Thomas Scientific

MilliporeSigma

Trusted Results

SupraSolv® High Purity Solvents for Gas Chromatography

Supelco®
Analytical Products

SupraSolv® and SupraSolv® hypergrade 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 SupraSolv® hypergrade 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® 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 SupraSolv® hypergrade solvents benefits

- The most comprehensive application range 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

Table of Contents

Quality for the widest range of applications

Our 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.

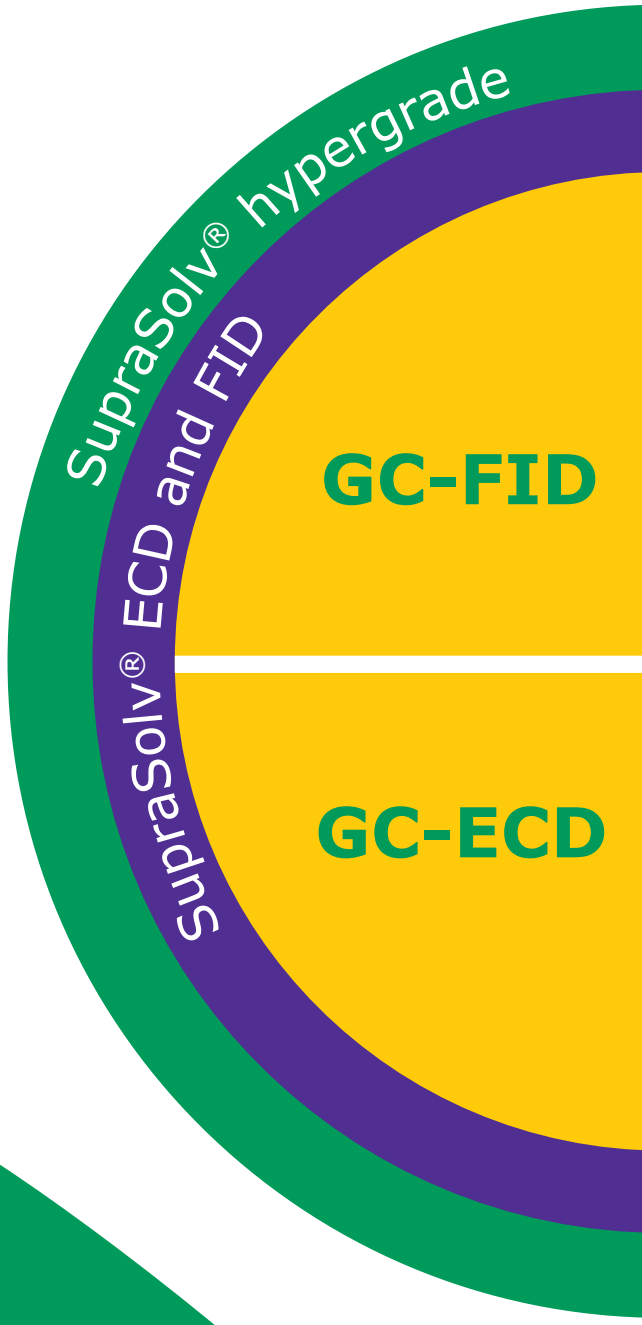
SupraSolv® and SupraSolv® hypergrade solvents for all your gas chromatography needs

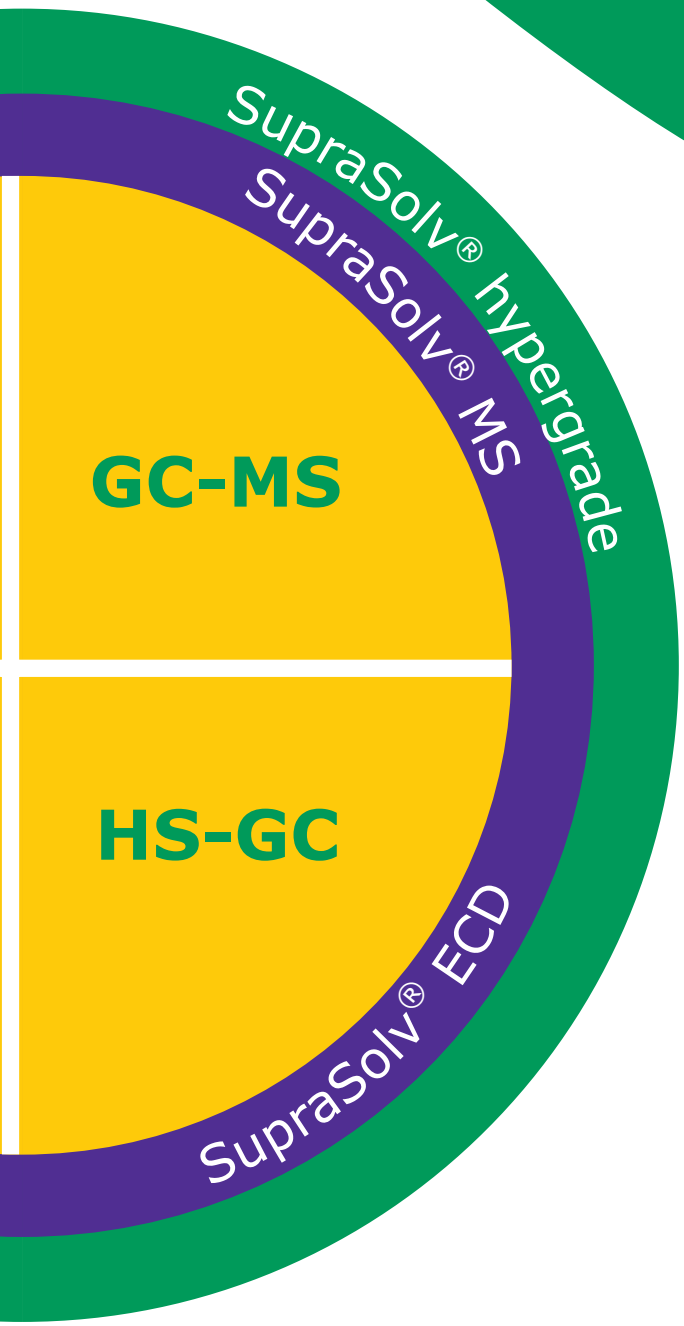
FID FLAME IONIZATION DETECTOR

- 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.





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
- 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 guideline, Ph Eur and USP

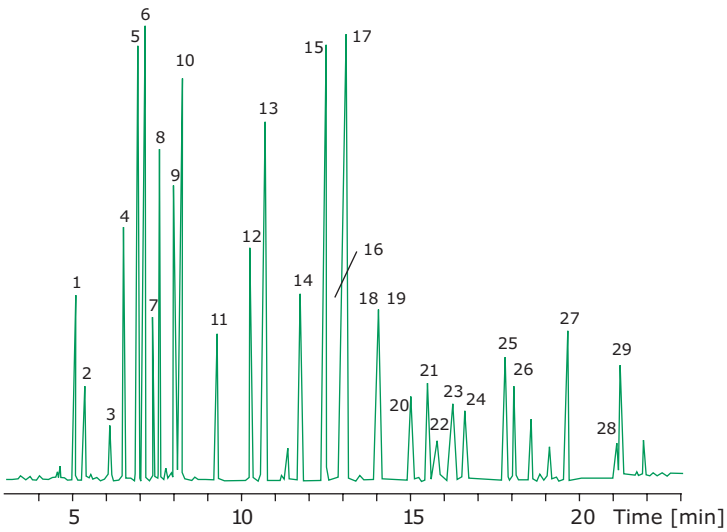
SupraSolv® solvents for gas chromatography

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 Dichloromethane Methanol, Methyl tert-butyl ether (MTBE) 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. Chlorneb
3. Propachlor
4. Trifluralin
5. α-HCH
6. Hexachlorobenzene
7. β-HCH
8. Ω-HCH
9. γ-HCH
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. Methoxychlor
28. cis-Permethrin
29. trans-Permethrin

Figure 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.

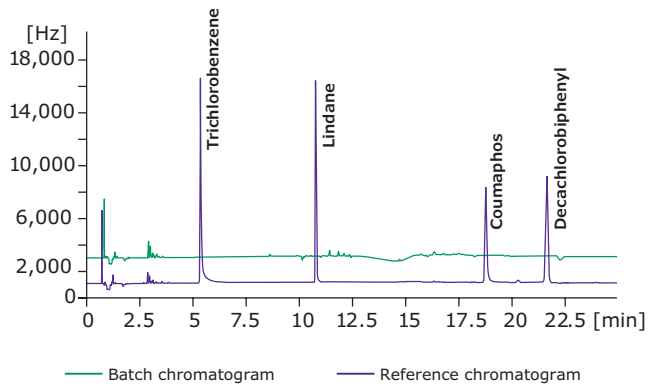


Figure 2 GC-ECD, batch and reference chromatogram (indane = 3 pg/mL), n -Hexane SupraSolv® EDC and FID (104371)

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.

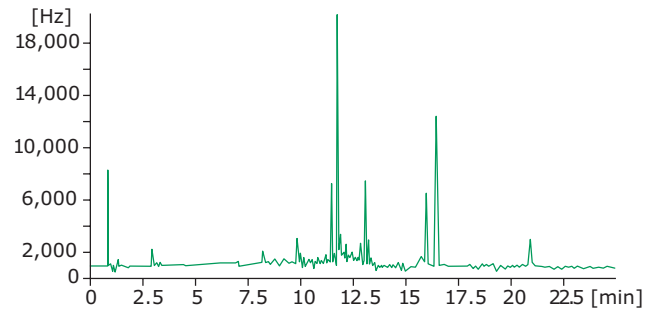


Figure 3A GC-ECD, batch chromatogram of a non-GC-specific solvent, n-Hexane reagent grade

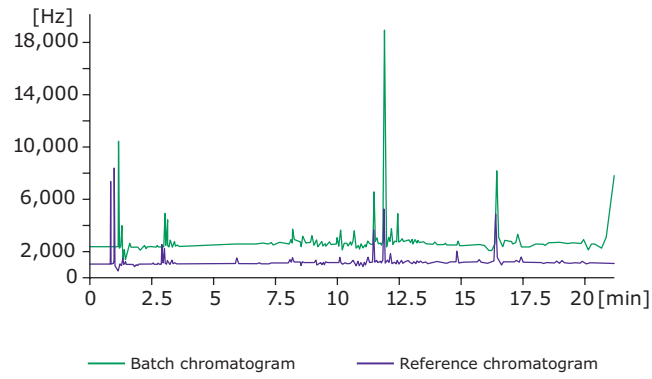


Figure 3B GC-ECD, batch chromatogram, n-Hexane GC grade, competitor A.

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, we offer 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.

SupraSolv® headspace solvents are specially designed for the analysis of residual solvents

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

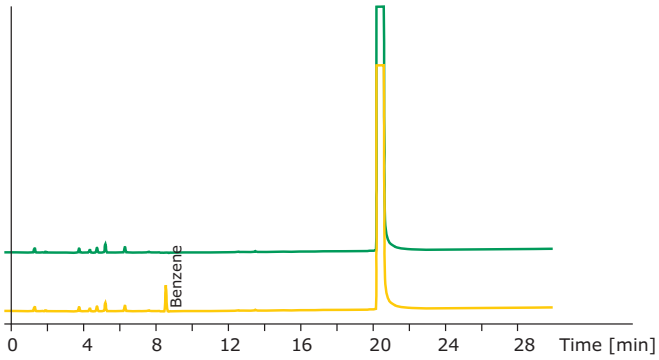


Figure 4 Chromatogram of DMSO Headspace SupraSolv® 101900 without addition compared to a chromatogram of DMSO Headspace SupraSolv® 101900 with 0.8 ppm benzene.

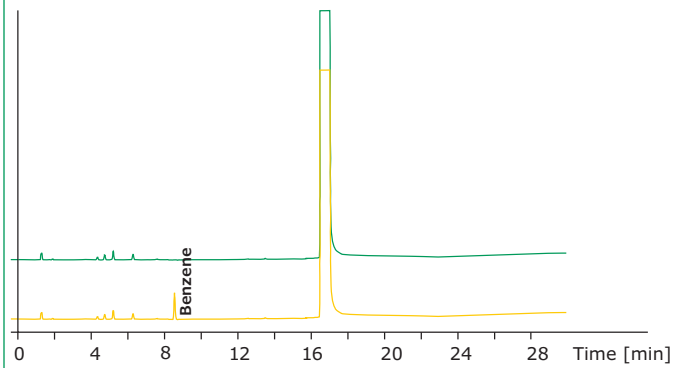


Figure 5 Chromatogram of DMF Headspace SupraSolv® 100202 without addition compared to a chromatogram of DMF Headspace SupraSolv® 100202 with 0.8 ppm benzene.

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

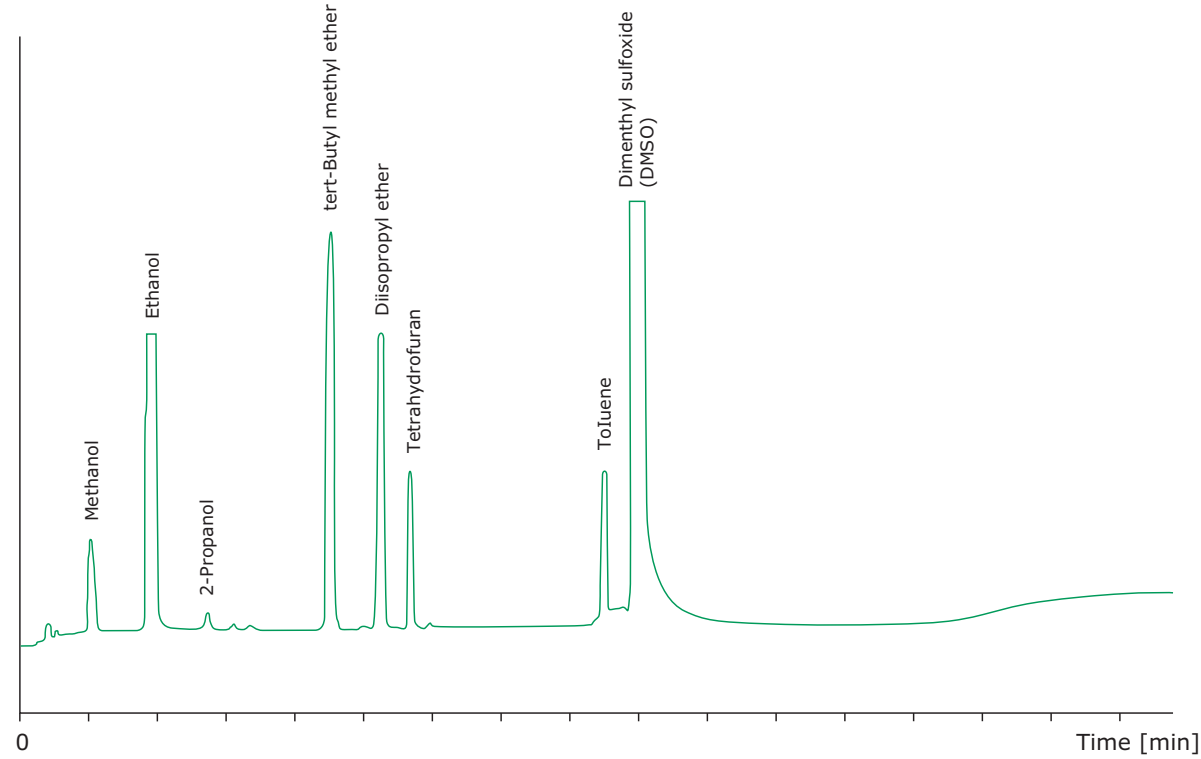


Figure 6 Quantification of residual solvents in an AFI using Dimethyl sulfoxide (DMSO) SupraSolv® for headspace gas chromatography (101900).

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

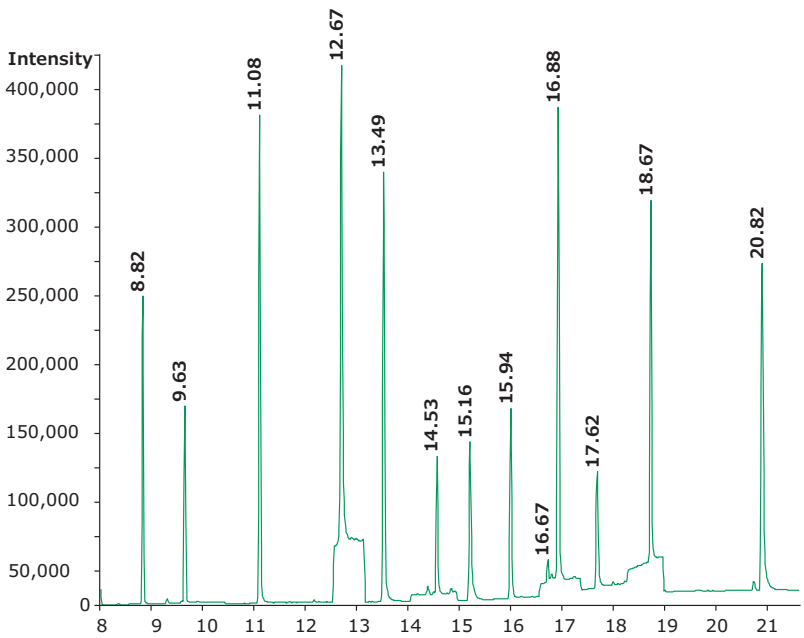
No.	Compound	Time [min]	Area
1	Methanol	2.0	12361
2	Ethanol	3.8	399048
3	2-Propanol	5.4	2368
4	tert-Butyl methyl ether	9.0	34637
5	Diisopropyl ether	10.5	43000
6	Tetrahydrofuran	11.4	14083
7	Toluene	11.5	11502

SupraSolv® hypergrade solvents for organic trace analysis

SupraSolv® hypergrade solvents offer a unique solution for all applications. The specification is even broader and higher than that of SupraSolv® hypergrade solvents: 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 also lower. We recommend SupraSolv® solvents for all areas that demand the highest levels of reliability in analytical results — for example, environmental analyses. Intensive resear ch — 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 SupraSolv® hypergrade Dichloromethane

As the consumption of fruit-based soft drinks is significant in vulnerable groups, these products should be closely monitored regarding pesticides. Classical pesticide residue analysis is still performed with GC-ECD (see page 6) and SupraSolv® solvents n-Hexane, Ethyl acetate, Dichloromethane or Acetone. An alternative and faster method using QuEChERS sample preparation 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 SupraSolv® (106454).



Eluting solvent	Dichloromethane SupraSolv® hypergrade [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
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

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

Hydrocarbon-oil index analysis (C10-C40) in water in accordance with DIN EN ISO 9377-2 (H53, 2001) using SupraSolv® hypergrade

The specifications of SupraSolv® hypergrade solvents have been fine-tuned to permit even the determination of the hydrocarbon-oil index in water (DIN EN ISO 9377-2 [H53, 2001]). SupraSolv® petroleum benzine 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.

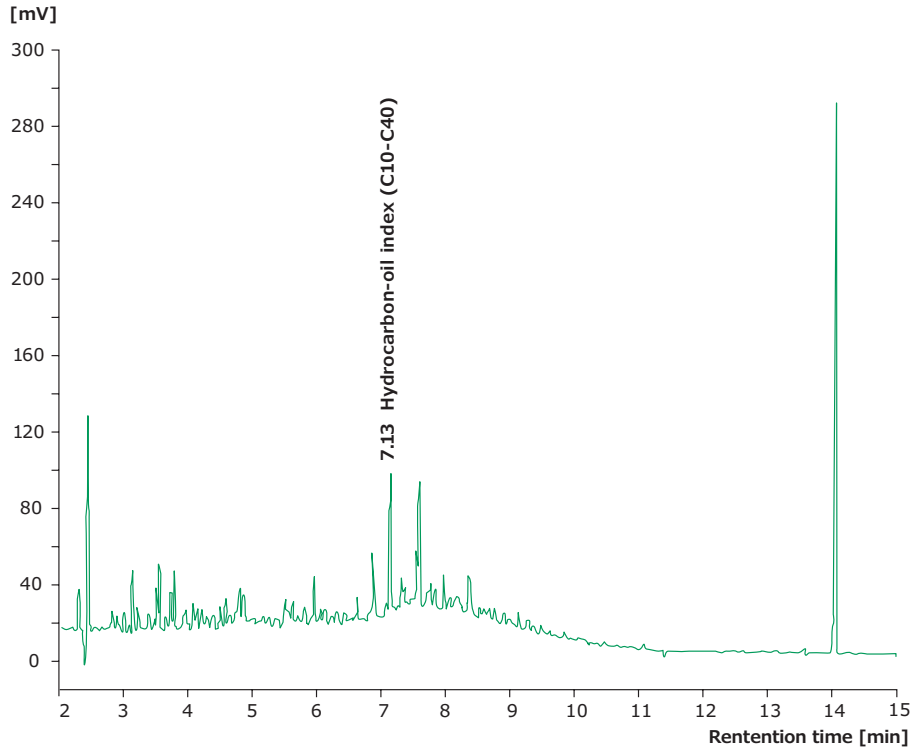


Figure 8 GC-FIP, Fetroleum benzine SupraSolv® hypergrade (116740); measured value: 0.62 mg/L; retention time: within 14 min

SupraSolv® hypergrade 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 SupraSolv® hypergrade solvents, you only need to use a single quality. SupraSolv® hypergrade solvents are 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).

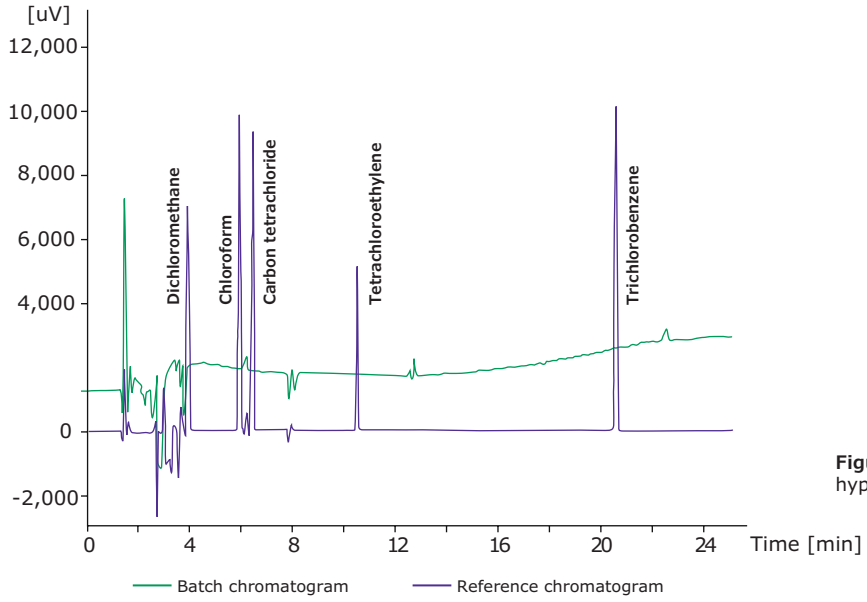


Figure 9a GC-ECD, n-Hexane SupraSolv® hypergrade (104369), low boiling range.

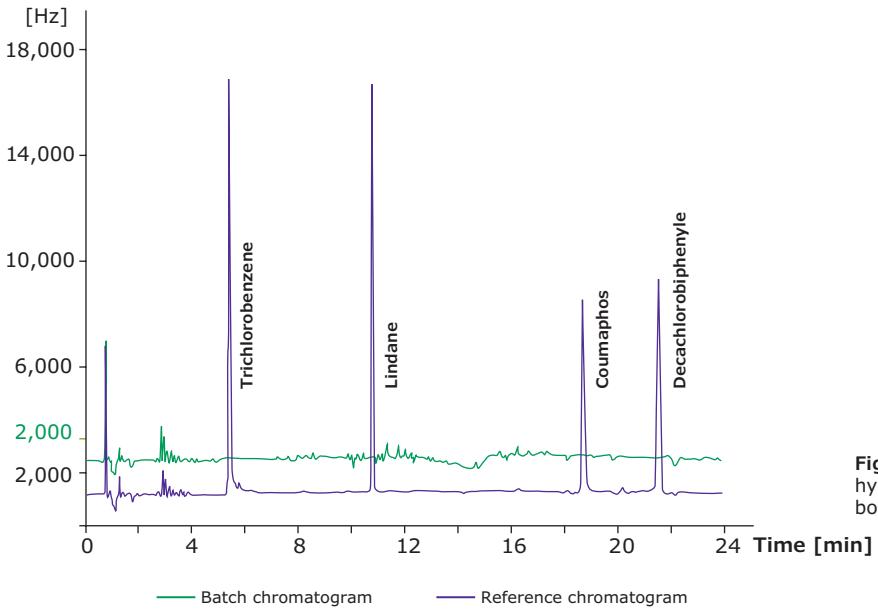


Figure 9b GC-ECD, n-Hexane SupraSolv® hypergrade (104369), medium- and high boiling range.

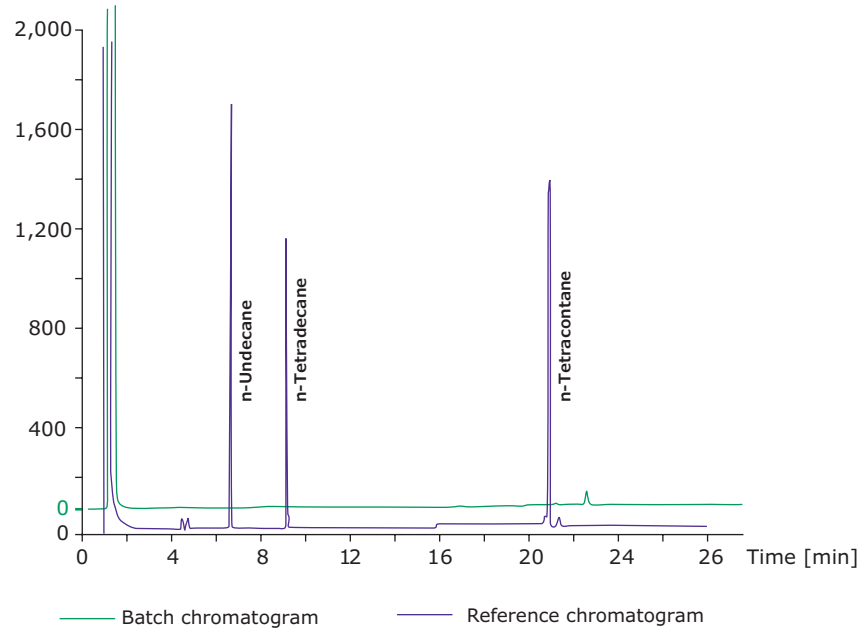


Figure 10 GC-FID, n-Hexane SupraSolv® hypergrade (104369).

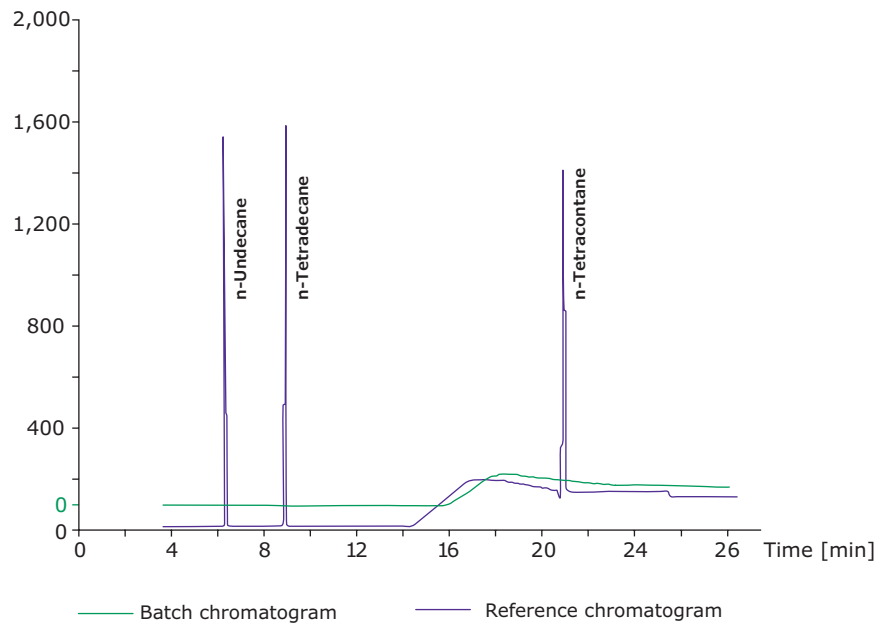


Figure 11 GC-MS, n-Hexane SupraSolv® hypergrade (104369).

	GC-ECD	GC-ECD pesticide analysis	GC-FID	GC-MS
Specifications at a glance	**Dichloromethane to 1,2,4-Trichlorobenzene (Tetrachloromethane standard)**	**1,2,4-Trichlorobenzene to Decachlorobiphenyle (Lindane standard)**	**n-Undecane to n-Tetracontane (n-Tetradecane standard)**	**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
SupraSolv® hypergrade 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® 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.

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. Our stainless steel barrels are returnable, and remain the property of Merck KGaA Darmstadt, Germany throughout their life cycle. After use, empty barrels must be returned. We will then ensure they are properly cleaned, checked and refilled.

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 our antistatic device (Cat. No. 1.07070.0001).

Our withdrawal systems have been developed and optimized for the use with Supelco® containers and solvents. We therefore disclaims any warranty or liability for the operability of its withdrawal systems in connection with containers or solvents from other manufacturers. We reserve 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 Supelco® solvents and containers.

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.

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

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/ Pkg.	Mfr. No.	Thomas No.
A	Acetone	99.8	3.0	0.05	10	1 L GL	1.00012.1000	**C992G89**
						2.5 L GL	1.00012.2500	**C992G90**
						4 L GL	1.00012.4000	**CHM01V751**
						30 L ST	1.00012.9030	**CHM01V750**
	Acetonitrile	99.8	3.0	0.05	10	1 L GL	1.00017.1000	**C992G94**
						2.5 L GL	1.00017.2500	**C992G95**
						4 L GL	1.00017.4000	—
B	tert-Butyl methyl ether	99.8	3.0	0.02	10	1 L GL	1.01995.1000	**C992H96**
						2.5 L GL	1.01995.2500	**C992H97**
C	Chloroform, stabilized	99.8	5.0	0.01	10	1 L GL	1.02432.1000	**C992J11**
						2.5 L GL	1.02432.2500	**C992J12**
	Cyclohexane	99.8	3.0	0.01	10	1 L GL	1.02817.1000	**C992J16**
						2.5 L GL	1.02817.2500	**C992J17**
						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	**C992K37**
						2.5 L GL	1.06054.2500	**C992K38**
						4 L GL	1.06054.4000	**C747K13**
						10 L ST	1.06054.9010	—
	Diethyl ether, stabilized	99.8	3.0	0.05	10	1 L GL	1.00931.1000	**C992H46**
						2.5 L GL	1.00931.2500	**C992H47**
						4 L GL	1.00931.4000	—
	N,N-Dimethylformamide	99.8	3.0	0.05	10	1 L GL	1.10983.1000	**C992M16**
						2.5 L GL	1.10983.2500	**C992M17**
E	Ethanol	99.8	3.0	0.01	10	1 L GL	1.02371.1000	**CHM01U386**
						2.5 L GL	1.02371.2500	**CHM01U385**
	Ethyl acetate	99.8	3.0	0.02	10	1 L GL	1.10972.1000	**C992M14**
						2.5 L GL	1.10972.2500	**C992M15**
						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	**C992J74**
						2.5 L GL	1.04371.2500	**C992J75**
						4 L GL	1.04371.4000	**C977Q21**
						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	**C992J74**
	Isooctane	99.8	3.0	0.01	10	1 L GL	1.15440.1000	**C992M35**
						2.5 L GL	1.15440.2500	**C992M36**
M	Methanol	99.8	3.0	0.01	10	1 L GL	1.06011.1000	**C992K23**
						2.5 L GL	1.06011.2500	**C992K24**
						4 L GL	1.06011.4000	—

	Product	Purity (GC) min. [%]	Evap. residue max. [mg/L]	Water max. [%]	Color max. [Hazen]	Content/ Pkg.	Mfr. No.	Thomas No.
P	n-Pentane	99.8	3.0	0.02	10	1 L GL	1.00882.1000	**C992H38**
						2.5 L GL	1.00882.2500	**C992H39**
	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	0.01	10	1 L GL	1.00998.1000	**C992H60**
						2.5 L GL	1.00998.2500	**C992H61**
T	Toluene	99.8	3.0	0.03	10	1 L GL	1.08389.1000	**C992L19**
						2.5 L GL	1.08389.2500	**C992L20**
						4 L GL	1.08389.4000	**C977R15**
						10 L ST	1.08389.9010	—
W	Water	—	5.0	—	10	1 L GL	1.02699.1000	—
						2.5 L GL	1.02699.2500	—

GL = glass bottle I ST = stainless steel barrel I * = 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/ Pkg.	Mfr. No.	Thomas No.
A	Acetone	99.8	3.0	0.05	10	1 L GL	1.00658.1000	**C992H16**
						2.5 L GL	1.00658.2500	**C992H17**
	Acetonitrile	99.8	3.0	0.05	10	1 L GL	1.00665.1000	**C992H18**
						2.5 L GL	1.00665.2500	**C992H19**
C	Cyclohexane	99.8	3.0	0.01	10	1 L GL	1.00667.1000	**C992H20**
						2.5 L GL	1.00667.2500	**C992H21**
D	Dichloromethane, stabilized	99.8	5.0	0.01	10	1 L GL	1.00668.1000	**C992H22**
						2.5 L GL	1.00668.2500	**C992H23**
E	Ethyl acetate	99.8	3.0	0.02	10	1 L GL	1.00789.1000	**C992H28**
						2.5 L GL	1.00789.2500	**C992H29**
H	n-Hexane	99.8 *	3.0	0.01	10	1 L GL	1.00795.1000	**C992H30**
						2.5 L GL	1.00795.2500	**C992H31**
M	Methanol	99.8	3.0	0.01	10	1 L GL	1.00837.1000	**C992H32**
						2.5 L GL	1.00837.2500	**C992H33**
T	Toluene	99.8	3.0	0.03	10	1 L GL	1.00849.1000	**C992H34**
						2.5 L GL	1.00849.2500	**C992H35**
W	Water	—	5.0	—	10	1 L GL	1.03702.1000	—
						2.5 L GL	1.03702.2500	—

GL = glass bottle I * = 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/ Pkg.	Mfr. No.	Thomas No.
	1-Methyl-2-pyrrolidone	99.8	—	0.05	10	0.5 L GL	1.02497.0500	—
						1 L GL	1.02497.1000	—
						2.5 L GL	1.02497.2500	—
B	Benzylalcohol	99.5	—	0.01	10	1 L GL	1.02695.1000	**CHM01U774**
						2.5 L GL	1.02695.2500	**CHM01U773**
D	N,N-Dimethylacetamide	99.8	3.0	0.05	10	0.5 L GL	1.00399.0500	—
	N,N-Dimethylacetamide	99.8	3.0	0.05	10	1 L GL	1.00399.1000	**C992H06**
	N,N-Dimethylformamide	99.8	3.0	0.05	10	1 L GL	1.00202.1000	**C992H01**
						2.5 L GL	1.00202.2500	**C992H02**
	Dimethyl sulfoxide	99.8	3.0	0.05	10	1 L GL	1.01900.1000	**C992H88**
						2.5 L GL	1.01900.2500	**C992H89**
W	Water	—	5.0	—	—	1 L GL	1.00577.1000	**C992H09**
						2.5 L GL	1.00577.2500	**C992H10**

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

SupraSolv® hypergrade solvents for organic trace analysis

	Product	Purity (GC) min. [%]	Evap. residue max. [mg/L]	Water max. [%]	Color max. [Hazen]	Content/ Pkg.	Mfr. No.	Thomas 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	—
	n-Pentane	99.9	3.0	0.01	10	1 L GL	1.07288.1000	—
						2.5 L GL	1.07288.2500	—
P	Petroleum benzine (40 - 60°C)	—	3.0	0.005	10	1 L GL	1.16740.1000	—
						2.5 L GL	1.16740.2500	—

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

Column Selection by GC Technique & Application

We have developed an extensive line of special purpose columns designed for industry specific applications. These columns are manufactured to deliver high resolution, great analyte response, low bleed, and long column life; allowing you to achieve the analytical performance you require. Look at our easy-to-read phase selection charts highlight choices for applications that are independent of any industry. Simply locate the application to identify a recommended column phase.

The stationary phase also dictates the minimum and maximum temperatures at which a column can be used. Therefore, it is critical to ensure the selected stationary phase can withstand the temperature requirements of the GC method.

Fast GC Applications

	SLB®-1ms**	Equity®-1**	SLB®-5ms**	Equity®-5**	SPB®-624	VOCOL®**	Equity®-1701**	Omegawax®**	SUPELCOWAX® 10**	SLB®-IL59	SP®-2560	SLB®-IL82	SLB®-IL100	SLB®-IL111i
Volatiles					●	●								
Semivolatiles			●											
Pesticides			●	●			●							
PCBs			●	●			●			●		●		●
Fuels by Pattern Recognition	●	●	●											
Aromatics									●	●			●	●
Sulfur Compounds										●				
Biodiesel: FAME Profile								●						●
Solvents			●						●					
Aromatic Amines (Anilines)										●				
Omega 3 and Omega 6 FAMEs								●		●				
cis/trans FAME Isomers											●			●
Nitrosamines			●							●				
Essential Oils	●	●	●						●					
Drugs of Abuse			●											
General Purpose Non-Polar	●	●		●										
General Purpose Intermediate Polar							●							
General Purpose Polar									●					

** Indicated columns are available in Intuvo format

GCxGC Applications

	SLB®-5ms**	Equity®-5**	SPB®-5**	PTA-5	SAC-5	SLB®-1ms**	SPB®-1**	SUPELCOWAX® 10**	SLB®-IL60i**	SLB®-IL59	SLB®-IL61	SLB®-IL111i	SP®-2380**	SLB®-IL76i	SLB®-IL82	SP®-2331**
Non-Polar Primary (1°) Column	●	●	●	●	●	●	●									
Polar Secondary (2°) Column								●		●	●	●		●	●	
Polar Primary (1°) Column								●	●	●	●	●	●	●	●	●
Non-Polar Secondary (2°) Column	●	●				●										

** Indicated columns are available in Intuvo format

Chiral Applications

	Astec® CHIRALDEX® TA	Astec® CHIRALDEX® PN	Astec® CHIRALDEX® DP	Astec® CHIRALDEX® BP	Astec® CHIRALDEX® DM	Supelco® DEX 325	Supelco® DEX 225	Astec® CHIRALDEX® PM	Supelco® DEX 110	Supelco® DEX 120**	Astec® CHIRALDEX® DA	Astec® CHIRALDEX® PH	α-Cyclodextrins	β-Cyclodextrins	γ-Cyclodextrins
Oxygen containing analytes in the form of alcohols, ketones, acids, aldehydes, and lactones; halogenated compounds	●														
Lactones and aromatic amines; epoxides; styrene oxide		●													
Aliphatic and aromatic amines; aliphatic and some aromatic esters; polar racemates			●												
Amino acids; amines; furans				●											
Aliphatic, olefinic, and aromatic enantiomers					●	●	●					●			
Terpenes and tertiary amines								●	●	●					
Heterocyclic amines											●				
Xylenes; menthols; cresols; substituted phenols; substituted benzenes; epoxide enantiomers													●		
Acids; alcohols; amines; diols; esters; ethers; halohydrocarbons; hydrocarbons; ketones; positional isomers; silanes; terpenes; terpineols														●	
α-BHC; carvone; carboxylic acids; methamphetamine															●

** Indicated columns are available in Intuvo format

General Purpose (non-MS) Applications

	Equity®-1**	SPB®-1**	Equity®-5**	SPB®-5**	SPB®-20**	Equity®-1701**	SPB®-35	SPB®-50	SPB®-225	PAG	SUPELCOWAX® 10**	SP®-2330	SP®-2380**	SP®-2340**
Non-Polar Column	●	●	●	●										
Intermediate Polar Column					●	●	●	●						
Polar Column									●	●	●			
Highly Polar Column												●	●	●

** Indicated columns are available in Intuvo format

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

n-Hydrocarbons

Product	Chain length	Assay [%]	Content/ Pkg.	Mfr. No.	Thomas No.
Pentane	C5	≥99.5%	10 mL, 50 mL	76870	**C989X16**
		≥99.7%	5 mL	1.09719	**C992L95**
Hexane	C6	≥99.7%	10 mL, 50 mL	52750	**C965R30**
		≥99.7%	5 mL	1.09687	**C986A99**
Heptane	C7	≥99.8%	5 mL, 50 mL	51730	**C989M89**
		≥99.5%	5 mL	1.09686	**C992L90**
Octane	C8	≥99.7%	5 mL, 50 mL	74820	**C989W69**
		≥99.0%	5 mL	1.09716	**C992L94**
Nonane	C9	≥99.8%	50 mL	74250	**CHM01V194**
Decane	C10	≥99.8%	5 mL, 25 mL	30540	**C990F47**
		≥99.5%	5 mL	1.09603	**C992L68**
Undecane	C11	≥99.8%	5 mL, 25 mL	94000	**C988C21**
		≥99.5%	5 mL	1.09794	**C992M02**
Dodecane	C12	≥99.8%	5 mL, 25 mL	44010	**C990Z87**
		≥99.5%	5 mL	1.09658	**C992L86**
Dodecane, TraceCERT®		certified content on the CoA	100 mL	92064	**CHM02J622**
Tridecane	C13	≥99.5%	5 mL, 25 mL	91490	**C988B68**
		≥99.3%	5 mL	1.09609	**C992L74**
Tetradecane	C14	≥99.5%	5 mL, 25 mL	87139	**C988A34**
		≥99.0%	5 mL	1.09658	**—**
Dodecane, TraceCERT®		certified content on the CoA	100 mL	04003	**—**
Pentadecane	C15	≥99.8%	5 mL	1.09658	**—**
Hexadecane	C16	≥99.8%	5 mL, 25 mL	52209	**C989N13**
		≥99.5%	5 mL	1.09605	**C992L70**
Heptadecane	C17	≥99.5%	5 mL, 25 mL	51578	**C989M79**
		≥99.3%	5 mL	1.09604	**C992L69**
Octadecane	C18	≥98.5%	1 g, 5 g	74691	**C989W66**
Nonadecane	C19	≥99.5%	1 g, 5 g	74158	**C989W56**
Eicosane	C20	≥99.5%	1 g, 5 g	44818	**C989B06**
Heneicosane	C21	≥99.5%	1 g, 5 g	51523	**C965H73**
Docosane	C22	≥99.5%	1 g, 5 g	43942	**C966Z51**
Tricosane	C23	≥99.5%	1 g, 5 g	91447	**C918Q13**
Tetracosane	C24	≥99.5%	1 g, 5 g	87089	**C919Z02**
Pentacosane	C25	≥99.5%	250 mg, 1 g	76493	**C920H51**
Hexacosane	C26	≥98.0%	250 mg, 1 g	52183	**C965M88**
Heptacosane	C27	≥98.0%	250 mg, 1 g	51559	**C965J02**
Octacosane	C28	≥98.0%	250 mg, 1 g	74684	**—**
Nonacosane	C29	≥98.0%	250 mg, 1 g	74156	**C921U74**
Triacontane	C30	≥98.0%	250 mg, 1 g	90270	**C918K69**
Hentriacontane	C31	≥98.0%	250 mg, 1 g	51529	**C965H76**

Product	Chain length	Assay [%]	Content/ Pkg.	Mfr. No.	Thomas No.
Dotriacontane	C32	≥98.0%	100 mg	44253	**C989A33**
Tritriacontane	C33	≥98.0%	250 mg	93435	**C988C12**
Tetratriacontane	C34	≥98.0%	250 mg, 1g	88152	**C918B73**
Pentatriacontane	C35	≥98.0%	250 mg	76968	**C989X25**
Hexatriacontane	C36	≥98.0%	1 g	52919	**—**
Heptatriacontane	C37	≥97.0%	100 mg, 1 g	51848	**C965K66**
Tetracontane	C40	≥98.0%	250 mg	87086	**C988A30**
Dotetracosane	C42	≥98.0%	100 mg	44250	**C965C75**
Tetratetracontane	C44	≥98.0%	250 mg	88144	**C918B72**
Hexatetracontane	C46	≥98.0%	250 mg	52913	**C965T23**
Octatetracosane	C48	≥98.0%	100 mg	74892	**C920C66**
Tetrapentacontane	C54	≥98.0%	500 mg	87992	**—**

Aromatic, unsaturated & branched Hydrocarbons

Product	Assay [%]	Content/ Pkg.	Mfr. No.	Thomas No.
Benzene	≥99.9%	5 mL	1.09646	**—**
	≥99.9%	5 mL, 50 mL	12540	**C991K51**
Toluene	≥99.7%	5 mL	1.09768	**C986B19**
	≥99.9%	5 mL, 25 mL	89680	**C988A98**
o-Xylene	≥99.0%	5 mL	1.09798	**C992M04**
	≥99.0%	5 mL, 50 mL	95660	**C988C78**
m-Xylene	≥99.3%	5 mL	1.09797	**C992M03**
	≥99.5%	5 mL, 50 mL	95670	**C988C82**
p-Xylene	≥99.3%	5 mL	1.09799	**C992M05**
	≥99.5%	5 mL, 50 mL	95680	**C988C85**
2-Methylbutane	≥99.7%	5 mL, 10 mL	59060	**C989Q10**
2-Methylpentane	≥99.5%	5 mL, 50 mL	68310	**C989U05**
2,2-Dimethylbutane	≥98.0%	5 mL, 10 mL	39730	**C928H89**
2,3-Dimethylbutane	≥99.5%	5 mL, 10 mL	39760	**C990W09**
3,4-Dimethylhexane	≥99.0%	1 mL	40512	**C928N75**
2,2,4-Trimethylpentane	≥99.7%	5 mL, 10 mL, 50 mL	59030	**C925P88**
1-Hexene	≥99.8%	5 mL, 10 mL, 50 mL	52930	**C965T46**
1-Nonene	≥99.5%	5 mL	74323	**C921W72**
1-Decene	≥99.0%	5 mL, 50 mL	30649	**C990F54**
1-Dodecene	≥99.5%	5 mL	44146	**C965B22**
1-Tetradecene	≥99.8%	5 mL, 25 mL	87187	**C919Z37**
1-Octadecene	≥99.5%	1 mL, 5 mL	74738	**C920A96**
4-Methyl-1-pentene	≥99.5%	5 mL	68510	**C923U53**
1,7-Hexadecadiene	≥90%	25 mg	52206	**C965N00**

Hydrocarbon mixes and kits

Product	Description	Pkg. Size	Mfr. No.	Thomas No.
Hydrocarbon Test mix, *Trace***CERT**®	C12, C13, C14, C15, C16, C17: varied concentrations in $CHCl_3$	2 mL	48244	**C960T15**
n-Paraffin mix C5, C6, C7, C8	varied concentrations, neat	500 mg	47100	**C926A26**
n-Paraffin Mix C7, C8, C9, C10	varied concentrations, neat	500 mg	47101	**C926A27**
n-Paraffin Mix C10, C12, C14, C16	varied concentrations, neat	500 mg	47102	**C989E60**
n-Paraffin Mix C18, C20, C22, C24, *Trace***CERT**®	2% (w/w) each component in octane	5 mL	47108	**C989E61**
Alkane standard solution C8-C20	~40mg/L each, in hexane	1 mL, 5 mL	04070	**C991G80**
Alkane standard solution C21-C40	40mg/L each, in toluene	1 mL, 5 mL	04071	**C991G82**
Alphatic Hydrocarbons Kit	34 individual ampules of neats plus 6 ampules of solutions	1 each	44575-U	**C927F72**
Florisil Applicability Test acc. to DIN EN ISO 9377-2/53, kit	Kit contains: Stearyl stearate Minal oil standard mixture type A and B (~10mg/mL in n-heptane) Extraction medium stock solution	1 each	52462	**C965P49**

Product	Description	Pkg. Size	Mfr. No.	Thomas No.
Extraction Medium Stock solution	Acc. to DIN EN ISO 9377-2	100 mL	49574	**C926J78**
Mineral oil standard mixture Type A and B for EN ISO 9377-2	~10mg/L each in n-heptane	2 mL	18602	**C929C53**
QC Standard solution for EN ISO 9377-2	Mineral oil type A and B ~5mg/L each in n-heptane	1 mL	51706	**C965J87**
Alkane standard mixture for performance tests of GC systems	C10 – C40 (all even), 50 mg/L each in n-heptane	2 mL	68281	**C989U04**
Alkane Standard Mixture for performance tests of GC-systems		1 kit	56681	—
Alkane Standard Mixture for performance tests of GC-systems	C10, C20 – C40 (all even), 50 mg/L each in n-heptane	2 mL, 10 mL	94234	**C917D08**

Fatty acid methyl esters (FAME)

Designation	Empirical formula	Assay [%]	Content/ Pkg.	Mfr. No.	Thomas No.
Methyl valerate	C5	99.8%	1 mL, 5 mL	94560	**C917D96**
Methyl hexanoate	C6	99.8%	1 mL, 5 mL	21599	**C929K33**
Methyl hexanoate, *Trace***CERT**®	C6	certified content on the CoA	50 mg	94776	**C917E60**
Methyl heptanoate	C7	99.8%	1 mL, 5 mL	75218	**C954K77**
Methyl octanoate	C8	99.8%	5 mL	21719	**C991V17**
Methyl octanoate, *Trace***CERT**®	C8	certified content on the CoA	50 mg	06934	—
Methyl octanoate	C8	99.5%	5 mL	1.09633	**C992L79**
Methyl nonanoate	C9	99.8%	1 mL, 5 mL	76368	**C954Z02**
Methyl decanoate	C10	99.5%	5 mL	1.09637	**C992L81**
Methyl undecanoate	C11	99.0%	1 mL, 5 mL	94118	**C917C57**
Methyl undecanoate, *Trace***CERT**®	C11	certified content on the CoA	100 mg	47147	—
Methyl laurate	C12	99.5%	5 mL	61689	—
Methyl laurate	C12	99.0%	5 mL	1.09693	**C992L91**
Methyl tridecanoate	C13	99.5%	5 mL	91558	**C988B69**
Methyl myristate	C14	99.5%	1 mL, 5 mL	70129	**C989U63**
Methyl myristate, *Trace***CERT**®	C14	certified content on the CoA	100 mg	55791	**C970P81**
Methyl myristate	C14	99.5%	5 mL	1.09736	**C993V11**
Methyl pentadecanoate	C15	99.5%	1 mL, 5 mL, 25 mL	76560	**C920J48**
Methyl palmitate	C16	99.0%	1 g, 5 g	76159	**C989W97**
Methyl heptadecanoate	C17	99.0%	1 g, 5 g	51633	**C989M82**
Methyl heptadecanoate, *Trace***CERT**®	C17	certified content on the CoA	100 mg	90606	**C918L43**
Methyl margarate	C17	99.0%	5 mL	1.09754	**C992L99**
Methyl stearate	C18	99.5%	1 g, 5 g	85769	**C989Z27**
Methyl stearate, *Trace***CERT**®	C18	certified content on the CoA	100 mg	75533	**C954P15**
Methyl stearate	C18	99.0%	5 mL	1.09602	**C992L67**
Methyl oleate (Methyl cis-9-octadecenoate)	C18-cis 9	99.0%	1 mL, 5 mL	75160	**C989W80**
Methyl oleate (Methyl cis-9-octadecenoate)	C18-cis 9	96.0%	5 mL	1.09743	**C992L98**
Methyl cis-11-octadecenoate	C18-cis 11	99.0%	100 mg	17264	**C991N81**
Methyl trans-vaccenate	C18-trans11	95.0%	25 mg	07586	**CHM02N190**
Methyl nonadecanoate	C19	98.0%	1 g, 5 g	74208	**C989W58**
Methyl arachidate	C20	99.0%	1 g, 5 g	10941	**C991J71**
Methyl cis-11-eicosenoate	C20-cis 11	98.5%	100 mg	17263	**C991N80**
Methyl cis,cis-11,14-eicosadienoate	C20-cis,cis 11,14	98.0%	100 mg	17272	**C930V09**
Methyl heneiscosanoate	C21	98.5%	1 g	51535	**C965H79**
Methyl behenate	C22	99.0%	1 g, 5 g	11940	**C991K20**
Methyl tricosanoate	C23	99.0%	250 mg, 1 g	91478	**C988B66**
Methyl tetracosanoate	C24	99.0%	250 mg, 1 g	87115	**C988A32**
Methyl cis-15-tetracosenoate	C24-cis 15	99.0%	100 mg	17265	**C991N82**
Methyl pentacosanoate	C25	98.0%	100 mg	76497	**C920H56**
Methyl hexacosanoate	C26	99.0%	100 mg	52203	**C965M99**
Methyl octacosanoate	C28	98.0%	250 mg	74701	**C920A63**

All *Trace***CERT**® branded products are certified reference materials (CRMs), produced and certified in accordance with ISO/IEC 17025 and ISO 17034. The CRM is traceable to primary material from an NMI, e.g. NIST or MNIJ.

Certified content by quantitative NMR incl. uncertainty and expiry date are given on the certificate.

Discover the GC workflow solutions

PROFICIENCY TESTING

SAMPLE PREPARATION AND COLLECTION

Proficiency testing

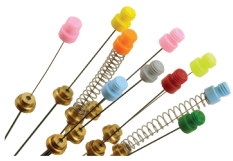
- Supelco® Proficiency Testing solutions represents over 20 years of experience and expertise in providing PT studies worldwide.
- Our PT samples are manufactured to CRM grade. More than 20 000 PT samples a year are sent to over 2 500 labs worldwide.
- Our quality and services allow you to work smarter, enabling us to live in a safer and healthier world.

Sample Preparation and Collection

- **SPME** - Solid Phase Micro Extraction (Fibers, Holders, Accessories)
- **SPE** (Tubes, Manifolds, Accessories, QuEChERS, Bulk Adsorbents)
- **Purge & Traps** (Traps & Purge Vessels)
- **Solvents** (Suprasolv® FID/ECD, MS, HS)
- **Milli-Q® water purification systems** and VOC-Pak® Polisher
- **Derivatisation Reagents**

SPE Products

Solvents



SPME Products

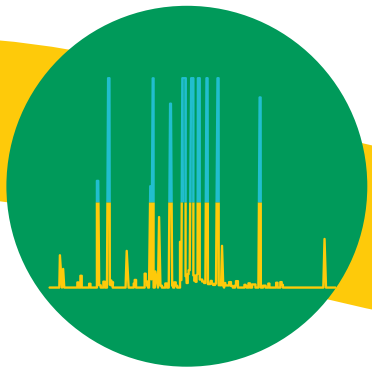
Derivatisation Reagents

Air Sampling

- Thermal Desorption (Adsorbent Tubes & Accessories)
- Solvent Desorption (Adsorbent Tubes & Accessories)
- Whole Air (Sampling Bags & Bulbs, Sampler)

GC ANALYSIS

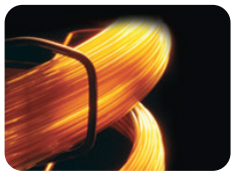
DETECTION AND CALIBRATION



GC Analysis

- **GC Columns** for GC, GC/MS, Fast GC, GCxGC
- **General Purpose Columns** (e.g. SLB®-1ms, SLB®-5ms, SLB®-35ms, Equity®-1701, SUPELCOWAX®, Nukol™/FFAP)
- **Special Application Columns** (e.g. FAME, PAH, PCB, Dioxins, VOC, PLOT, Chiral)
- **Ionic Liquid Columns** (SLB®-IL i-Series, Watercol™)
- **Packed Columns** (SS & Glass)

GC Columns (Packed)



GC Columns (Capillary)

Accessories

- Liner & Septa
- Fittings, Ferrules & Column Connectors
- Flow Measurement
- Vials & Syringes
- Gas Management & Purification
  - Gas Generators
  - Gas Purifiers
  - Plumbing (Valves, Fittings & Tubing)

Vials

Gas Generators

Liner

Septa

Detection and Calibration

- Certified Reference Materials (CRMs) & Reference Standards
- Neats & Solutions (for almost every application area)
- Matrix Standards
- Pharmacopoeia & Metrological Institute Standards

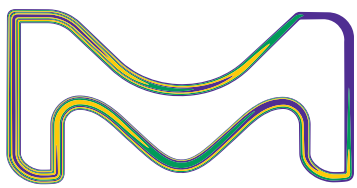
Certified Reference Materials & Reference Standards

Notes

Notes

Supelco®

Analytical Products



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