester	1019.9 ± 11.0	111-15-9	$C_6H_{12}O_3$
Phenol	1006.6 ± 9.6	108-95-2	C_6H_5OH
1,4-Dichlorobenzene	1002.9 ± 9.6	106-46-7	$C_6H_4Cl_2$
Isophorone	995.6 ± 10.8	78-59-1	$C_9H_{14}O$
4-Phenyl-1-cyclohexene	995.4 ± 9.5	4994-16-5	$C_{12}H_{14}$
n-Hexadecane	1007.6 ± 9.6	544-76-3	$C_{16}H_{34}$
n-Heptadecane	1004.2 ± 11.3	629-78-7	$C_{17}H_{36}$

Produced by:
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m-Xylene	998.5 ± 10.0	108-38-3	C_8H_{10}
o-Xylene	994.7 ± 11.8	95-47-6	C_8H_{10}
p-Xylene	1010.6 ± 10.2	106-42-3	C_8H_{10}
Dimethylformamide	1513.5 ± 15.5	68-12-2	C_3H_7NO
Ethylene glycol	5036 ± 51	107-21-1	$C_2H_6O_2$

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

Density 0.7978 g/cm^3 at 20°C

Starting Material	**Purity, Batch**
Benzene	99.88% (41623848)
Naphthalene	99.54% (41609538)
2-Propanol	99.61% (41628201)
n-Pentane	97.58% (41614181)
1,1-Dichloroethene	99.51% (41611340)
Dichloromethane	99.9% (41626856)
Carbon disulfide	99.79% (41590980)
Methyl-tert.butylether	99.89% (41628195)
n-Hexane	98.8% (41640579)
Chloroform	99.92% (41623251)
Ethyleneglycol-monomethyl ether	99.84% (41651575)
1,1,1-Trichloroethane	97.10% (41656587)
Tetrachloromethane	98.98% (41612286)
1-Methoxy-2-propanol	99.91% (41604731)
Trichloroethene	99.79% (41654880)
Dioxan	99.71% (41605745)
Ethyleneglycol-monoethyl ether	99.33% (41626795)
Toluene	99.86% (41643167)
Tetrachloroethene	99.92% (41648360)
4-Vinylcyclohexene	97.85% (41632512)
Chlorobenzene	99.92% (41613696)
Ethylbenzene	99.41% (41630358)
Styrene	99.94% (41626733)
Acetic acid-2-ethoxyethyl ester	99.73% (41640555)
Phenol	99.9% (41617847)
1,4-Dichlorobenzene	99.93% (41625231)
Isophorone	98.81% (41625071)
4-Phenyl-1-cyclohexene	98.2% (41545850)
n-Hexadecane	99.41% (41617939)
n-Heptadecane	99.36% (41604779)
m-Xylene	99.69% (41587263)
o-Xylene	99.01% (41634936)
p-Xylene	99.7% (41587249)
Dimethylformamide	99.71% (41634875)
Ethylene glycol	98.4% (41620854)

Storage Conditions: Store in a freezer at -18°C or below

Expiry Date: 23 May 2028

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.

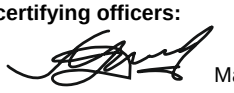
Instructions for the correct use of this certified reference material:
The CRM should be used shortly after opening to avoid concentration changes due to evaporation.
It is recommended to use 1 ml as the minimum sample size.
This CRM can be used directly or can be diluted in an appropriate solvent. Only a clean class A glassware should be used. 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 33401 , ISO 33405,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
- Accredited according to ISO 17034

Additional Information

Analytical Data:

GC Conditions:

Column	Agilent CP9105 J&W VF-624ms 60m, 0.32mm, 1.80µm	Oven	Temperature	Hold
Flow rate	1.6 ml/min	Initial	40°C	10
Injector	200 °C	3°C/min	180°C	1
Injection volume	1µl split (split ration 10:1)	20°C/min	220°C	30
Carrier gas	He, constant flow			

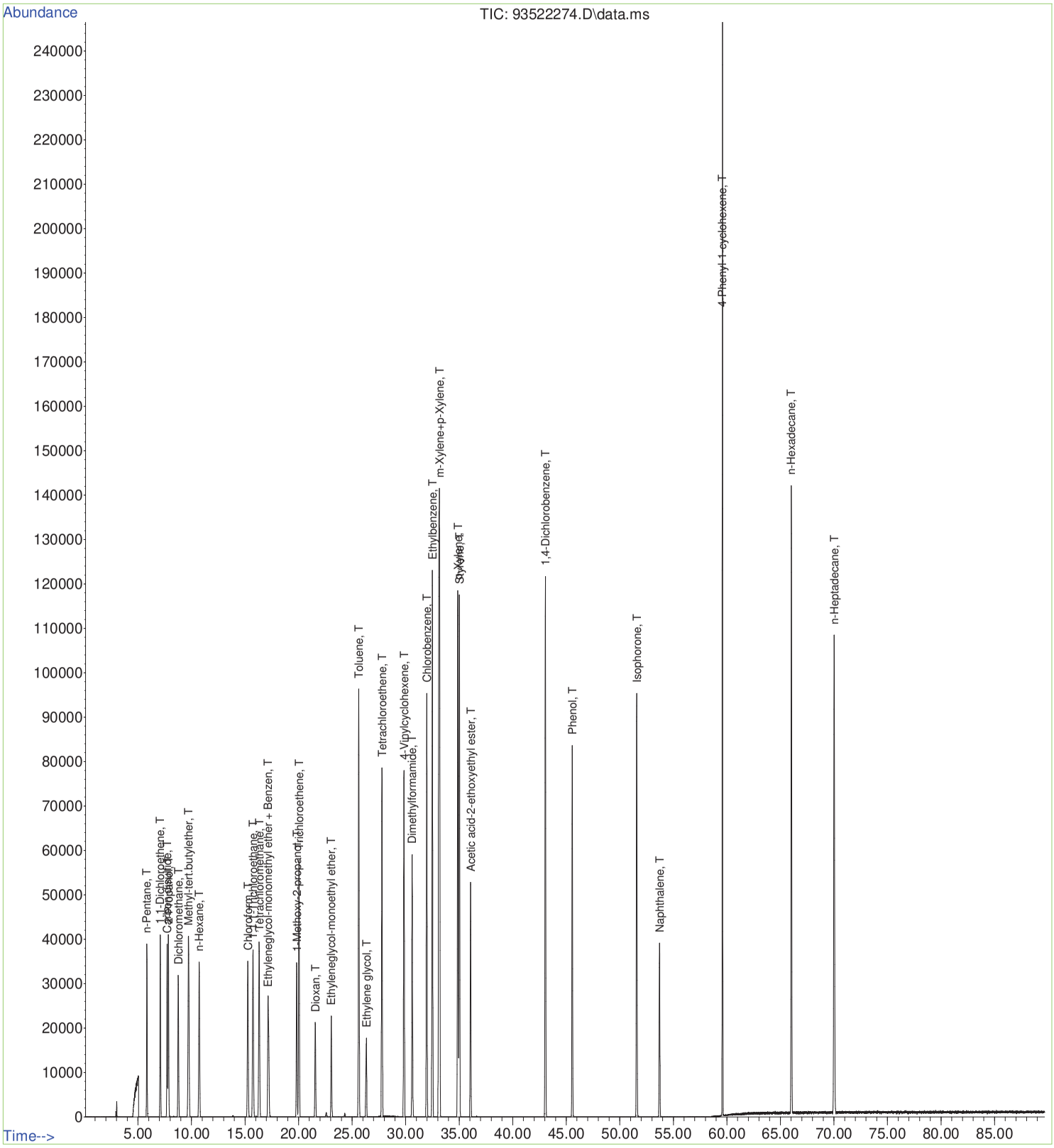
MS Conditions:

Transfer line	230°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	Concen-tration mg/kg	Chemist ID
Benzene	99.88	41623848	0.08449	2.3706	94263602	35598	KR
		94263602	0.3523	39.891	93522274	314.383	KR
Naphthalene	99.54	41609538	0.01259	39.891	93522274	314.155	KR
2-Propanol	99.61	41628201	0.101	8.4479	93522298	11909.0	NN
		93522298	4.2265	39.891	93522274	1261.76	NN
n-Pentane	97.58	41614181	0.1025	8.4479	93522298	11839.6	NN
		93522298	4.2265	39.891	93522274	1254.42	NN
1,1-Dichloroethene	99.51	41611340	0.1015	8.4479	93522298	11956.0	NN
		93522298	4.2265	39.891	93522274	1266.74	NN
Dichloromethane	99.9	41626856	0.1016	8.4479	93522298	12014.6	NN
		93522298	4.2265	39.891	93522274	1272.95	NN
Carbon disulfide	99.79	41590980	0.1012	8.4479	93522298	11954.1	NN
		93522298	4.2265	39.891	93522274	1266.54	NN
Methyl-tert.butylether	99.89	41628195	0.1014	8.4479	93522298	11989.7	NN
		93522298	4.2265	39.891	93522274	1270.31	NN
n-Hexane	98.8	41640579	0.1017	8.4479	93522298	11894.1	NN
		93522298	4.2265	39.891	93522274	1260.18	NN
Chloroform	99.92	41623251	0.1962	2.7681	94254495	70823	KR
		94254495	0.707	39.891	93522274	1255.20	KR
Ethyleneglycol-monomethyl ether	99.84	41651575	0.1004	8.4479	93522298	11865.6	NN
		93522298	4.2265	39.891	93522274	1257.16	NN
1,1,1-Trichloroethane	97.10	41656587	0.1015	8.4479	93522298	11666.4	NN
		93522298	4.2265	39.891	93522274	1236.07	NN
Tetrachloromethane	98.98	41612286	0.1031	8.4479	93522298	12079.7	NN
		93522298	4.2265	39.891	93522274	1279.85	NN
1-Methoxy-2-propanol	99.91	41604731	0.1004	8.4479	93522298	11874.0	NN
		93522298	4.2265	39.891	93522274	1258.05	NN
Trichloroethene	99.79	41654880	0.1007	8.4479	93522298	11895.1	NN
		93522298	4.2265	39.891	93522274	1260.29	NN
Dioxan	99.71	41605745	0.1033	8.4479	93522298	12192.4	NN
		93522298	4.2265	39.891	93522274	1291.79	NN
Ethyleneglycol-monoethyl ether	99.33	41626795	0.1024	8.4479	93522298	12040.2	NN
		93522298	4.2265	39.891	93522274	1275.66	NN
Toluene	99.86	41643167	0.1013	8.4479	93522298	11974.3	NN
		93522298	4.2265	39.891	93522274	1268.68	NN
Tetrachloroethene	99.92	41648360	0.1018	8.4479	93522298	12040.7	NN
		93522298	4.2265	39.891	93522274	1275.72	NN
4-Vinylcyclohexene	97.85	41632512	0.1018	8.4479	93522298	11791.2	NN
		93522298	4.2265	39.891	93522274	1249.28	NN
Chlorobenzene	99.92	41613696	0.1003	8.4479	93522298	11863.3	NN
		93522298	4.2265	39.891	93522274	1256.92	NN
Ethylbenzene	99.41	41630358	0.1014	8.4479	93522298	11932.2	NN
		93522298	4.2265	39.891	93522274	1264.22	NN
Styrene	99.94	41626733	0.1029	8.4479	93522298	12173.2	NN
		93522298	4.2265	39.891	93522274	1289.75	NN
Acetic acid-2-ethoxyethyl ester	99.73	41640555	0.1022	8.4479	93522298	12065.0	NN
		93522298	4.2265	39.891	93522274	1278.29	NN
Phenol	99.9	41617847	0.1007	8.4479	93522298	11908.2	NN
		93522298	4.2265	39.891	93522274	1261.67	NN
1,4-Dichlorobenzene	99.93	41625231	0.1003	8.4479	93522298	11864.5	NN

		93522298	4.2265	39.891	93522274	1257.05	NN
Isophorone	98.81	41625071	0.1007	8.4479	93522298	11778.3	NN
		93522298	4.2265	39.891	93522274	1247.91	NN
4-Phenyl-1-cyclohexene	98.2	41545850	0.1013	8.4479	93522298	11775.4	NN
		93522298	4.2265	39.891	93522274	1247.60	NN
n-Hexadecane	99.41	41617939	0.1013	8.4479	93522298	11920.4	NN
		93522298	4.2265	39.891	93522274	1262.96	NN
n-Heptadecane	99.36	41604779	0.101	8.4479	93522298	11879.2	NN
		93522298	4.2265	39.891	93522274	1258.60	NN
m-Xylene	99.69	41587263	0.1001	8.4479	93522298	11812.4	NN
		93522298	4.2265	39.891	93522274	1251.53	NN
o-Xylene	99.01	41634936	0.1004	8.4479	93522298	11766.9	NN
		93522298	4.2265	39.891	93522274	1246.71	NN
p-Xylene	99.7	41587249	0.1013	8.4479	93522298	11955.2	NN
		93522298	4.2265	39.891	93522274	1266.65	NN
Dimethylformamide	99.71	41634875	0.1517	8.4479	93522298	17905.0	NN
		93522298	4.2265	39.891	93522274	1897.05	NN
Ethylene glycol	98.4	41620854	0.2559	39.891	93522274	6312.2	KR


Abundance
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n-Pentane, T
1,1-Dichloroethene, T
Carbon disulfide, T
Dichloromethane, T
Methyl-tert.butylether, T
n-Hexane, T
Chloroform, T
1,1,1-Trichloroethane, T
Tetrachloromethane, T
Ethyleneglycol-monomethyl ether + Benzen, T
1-Methoxy-2-propanol, T
Trichloroethene, T
Dioxan, T
Ethyleneglycol-monoethyl ether, T
Ethylene glycol, T
Toluene, T
Tetrachloroethene, T
4-Vinylcyclohexene, T
Dimethylformamide, T
Chlorobenzene, T
Ethylbenzene, T
m-Xylene+p-Xylene, T
Styrene, T
o-Xylene, T
Acetic acid-2-ethoxyethyl ester, T
1,4-Dichlorobenzene, T
Phenol, T
Isophorone, T
Naphthalene, T
4-Phenyl-1-cyclohexene, T
n-Hexadecane, T
n-Heptadecane, T