MERCK MILLIPORE

Naturally pure.

SupraSolv® and UniSolv® – high purity solvents for gas chromatography

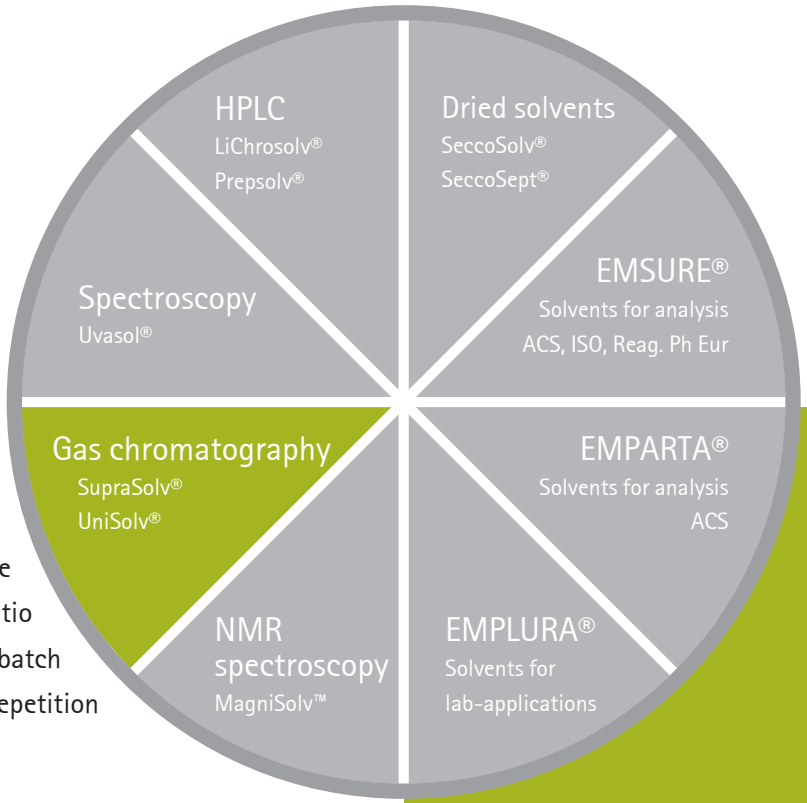
Merck Millipore is a division of MERCK

SupraSolv® and UniSolv®
Solvents for gas chromatography

As the world's leading supplier of high-purity solvents, we offer a full range of products for every gas chromatography application in the laboratory – including highly sensitive pesticide and dioxin analyses. Our **SupraSolv®** and **UniSolv®** solvents are developed specifically for sensitive detection processes in residue and environmental analysis. They cover all areas of application, and provide the highest level of reliability for your analytical results.

To ensure purity and suitability, we employ only the latest manufacturing processes. **SupraSolv®** and **UniSolv®** solvents are recovered during special distillation cuts, and suitability testing involves a variety of detectors and highly concentrated solvents.

As a result, these high-purity products support you in countless ways during your daily work – with individual specifications that are tailored to their specific area of application.



SupraSolv® and UniSolv® benefits

- The most comprehensive application area due to the largest retention time range
- Analytical reliability due to the highest possible purity and a minimal signal-to-noise ratio
- Time and cost savings due to the best possible batch consistency, thus avoiding analysis repetition

Quality for the widest range of applications

Merck Millipore solvents for gas chromatography offer the highest quality for the widest range of applications. The retention time window during which specified contaminants are lowest is broader than that of any competitor product.

Quality for the best batch consistency

Every batch that leaves our premises is tested to the same high standards of quality. This is your guarantee of consistently reliable analytical results.

Quality for reliable analyses

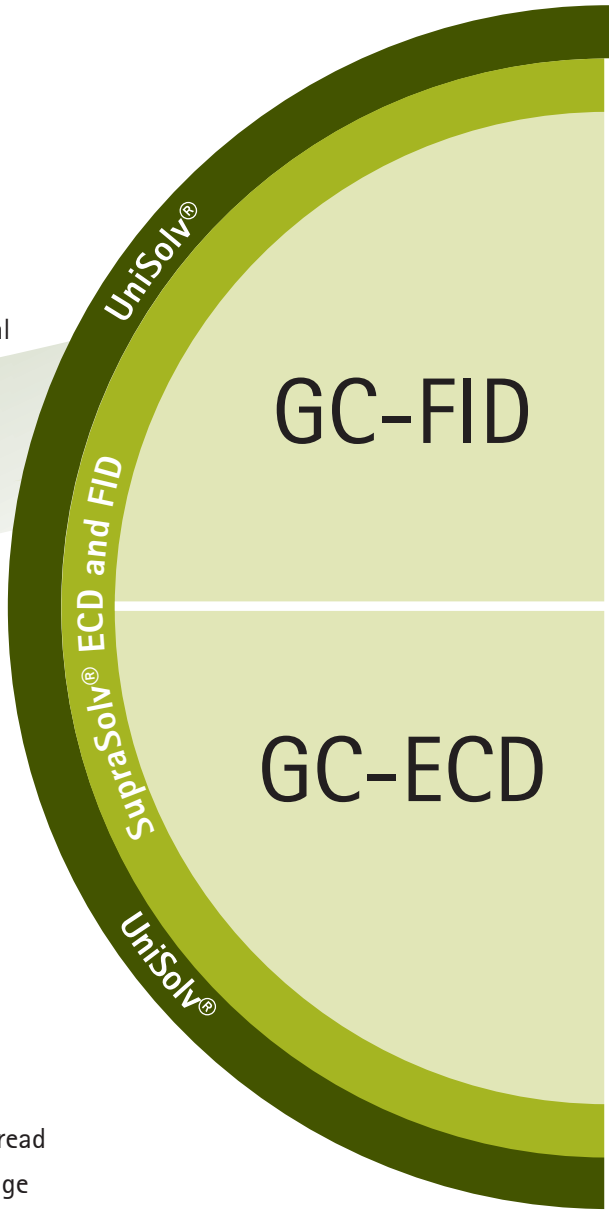
Our solvents for gas chromatography provide reliable, consistent analytical results without the need for costly purification and repeat analysis. As a result, they make your work easier, more efficient and more economical.

Content

SupraSolv® and UniSolv®
For all your needs in gas chromatography

FID
flame ionization detector

- BTX (Benzene, Toluene, Xylene) – highly volatile aromatic hydrocarbons in sewage, ground-water, juices, canned fish etc.
- Hydrocarbon-oil index in water
- Determination of emissions in car cockpit material



ECD
electron capture detector

- Pesticide analysis in fruits and vegetables
- Acrylamide in e.g. potato chips, crisps and crisp bread
- Polychlorinated biphenyls (PCB) in water and sludge
- DDT (preserver and insecticide) in milk, fish, meat, fruits etc.
- Highly volatile halogenated hydrocarbons in water
- Nitrate in lettuce, radish etc.

GC-MS

UniSolv®
SupraSolv® MS

HS-GC

SupraSolv® Headspace

MS
mass spectrometry

- Dioxins and furans (PCDD/PCDF) in meat, fish and milk
- Polycyclic aromatic hydrocarbons (PAH) in vegetables, olive oil and broiled meat
- Pesticide analysis in fruits and vegetables according Anastassiades (QuEChERS)
- Determination of drugs (cocaine, cannabis, ecstasy, heroine, alcohol) in human hair
- Analysis of phthalates in child care products and toys

HS-GC
headspace gas chromatography

- Analysis of residual solvents in drug substances, excipients, and drug products according to ICH, Ph Eur and USP

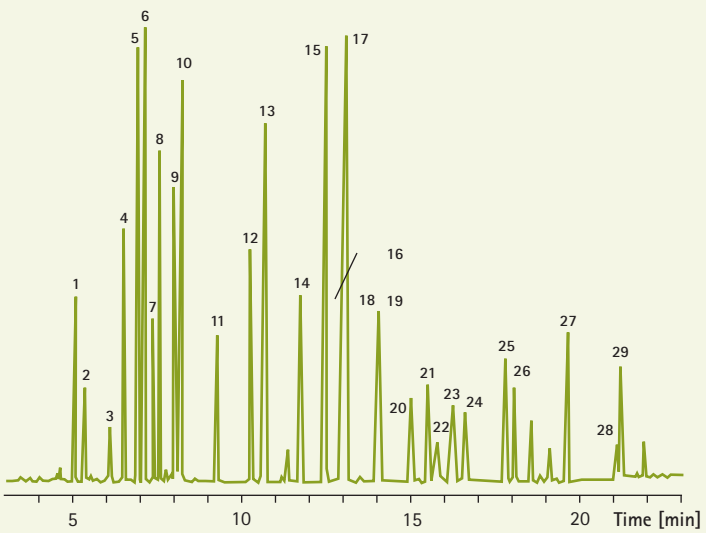
SupraSolv®
Solvents for gas chromatography

With gas chromatography, only solvents with the highest levels of purity are suitable for sample preparation tasks such as the extraction and concentration of the extracts before injection. SupraSolv® solvents are developed specially for this highly sophisticated application area.

Our comprehensive portfolio of GC solvents offers the right product for your specific application and detection method. SupraSolv® ECD and FID is specially developed and tested for ECD (Electron Capture Detector) and FID (Flame Ionization Detector). Typical applications include the determination of polychlorinated biphenyls (PCB) in water and soil or pesticides in fruits and vegetables. SupraSolv® MS is dedicated for use in gas chromatography coupled with mass spectrometric detection. This method is of increasing importance and used e.g. for the analysis of dioxins and furans (PCDD/PCDF) in food and water samples or for the determination of PAH (polycyclic aromatic hydrocarbons) in food. Both SupraSolv® qualities are carefully tested for the specific detectors and offer a clear baseline and minimal signal-to-noise ratio within a specified retention time range. Therefore SupraSolv® solvents help you achieve consistently accurate, reliable and reproducible results.

EPA Method 508: Determination of chlorinated pesticides in water, standard chromatogram

Classical pesticide analysis according EPA Method 508 is employed for the qualitative and quantitative determination of pesticides in food and environmental samples. This method uses gas chromatography coupled with ECD. For sample preparation the solvents n-Hexane, Ethyl acetate, Dichloromethane or Acetone are used. Due to their particular suitability for GC-ECD, as well as their high purity and minimal interference signals within the relevant retention time range, SupraSolv® solvents will help you to achieve consistently accurate, reliable and reproducible results in pesticide analysis. Furthermore the specified ECD retention time range of SupraSolv® ECD and FID covers all analytes of interest for this application, resulting in best application security.



1. Etridiazole
2. Chloroneb
3. Propachlor
4. Trifluralin
5. α-BHC
6. Hexachlorobenzene
7. β-BHC
8. Ω-BHC
9. γ-BHC
10. Chlorothalonil
11. Heptachlor
12. Aldrin
13. DCPA
14. Heptachlor epoxide
15. γ-Chlordane
16. Endosulfan I
17. α-Chlordane
18. Dieldrin
19. 4,4'-DDE
20. Endrin
21. Endosulfan II
22. Chlorobenzilate
23. 4,4'-DDD
24. Endrin aldehyde
25. Endosulfan sulfate
26. 4,4'-DDT
27. Methoxichlor
28. cis-Permethrin
29. trans-Permethrin

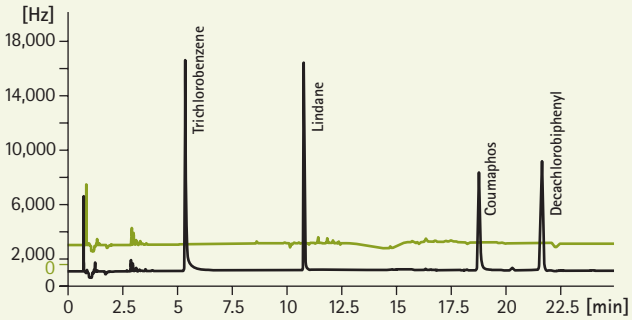
Fig. 1 *Chlorinated pesticides: EPA Method 508, GC-ECD.*

SupraSolv® – the reliable solution

SupraSolv® has minimal interference signals in the relevant retention time window (Fig. 2). This ensures reliable, reproducible and accurate analysis results. Thanks to outstanding batch consistency, SupraSolv® also saves you time and money by making repeat analyses a thing of the past.

SupraSolv® ECD specification

Outstanding analytical capabilities form the basis for providing you with comprehensive quality information – the specifications document our quality level and give you the reliability you need for your day-to-day laboratory decisions.



Batch chromatogram
Reference chromatogram

Fig. 2 *GC-ECD, batch and reference chromatogram (Lindane = 3 pg/ml), n-Hexane SupraSolv® EDC and FID (104371).*

Use of a non-specific solvent and competitor comparison

Both competitor chromatogram and the chromatogram of a non-GC-specific solvent (n-Hexane reagent grade) exhibit highly unstable baselines and many unidentifiable contaminant peaks. The competitor chromatogram also shows very low batch consistency. The bottom line: No clear analytical results, a risk of misinterpretation – and expensive, time-consuming repeat analyses.

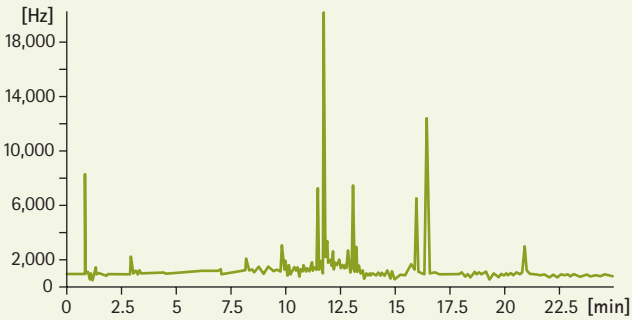
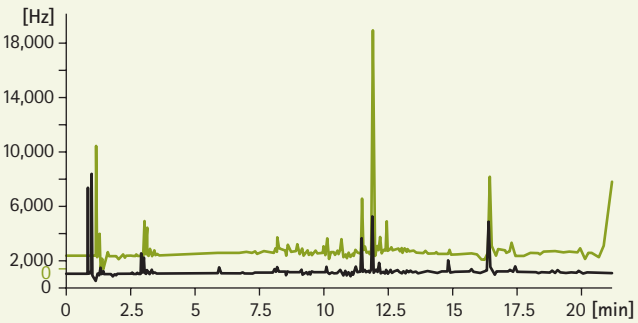


Fig. 3a *GC-ECD, batch chromatogram of a non-GC-specific solvent, n-Hexane reagent grade.*



Batch 1 chromatogram
Batch 2 chromatogram

Fig. 3b *GC-ECD, batch chromatogram, n-Hexane GC grade, competitor A.*

SupraSolv® headspace
Solvents for headspace gas chromatography

Headspace gas chromatography is a precise, well-accepted method for the analysis of residual solvents in drug substances and products. It is recommended as the preferred method of analysis for this application by the European Pharmacopoeia (Chapter 2.4.24) and the United States Pharmacopoeia (Chapter 467).

The ICH (International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use) Guideline Q3C »Impurities: Guideline for Residual Solvents« divides all residual solvents into three classes according to their harmfulness for human health, and defines permissible maximum concentrations in actives, excipients and drug products. Both the European and the United States Pharmacopoeia refer to this guideline. Accurate analysis with headspace gas chromatography demands the use of very pure solvents with extremely low concentrations of the defined residual solvents.

By specifying for SupraSolv® headspace the concentrations of all residual solvents of the three defined classes in the ICH guideline, Merck Millipore offers a precise purity window for this application – for unique, application-orientated quality. Since we also perform a headspace application test on each batch, every delivery gives you the reliability, accuracy and analytical safety you need.

Extract of specification

ICH = International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use

Every residual solvent of class 1 acc. ICH ≤ 1 µg/g
Every residual solvent of class 2 acc. ICH ≤ 10 µg/g
Every residual solvent of class 3 acc. ICH ≤ 50 µg/g

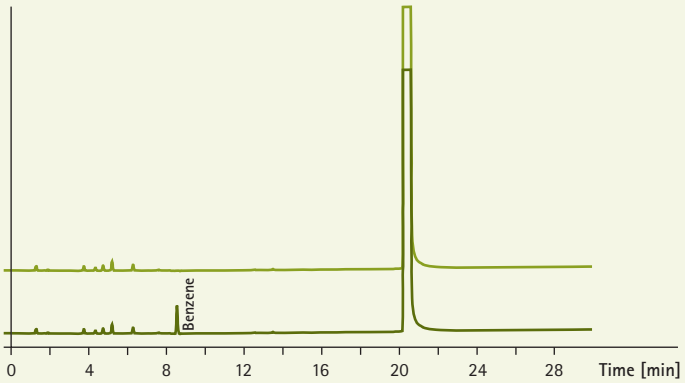


Fig. 4 *Chromatogram of DMSO Headspace SupraSolv® 101900 without addition compared to a chromatogram of DMSO Headspace SupraSolv® 101900 with 0.8 ppm benzene.*

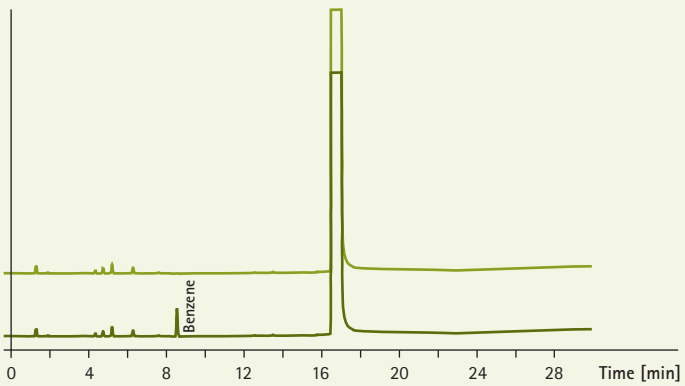


Fig. 5 *Chromatogram of DMF Headspace SupraSolv® 100202 without addition compared to a chromatogram of DMF Headspace SupraSolv® 100202 with 0.8 ppm benzene.*

SupraSolv® headspace solvents are specially designed for the analysis of residual solvents according to Ph Eur and USP. We have developed them in close cooperation with an experienced headspace laboratory, and manufacture them using special production processes. As a result, these high purity products ensure reliable, accurate analytical results.

Application: Quantification of residual solvents in an API

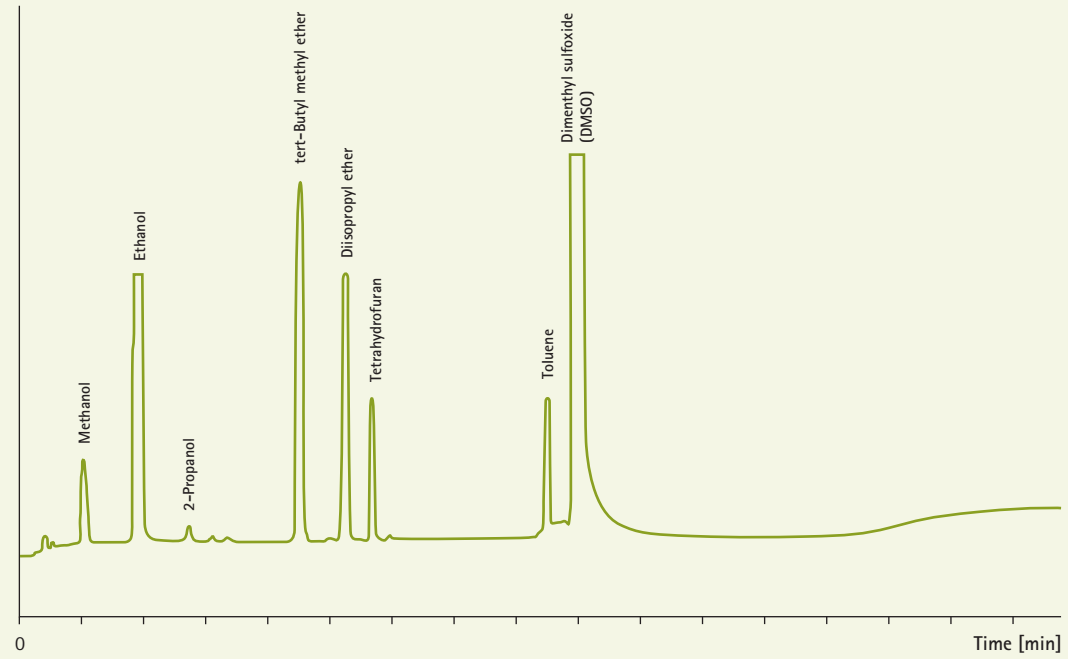


Fig. 6 *Quantification of residual solvents in an API using Dimenthyl sulfoxide (DMSO) SupraSolv® for headspace gas chromatography (101900).*

Chromatographic conditions		
Column	fused silica capillary column, DB 1, length 30 m, ID 0.32 mm, film 5 µm	
Pressure	0.6 bar / 8 psi (Helium)	
Injection	splitless, 150°C	
Headspace conditions		
	thermostating temperature	80°C
	transfer and needle temperature	130°C
	thermostating time	30 min
	pressurisation	1.0 min
	injection time	0.04 min
	withdrawal time	0.2 min
	High pressure	2 bar / 28 psi
Detection	FID, 250°C	
Temperature	50°C for 5 min, with 8°C/min up to 240°C, hold 240°C for 5 min	
Method	Quantification of residual solvents in an API	

Chromatographic data

No.	Compound	Time [min]	Area
1	Methanol	2.0	12361
2	Ethanol	3.8	399048
3	2-Propanol	5.4	2368
4	tert-Butyl methyl ether	9.0	34637
5	Diisopropyl ether	10.5	43000
6	Tetrahydrofuran	11.4	14083
7	Toluene	11.5	11502

UniSolv®
Solvents for organic trace analysis

UniSolv® is the unique solution for all applications. Its specification is even broader and higher than that of SupraSolv®: The specified retention time range is larger (so even low-boiling substances can be reliably detected), and the permissible concentration of interference signals within the retention time range is lower too. We recommend UniSolv® for all areas that demand the highest levels of reliability in analytical results – for example, environmental analyses. Intensive research – combined with ongoing product development – not only ensures reliability in standard applications, but also permits easier, more precise analyses in new fields, such as determining the Hydrocarbon-oil index of water and soil samples.

Pesticide residue analysis in apple juice with GC-MS and Dichloromethane UniSolv®

There are around 500 known pesticides in juices alone. Due to such substantial safety concerns, national and international regulations require that food and beverage manufactures regularly test their products for pesticides. Classical pesticide residue analysis is still performed with GC-ECD (see page 6) and SupraSolv® solvents n-Hexane, Ethyl acetate, Dichloromethane or Acetone. The new, faster method according Anastassiades (QuEChERS) uses GC-MS instead. This method reduces manual effort, improves analytical safety, and extends the range of detectable pesticides. The extraction agent with the best dissolution properties for pesticides is Dichloromethane UniSolv® (106454).

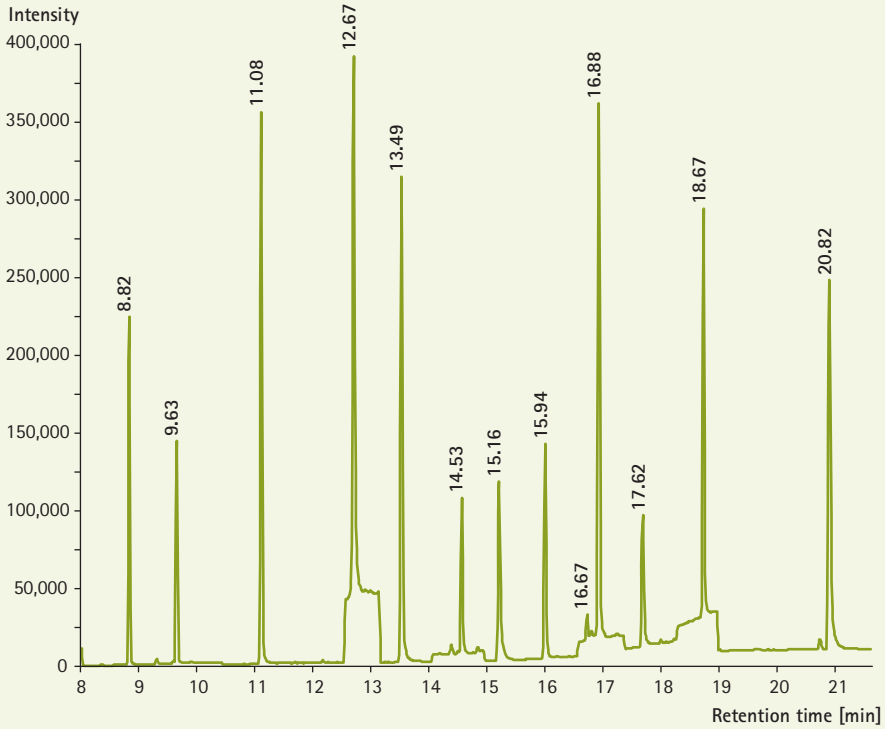


Fig. 7 *Sample chromatogram (TIC), apple juice spiked. Sample preparation via liquid-liquid-extraction with EXtrelut® NT 20. Eluting solvent: Dichloromethane UniSolv® (1.06454.1000).*

Eluting solvent	Dichloromethane UniSolv® [106454]
Instrumentation	Agilent 7890A
Autosampler	Gerstel MPS
Capillary column	Phenomenex, ZB-MultiResidue; 30 m, 0.25 mm id, 0.25 µm ft
Carrier gas	Helium; constant flow
Injector	CIS 4 (cooled injection system, Gerstel)
Injection volume	2 µl
Detector	MSD 5975C, inert XL MSD triple axis detector

Sample Retention time	**Active substance**
8.82 min	Trifluralin
9.63 min	Profluralin
11.08 min	Pirimiphos-methyl
12.67 min	Procymidon
13.49 min	p,p'-DDE
14.53 min	Trifloxystrobin
15.16 min	Quinoxyfen
15.94 min	Etoxazol
16.67 min	lambda-Cyhalothrin
16.88 min	lambda-Cyhalothrin
17.62 min	Fenarimol
18.67 min	Halfenprox
20.82 min	Azoxystrobin

Hydrocarbon-oil index analysis (C10–C40) in water in accordance with DIN EN ISO 9377-2 (H53, 2001) using Petroleum benzine UniSolv®

The specifications of UniSolv® solvents have been fine-tuned to permit even the determination of the hydrocarbon-oil index in water (DIN EN ISO 9377-2 [H53, 2001]). Petroleum benzine UniSolv® is used as the extraction agent for this application. Its minimal signal-to-noise ratio allows the employment of even steeper temperature gradients. For you, this means that your analysis times are reduced to a minimum, while the quality of the results remains unchanged. This allows your sample throughput to be greatly increased: an advantage from which you will profit daily.

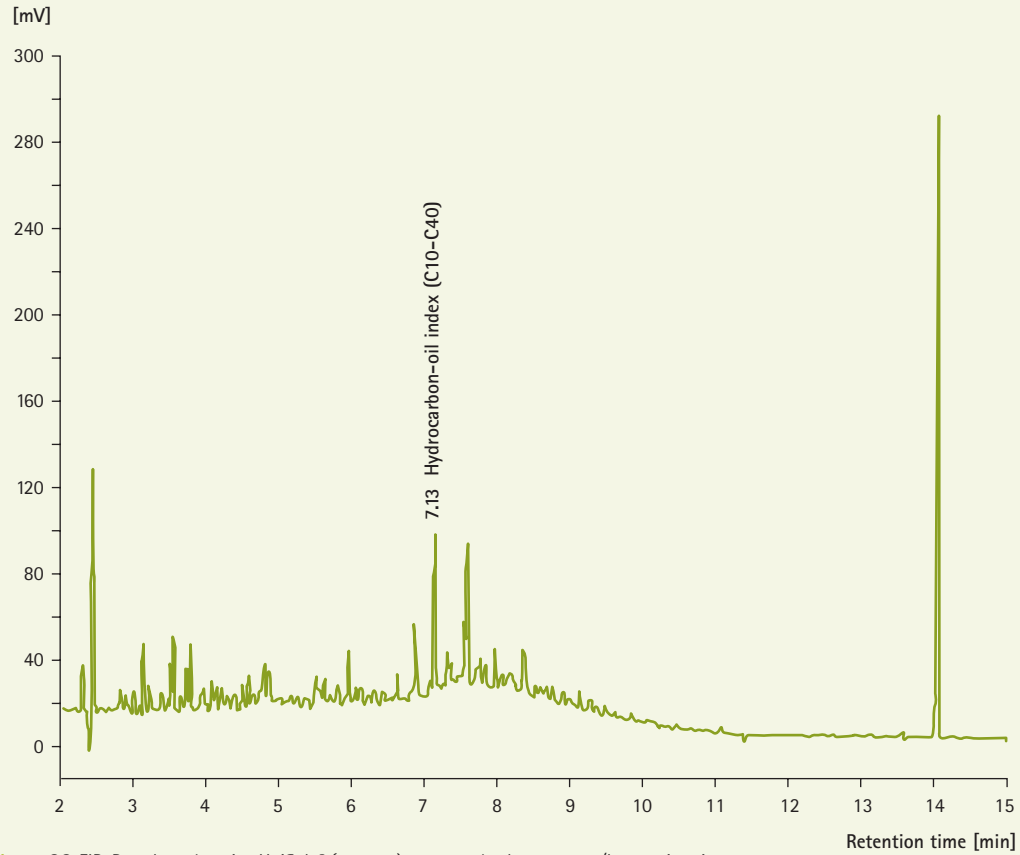


Fig. 8 *GC-FID, Petroleum benzine UniSolv® (116740); measured value: 0.62 mg/l; retention time: within 14 min.*

UniSolv®
Solvents for organic trace analysis

No matter which gas chromatography method you use, and regardless of whether you are analyzing soil or water samples: With UniSolv® you only need to use a single quality. UniSolv® is specified for GC-ECD and GC-FID, and also for mass spectroscopy (MS), which is rapidly growing in importance for the structure determination and quantification of sample components (Fig. 9a – 11).

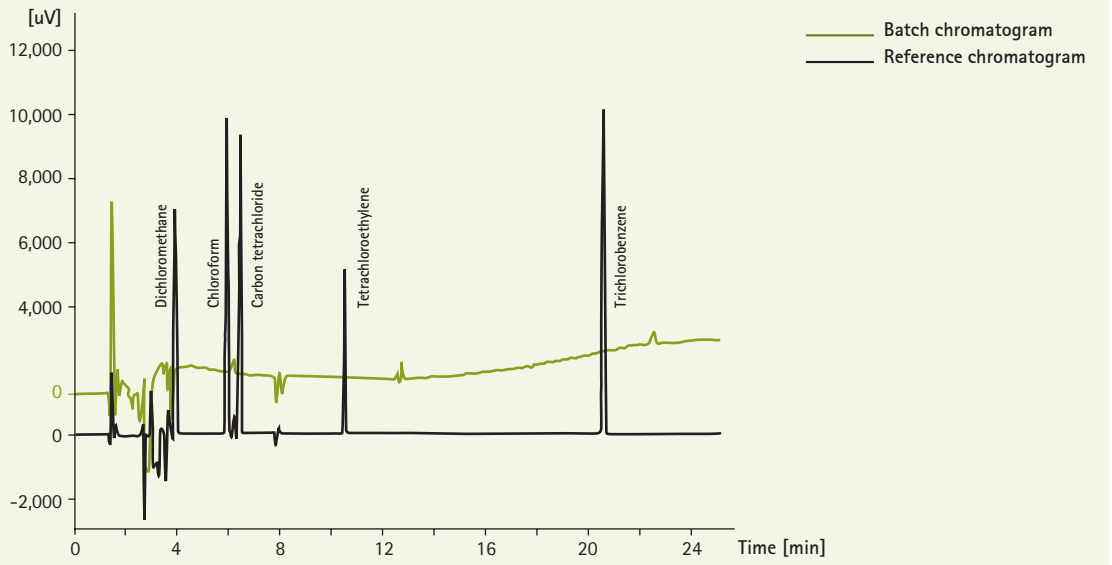


Fig. 9a *GC-ECD, n-Hexane UniSolv® (104369), low boiling range.*

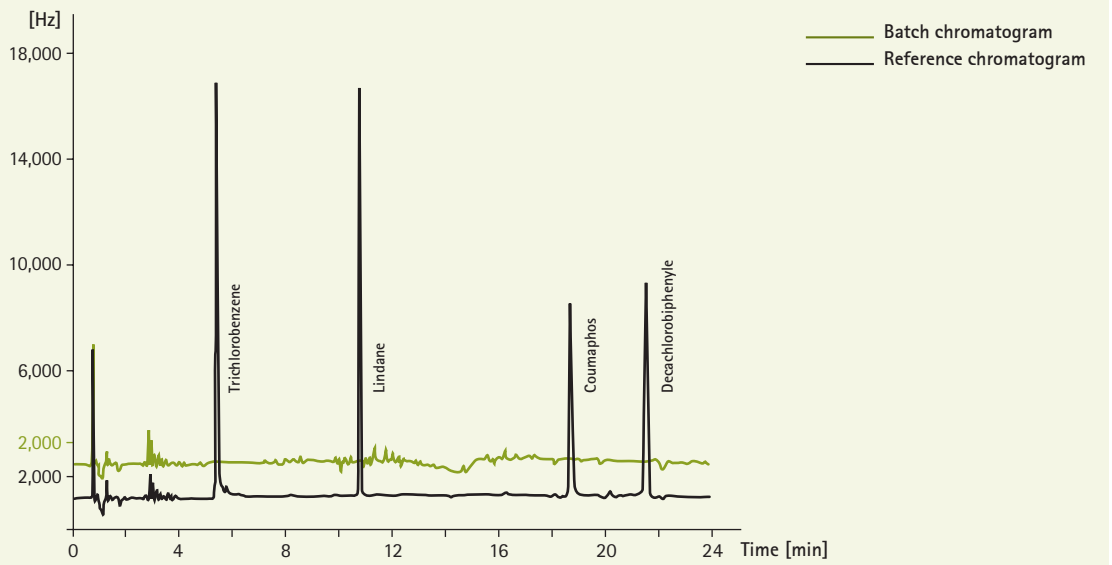


Fig. 9b *GC-ECD, n-Hexane UniSolv® (104369), medium- and high boiling range.*

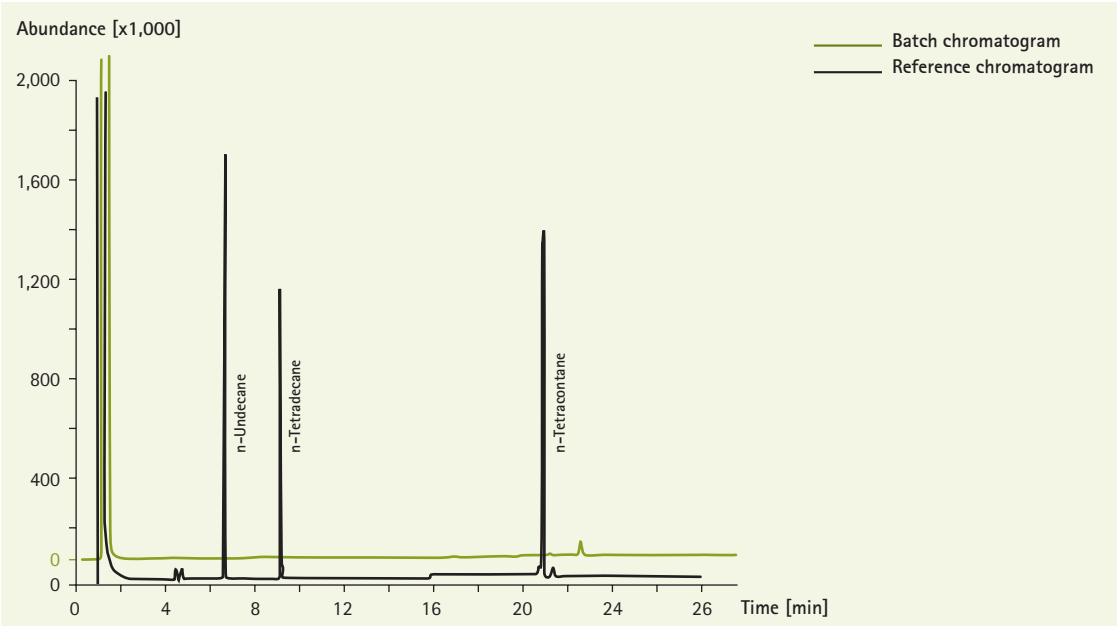


Fig. 10 *GC-FID, n-Hexane UniSolv® (104369).*

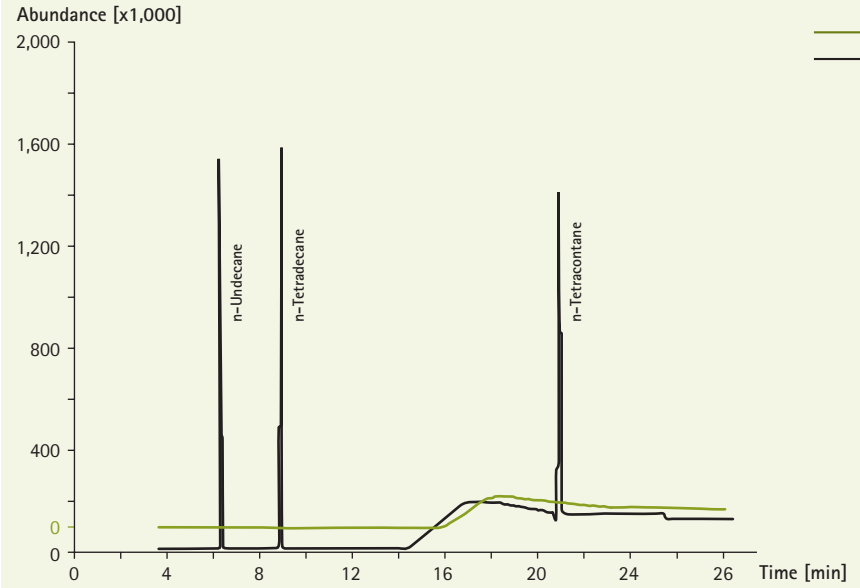


Fig. 11 *GC-MS, n-Hexane UniSolv® (104369).*

Specifications at a glance	**GC-ECD** Dichloromethane to 1,2,4-Trichlorobenzene (Tetrachloromethane standard)	**GC-ECD** pesticide analysis 1,2,4-Trichlorobenzene to Decachlorobiphenyle (Lindane standard)	**GC-FID** n-Undecane to n-Tetracontane (n-Tetradecane standard)	**GC-MS** n-Undecane to n-Tetracontane; scan range 30 – 600 amu (n-Tetradecane standard)
SupraSolv® solvents for gas chromatography ECD and FID	–	max. 3 pg/ml	max. 3 ng/ml	–
SupraSolv® solvents for gas chromatography MS	–	–	–	max. 3 ng/ml
UniSolv® solvents for organic trace analysis	max. 1 ng/ml	max. 2 pg/ml	max. 2 ng/ml	max. 2 ng/ml

Optimum packaging and withdrawal systems

Quality for high-grade packaging

Our quality standards apply to each individual package of SupraSolv® and UniSolv® solvents. We place great value on providing a large selection of application-orientated package sizes, from 1 liter glass bottles up to 10 and 30 liter returnable barrels made of stainless steel.

Glass bottles

Optimum characteristics for handling, storage and transport. Safe footprint, low center of gravity, optimum emptying. Safety screw cap S40.

1 liter 2.5 liter 4 liter

Stainless steel barrels

Optimum material characteristics (avoidance of interactions between solvents and packaging material). These stackable, returnable barrels ensure optimum emptying, and can be combined with a variety of withdrawal systems.

10 liter 30 liter

Sustainable environmental protection

Stainless steel barrels are unbreakable, and help to minimize packaging waste and environmental pollution risks. By using them, suppliers and users can proactively help to protect our environment. Merck Millipore stainless steel barrels are returnable, and remain the property of Merck KGaA Darmstadt throughout their life cycle. After use, empty barrels must be returned to Merck Millipore. We will then ensure they are properly cleaned, checked and refilled.

Quality for reliable and safe dispensing

Our specially designed withdrawal systems for stainless steel containers safeguard the high quality of our solvents during dispensing. To prevent any detectable contamination, solvents, packaging and dispensing systems are optimally matched. Our withdrawal systems also provide the highest levels of safety when used in daily work.

Withdrawal system for manual pressure build-up in stainless steel barrels

System compounds: exchangeable dip tube for 10 and 30 liter stainless steel barrels, clamp for outlet tube, ball valve, pump ball, three-way stopcock.
Advantages: independent from gas supply, enables simple and safe filling of smaller bottles or containers, can be used in the laboratory, central storage possible.

1.01123.0001

Withdrawal system for inert gas pressurizing in stainless steel barrels

System compounds: 2"-thread adapter with two rapid-action connections, spiral gas feed tube for pressurizing, stainless steel-coated PTFE tube with rapid-action connector and threaded connector, self-closing stainless steel nozzle with large handle.
Advantages: flexible tubing (gas: 180 cm usable length, product: 80 cm length), enables simple and safe filling of smaller bottles or containers, central storage and supply possible.

1.06710.0001

Important safety advice

Withdrawal of flammable liquids should only be made from vessels that have been properly earthed as well as the withdrawal system itself. This can be done e.g. using the Merck Millipore antistatic device (Ord. No. 1.07070.0001).

Our withdrawal systems have been developed and optimized for the use with containers and solvents from Merck Millipore. Merck Millipore therefore disclaims any warranty or liability for the operability of its withdrawal systems in connection with containers or solvents from other manufacturers. Merck Millipore reserves the right to refrain from the delivery of withdrawal systems if the respective order does not indicate that each withdrawal system will be used in combination with appropriate solvents and containers from Merck Millipore.

We inform and advise our customers to the best of our knowledge and ability but without any engagement or liability on our part. Our customers must obey all existing laws and regulations. This also applies in respect of any protected rights of third parties. Our information and advice does not eliminate the need for our customers to check, on their own responsibility, that our products are suitable for the purpose envisaged.

Ordering information

SupraSolv® solvents for gas chromatography ECD and FID

	Product	Purity (GC) min. [%]	Evap. residue max. [mg/l]	Water max. [%]	Color max. [Hazen]	Content / Packaging	Ord. No.
A	Acetone	99.8	3.0	0.05	10	1 l GL	1.00012.1000
						2.5 l GL	1.00012.2500
						4 l GL	1.00012.4000
						30 l ST	1.00012.9030
	Acetonitrile	99.8	3.0	0.05	10	1 l GL	1.00017.1000
						2.5 l GL	1.00017.2500
						4 l GL	1.00017.4000
B	tert-Butyl methyl ether	99.8	3.0	0.02	10	1 l GL	1.01995.1000
						2.5 l GL	1.01995.2500
C	Chloroform, stabilized	99.8	5.0	0.01	10	1 l GL	1.02432.1000
						2.5 l GL	1.02432.2500
	Cyclohexane	99.8	3.0	0.01	10	1 l GL	1.02817.1000
						2.5 l GL	1.02817.2500
						4 l GL	1.02817.4000
						10 l ST	1.02817.9010
D	Dichloromethane, stabilized	99.8	5.0	0.01	10	1 l GL	1.06054.1000
						2.5 l GL	1.06054.2500
						4 l GL	1.06054.4000
						10 l ST	1.06054.9010
	Diethyl ether, stabilized	98.0	3.0	0.05	10	1 l GL	1.00931.1000
						2.5 l GL	1.00931.2500
						4 l GL	1.00931.4000
	N,N-Dimethylformamide	99.8	3.0	0.05	10	1 l GL	1.10983.1000
						2.5 l GL	1.10983.2500
NEW E	Ethanol	99.8	3.0	0.01	10	1 l GL	1.02371.1000
						2.5 l GL	1.02371.2500
	Ethyl acetate	99.8	3.0	0.02	10	1 l GL	1.10972.1000
						2.5 l GL	1.10972.2500
						4 l GL	1.10972.4000
						10 l ST	1.10972.9010
						30 l ST	1.10972.9030
H	n-Hexane	98.0 *	3.0	0.01	10	1 l GL	1.04371.1000
						2.5 l GL	1.04371.2500
						4 l GL	1.04371.4000
						10 l ST	1.04371.9010
						30 l ST	1.04371.9030
I	Isohexane	99.8	3.0	0.01	10	2.5 l GL	1.04340.2500
	Isooctane	99.8	3.0	0.01	10	1 l GL	1.15440.1000
						2.5 l GL	1.15440.2500
M	Methanol	99.8	3.0	0.1	10	1 l GL	1.06011.1000
						2.5 l GL	1.06011.2500
						4 l GL	1.06011.4000
NEW P	n-Pentane	99.8	3.0	0.02	10	1 l GL	1.00882.1000
						2.5 l GL	1.00882.2500
	Petroleum benzine (40 – 60°C)	–	3.0	0.01	10	1 l GL	1.01772.1000
						2.5 l GL	1.01772.2500
						4 l GL	1.01772.4000
						10 l ST	1.01772.9010
						30 l ST	1.01772.9030
	2-Propanol	99.8	3.0	0.1	10	1 l GL	1.00998.1000
						2.5 l GL	1.00998.2500
T	Toluene	99.8	3.0	0.03	10	1 l GL	1.08389.1000
						2.5 l GL	1.08389.2500
						4 l GL	1.08389.4000
						10 l ST	1.08389.9010

GL = glass bottle | ST = stainless steel barrel | * = sum of hexane isomers + methyl cyclopentane (GC) ≥ 99.8 % | GC-ECD (retention range 1,2,4-Trichlorobenzene to Decachlorobiphenyle individual signals (Lindane standard)) ≤ 3 pg/ml | GC-FID (retention range n-Undecane to n-Tetracontane individual signals (n-Tetradecane standard)) ≤ 3 ng/ml

SupraSolv® solvents for gas chromatography MS

	Product	Purity (GC) min. [%]	Evap. residue max. [mg/l]	Water max. [%]	Color max. [Hazen]	Content / Packaging	Ord. No.
A	Acetone	99.8	3.0	0.05	10	1 l GL	1.00658.1000
						2.5 l GL	1.00658.2500
	Acetonitrile	99.8	3.0	0.05	10	1 l GL	1.00665.1000
						2.5 l GL	1.00665.2500
C	Cyclohexane	99.8	3.0	0.01	10	1 l GL	1.00667.1000
						2.5 l GL	1.00667.2500
D	Dichloromethane, stabilized	99.8	5.0	0.01	10	1 l GL	1.00668.1000
						2.5 l GL	1.00668.2500
E	Ethyl acetate	99.8	3.0	0.02	10	1 l GL	1.00789.1000
						2.5 l GL	1.00789.2500
H	n-Hexane	98.0 *	3.0	0.01	10	1 l GL	1.00795.1000
						2.5 l GL	1.00795.2500
M	Methanol	99.8	3.0	0.1	10	1 l GL	1.00837.1000
						2.5 l GL	1.00837.2500
T	Toluene	99.8	3.0	0.03	10	1 l GL	1.00849.1000
						2.5 l GL	1.00849.2500

GL = glass bottle | * = sum of hexane isomers + methyl cyclopentane (GC) ≥ 99.8 % | GC-MS (retention range n-Undecane to n-Tetracontane; scanning area 30 – 600 amu individual signals (n-Tetradecane standard)) ≤ 3 ng/ml

SupraSolv® headspace For the analysis of residual solvents according to ICH, Ph Eur and USP

	Product	Purity (GC) min. [%]	Evap. residue max. [mg/l]	Water max. [%]	Color max. [Hazen]	Content / Packaging	Ord. No.
D	N,N-Dimethylacetamide	99.8	3.0	0.05	10	1 l GL	1.00399.1000
	N,N-Dimethylformamide	99.8	3.0	0.05	10	1 l GL	1.00202.1000
						2.5 l GL	1.00202.2500
	Dimethyl sulfoxide	99.8	3.0	0.05	10	1 l GL	1.01900.1000
						2.5 l GL	1.01900.2500
W	Water	–	5.0	–	–	1 l GL	1.00577.1000
						2.5 l GL	1.00577.2500

GL = glass bottle | Every residual solvent of class 1 acc. ICH ≤ 1 µg/g | Every residual solvent of class 2 acc. ICH ≤ 10 µg/g | Every residual solvent of class 3 acc. ICH ≤ 50 µg/g

UniSolv® solvents for organic trace analysis

	Product	Purity (GC) min. [%]	Evap. residue max. [mg/l]	Water max. [%]	Color max. [Hazen]	Content / Packaging	Ord. No.
D	Dichloromethane	99.9	3.0	0.005	10	1 l GL	1.06454.1000
H	n-Hexane	99.0*	3.0	0.005	10	1 l GL	1.04369.1000
						2.5 l GL	1.04369.2500
P	n-Pentane	99.9	3.0	0.01	10	1 l GL	1.07288.1000
						2.5 l GL	1.07288.2500
	Petroleum benzine (40 – 60°C)	–	3.0	0.005	10	1 l GL	1.16740.1000
						2.5 l GL	1.16740.2500
T	Toluene	99.9	3.0	0.005	10	1 l GL	1.08388.1000
						2.5 l GL	1.08388.2500

GL = glass bottle | * Sum of hexane isomers + methylcyclopentane (GC) ≥ 99.9 % | GC-ECD (retention range Dichloromethane to 1,2,4-Trichlorobenzene individual signals (Tetrachloromethane standard)) ≤ 1 ng/ml | GC-ECD (retention range 1,2,4-Trichlorobenzene to Decachlorobiphenyle individual signals (Lindane standard)) ≤ 2 pg/ml | GC-FID (retention range n-Undecane to n-Tetracontane individual signals (n-Tetradecane standard)) ≤ 2 ng/ml | GC-MS (retention range n-Undecane to n-Tetracontane; scanning area 30 – 600 amu individual signals (n-Tetradecane standard)) ≤ 2 ng/ml

Reference substances for gas chromatography

Most of the high-purity products in our »reference substances for GC« range are completely synthetic in origin, which means they are largely free from isomers that are difficult to separate by GC. Their assay is generally greater than 90 %, and is usually over 99.5 or 99.7 %. Every pack includes a gas chromatogram under the appropriate test conditions. These reference substances can be used when identifying unknown compounds in a gas chromatogram, as standards in quantitative GC analysis, or in the characterization of GC column properties. Reference substances belonging to the hydrocarbon group are packed in pierceable ampoules; fatty acid methyl esters and other reference substances come in screw-capped glass vials.

Ordering information

Hydrocarbons C 5 – C 7

	Designation	Empirical formula	Assay [%]	Content / Packaging	Ord. No.
B	**Benzene**	C_6H_6	≥ 99.9	5 ml GA	**1.09646.0005**
H	**n-Heptane**	C_7H_{16}	≥ 99.5	5 ml GA	**1.09686.0005**
	n-Hexane	C_6H_{14}	≥ 99.7	5 ml GA	**1.09687.0005**
P	**n-Pentane**	C_5H_{12}	≥ 99.7	5 ml GA	**1.09719.0005**
T	**Toluene**	C_7H_8	≥ 99.7	5 ml GA	**1.09768.0005**

GA = glass ampoule

Hydrocarbons C 8

	Designation	Empirical formula	Assay [%]	Content / Packaging	Ord. No.
O	**n-Octane**	C_8H_{18}	≥ 99.0	5 ml GA	**1.09716.0005**
X	**o-Xylene**	C_8H_{10}	≥ 99.0	5 ml GA	**1.09798.0005**
	m-Xylene	C_8H_{10}	≥ 99.3	5 ml GA	**1.09797.0005**
	p-Xylene	C_8H_{10}	≥ 99.5	5 ml GA	**1.09799.0005**

GA = glass ampoule

Hydrocarbons C 9 – C 18

	Designation	Empirical formula	Assay [%]	Content / Packaging	Ord. No.
D	**n-Decane**	$C_{10}H_{22}$	≥ 99.5	5 ml GA	**1.09603.0005**
	n-Dodecane	$C_{12}H_{26}$	≥ 98.5	5 ml GA	**1.09658.0005**
H	**n-Heptadecane**	$C_{17}H_{36}$	≥ 99.3	5 ml GA	**1.09604.0005**
	n-Hexadecane	$C_{16}H_{34}$	≥ 99.5	5 ml GA	**1.09605.0005**
O	**n-Octadecane**	$C_{18}H_{38}$	≥ 99.3	5 ml GA	**1.09606.0005**
P	**n-Pentadecane**	$C_{15}H_{32}$	≥ 99.5	5 ml GA	**1.09607.0005**
T	**n-Tetradecane**	$C_{14}H_{30}$	≥ 99.0	5 ml GA	**1.09608.0005**
	n-Tridecane	$C_{13}H_{28}$	≥ 99.5	5 ml GA	**1.09609.0005**
U	**n-Undecane**	$C_{11}H_{24}$	≥ 99.5	5 ml GA	**1.09794.0005**

GA = glass ampoule

Fatty acid methyl esters

	Designation	Empirical formula	Assay [%]	Content / Packaging	Ord. No.
M	**Methyl decanoate**	$C_{11}H_{22}O_2$	≥ 99.5	5 ml GV	**1.09637.0005**
	Methyl laurate	$C_{13}H_{26}O_2$	≥ 99.0	5 ml GV	**1.09693.0005**
	Methyl margarate	$C_{18}H_{36}O_2$	≥ 99.0	5 ml GV	**1.09754.0005**
	Methyl myristate	$C_{15}H_{30}O_2$	≥ 99.5	5 ml GV	**1.09736.0005**
	Methyl octanoate	$C_9H_{18}O_2$	≥ 99.5	5 ml GV	**1.09633.0005**
	Methyl oleate	$C_{19}H_{36}O_2$	≥ 96.0	5 ml GV	**1.09743.0005**
	Methyl stearate	$C_{19}H_{38}O_2$	≥ 99.0	5 g GV	**1.09602.0005**

GV = glass vial

Miscellaneous reference substance

	Designation	Empirical formula	Assay [%]	Content / Packaging	Ord. No.
C	**D-Camphor**	$C_{10}H_{16}O$	≥ 96.0	5 g GV	**1.09656.0005**
E	**Ethyl methyl ketone**	C_4H_8O	≥ 99.5	5 ml GV	**1.09709.0005**

GV = glass vial

We provide information and advice to our customers to the best of our knowledge and ability, but without obligation or liability. Existing laws and regulations are to be observed in all cases by our customers. This also applies in respect to any rights of third parties. Our information and advice do not relieve our customers of their own responsibility for checking the suitability of our products for the envisaged purpose. SupraSolv® and UniSolv® are registered trademarks of Merck KGaA, Darmstadt, Germany.

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