

VWR EVAPORATIVE LIGHT SCATTERING DETECTORS FOR LIQUID CHROMATOGRAPHY



Getting more out of your HPLC, U-HPLC, LC/MS, and SFC analysis

Introducing VWR ELSD detectors

VWR's manufacturer partner develops, manufactures, distributes and supports VWR ELSD detectors, the most complete and versatile product line dedicated to Low-Temperature Evaporative Light-Scattering Detection. As one of the pioneers of this detection mode, remains exclusively focused on this technology as its core competency.

With industry leading ELSD technology, which leverages decades of experience and customer knowledge to continually raise the bar for High Sensitivity, High Flexibility and High Fidelity, the VWR ELSD is a best-in-class range of detectors. The unparalleled selection of six VWR ELSD models can satisfy both very high performance requirements and budget limitations for all analytical and preparative chromatography applications from basic research to quality control.

Evaporative Light-Scattering Detectors (ELSD) provide a Universal detection mode for the following analysis technologies:

- Standard HPLC
- U-HPLC
- HTLC
- μ -HPLC
- GPC
- Preparative HPLC
- Flash Chromatography
- Counter Current Chromatography
- SFC

ELSD doesn't rely on the optical properties of the analyte, making this detection mode ideal for all compounds less volatile than the mobile phase, including those with no chromophore or widely differing extinction coefficients.

This detection mode is able to accurately measure a wide range of analytes with consistent response and is therefore an extremely useful technique to get the complete picture of complex samples.

In some cases, ELSD presents great advantages over UV, RI and MS:

- UV detection fails to detect compounds without chromophores.
- RI detection lacks sensitivity, cannot be used with gradient and is often difficult to operate due to drift and instability.
- MS necessitates specific technical skills to be operated and cannot be used when analytes are difficult to ionize.

Typical applications using ELSD include Lipids, Carbohydrates, Surfactants, Polymers but also Pharmaceutical High Throughput Screening, Peptides and Proteins, Natural Products and small molecules such as Amino Acids (without any derivation step) or Inorganic Ions (without the need of any additional post-column device). VWR ELSD is commonly used in Industrial, Governmental and University research and control laboratories.

Features

- High sensitivity for semi-volatile and thermo-sensitive compounds
- Lowest background noise to provide excellent S/N ratio
- Optimization of peak shape and peak width
- Consistency of operating protocols
- Compatibility of nebulization with any HPLC protocol
- Prevents contamination of critical detector components
- User friendly, low maintenance system
- Integrates readily with HPLC software with drivers.

VWR ELSD Technology

- The strength of the real Low Temperature technology
- Enhanced digital signal processing
- Automated Gain Adjustment (SAGA)
- Nebulizer design for all applications
- Data rate up to 100Hz
- Complete, efficient and reliable information and SOP
- Safety features, patented Gas Supported Focusing (GSF™)
- Plug-and-play detector, power-down methods
- RS 232, USB.

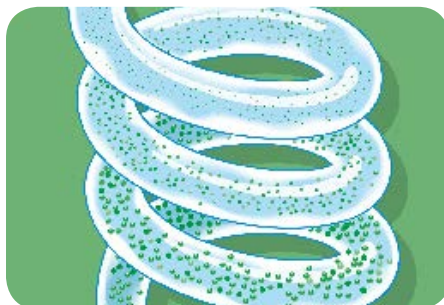
Three stages of Low-Temperature ELSD, each optimized for high performance detection



Nebulize eluent and select small droplets to minimize background noise

The eluent from the column is mixed with an inert gas and goes through the narrow orifice of a nebulizer to generate a homogeneous mist. This fine mist is composed of droplets of mobile phase containing the eluting compound of interest.

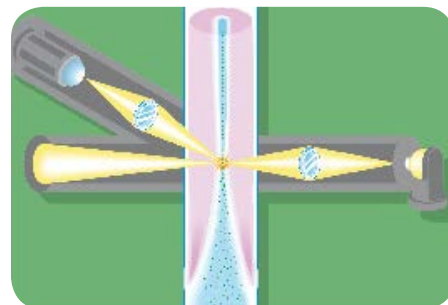
VWR ELSD technology allows the selection of droplets as a function of their size in order to prevent larger droplets from entering the evaporation (drift) tube. Large droplets would require higher temperatures to be dried, resulting in increased background noise. This selection of droplets by size enables detection using a very low evaporation temperature, with resulting low baseline noise and excellent sensitivity to solutes, including semi-volatile solutes.



Evaporate at low temperature every time so you won't miss any compound

The nebulized eluent goes through a heated tube to evaporate the mobile phase.

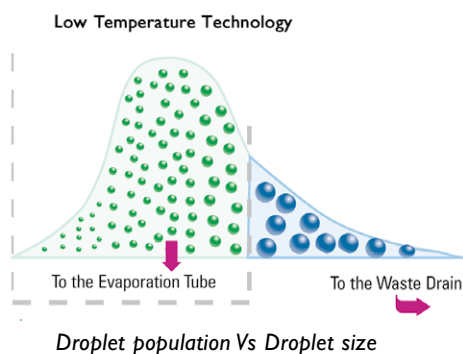
Solute molecules are obtained from the mist using a heated evaporation (drift) tube, at a low temperature. All VWR ELSD detectors are designed to evaporate mobile phases with high boiling points at very low temperatures. This unique feature minimizes the potential for evaporation or thermal decomposition of the compounds of interest, and makes the VWR ELSD technology a more reliable way to detect everything in the sample.



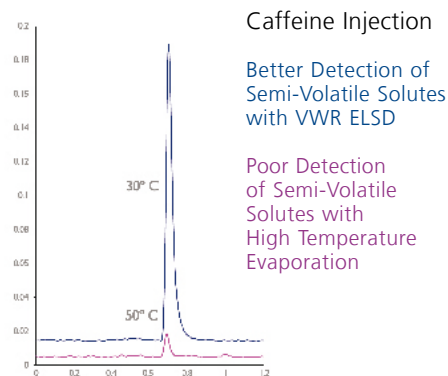
Detect light-scattering using Gas Supported Focusing (GSF) for less maintenance and better data

The stream of solid particles enters a flow cell which includes a light source and a photomultiplier or a photodiode. The intensity of the light scattered by the particles is directly related to the mass of the eluted compound.

The solute molecules from the mist, assisted by GSFTM, go through an optical head designed to measure the scattered light. GSFTM involves the addition of gas to focus the solute particles within the optical head for enhanced detection and safety.



All VWR ELSD detectors feature low-temperature operation to ensure that excellent sensitivity is provided even for semi-volatile or thermally labile compounds. These detectors can be used with conventional analytical and preparative Liquid Chromatography, as well as with U-HPLC, HTLC, μ -HPLC, GPC, Flash Chromatography, CCC, and SFC.



Why Low-Temperature evaporation is important in ELS detection

In an ELSD, the nebulized eluent is evaporated by going through a heated tube. The temperature of this tube is undoubtedly the most critical parameter when optimizing detection. If the temperature is too high, semi-volatile or thermally labile compounds in the sample may evaporate or decompose and will not be detected. Most other ELSD systems do not select droplets and require higher temperatures to reach acceptable levels of noise during the analysis, resulting in much lower sensitivities for semi-volatile and thermo-labile compounds.

Quality Control and Educational Laboratories

VWR ELSD LC combines sensitivity, reliability, and accuracy for all your analytical works, thanks to unrivalled technology.

The VWR ELSD LC detector provides the cost-effective solution in Evaporative Light Scattering Detection for standard Liquid Chromatography. Control of the system can be done either locally or via a PC. A remote shut down mode is also provided to minimize cost and enhance system lifetime.



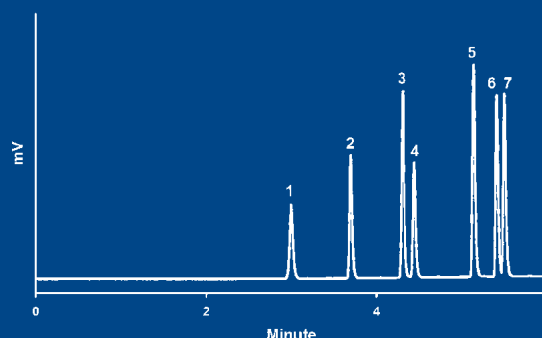
Chromatogram of four terpenic lactones and three flavonoids by HPLC/ELSD

Features and Benefits:

- Optimizes sensitivity of non-volatile, thermally labile and semi-volatile compounds.
- Minimized band broadening thanks to a dedicated VWR ELSD LC HPLC nebulizer and an innovative cell design. This nebulizer covers the flow rate range from 200 μ L/min to 2mL/min and can be easily mounted and dismantled.
- With SAGA (ELSD Automated Gain Adjustment)*, an innovative gain control available when it is driver-controlled by software, VWR ELSD LC automatically adapts the gain setting to avoid any off-scale saturation of the detector.
- Complete Remote Control: the gas, heater, photodiode and light source can be automatically shut off at the end of a series of analyses.

Typical Application: Natural Products

Many natural products such as herbal drugs are gaining more and more interest in the pharmaceutical and nutraceutical industry because they contain bioactive compounds. Some of these compounds such as saponins and terpenes do not possess any chromophore and therefore cannot be analyzed in HPLC using a UV detector. Only VWR ELSD can detect chromophoric and non-chromophoric molecules in a single gradient HPLC analysis with an excellent sensitivity, thanks to VWR ELSD technology. The following example shows a method for a quick and simultaneous determination of terpenic lactones and flavonoids present in Ginkgo Biloba.



- 1 - Bilobalide,
- 2 - Ginkgolide C,
- 3 - Ginkgolide A,
- 4 - Ginkgolide B,
- 5 - Quercetin,
- 6 - Isorhamnetin,
- 7 - Kaempferol

Injection Volume: 1 μ L

Column: Hypersil Gold (1.9 μ m, 2.1 x 50mm), 30°C

Eluent: A - 0.1% formic acid in H₂O; B - 0.1% formic acid in Acetone

Gradient: 0-0.5 minute: 5%B, 0.5-4 minutes: from 5%B to 50%B, 4-6 minutes: 50%B

Flow Rate: 0.6mL/min

Purification works

VWR ELSD FP combines simplicity, reliability, and robustness for all your purification works, thanks to unrivalled VWR ELSD technology.

The VWR ELSD FP provides the cost-effective solution in Evaporative Light-Scattering Detection for purification by preparative HPLC, preparative SFC, Flash Chromatography or CounterCurrent Chromatography. Control of the system can be done either locally or via a PC. A remote shut down mode is also provided to minimize cost and enhance system lifetime.

Sophisticated, yet easy to use, VWR ELSD FP, mounted with an external splitter, is ready to detect and monitor your fraction collection.



Features and Benefits:

- Minimized band broadening thanks to a dedicated VWR ELSD FP nebulizer and an innovative cell design. This nebulizer covers the flow rate range from 100 μ L/min to 5mL/min and can be readily and quickly mounted and dismounted.
- With SAGA (VWR ELSD Automated Gain Adjustment)*, an innovative gain control available when it is driver-controlled by software, VWR ELSD FP automatically adapts the gain setting to avoid any off-scale saturation of the detector.
- An optimized liquid flow path and a Gas-Focusing technology in the optical detection cell prevent the detector from any clogging or contamination, and extend its operability.
- Complete remote control: the gas, heater, photodiode and light source can be automatically shut off at the end of a series of purifications.

Typical Application: Amino acids, peptides, proteins

In protein and peptide "mapping" and purification, where gradient elution is required, VWR ELSD has a key advantage over UV detection: it can detect all compounds including single amino acids, its baseline is unperturbed by the mobile phase change during the gradient, and remains flat. As a mass detector, ELSD can also provide a material balance purity assessment.

*patent pending

VWR ELSD 100 High Performance and High Throughput

The VWR ELSD 100 Low-Temperature Evaporative Light-Scattering Detector for conventional HPLC, U-HPLC and SFC allows for the detection of essentially all compounds: detection is based on a universal property of all analytes and does not require the presence of a chromophoric group, electroactive group, etc. The VWR ELSD 100 combines the highest sensitivity, reliability, and accuracy for your analyses compared to all other aerosol-based detectors, thanks to unrivalled SEDERE low-temperature technology. This detector presents a number of outstanding innovations thereby providing the best optical and electronic benefits at a reasonable price. The VWR ELSD 100 can be connected to any HPLC or SFC system, and you can control the detector locally or via a PC for a fully integrated system using a broad range of VWR ELSD drivers. A remote shut down mode is also provided to minimize cost and enhance system lifetime. Full SOP protocols are provided for GLP compliance and validation procedures.

Features and Benefits:

- New generation design for low-temperature evaporation of the mobile phase: optimizes sensitivity of thermally labile and semi-volatile compounds.
- New optical head design based on a new high power laser provides the highest signal-to-noise ratio for all compounds.
- Enhanced sensitivity using digital signal treatment: an innovative signal processing algorithm minimizes noise and optimizes sensitivity.
- Direct dynamic range of over five orders of magnitude: With SAGA (VWR ELSD Automated Gain Adjustment), an innovative gain control available when it is driver-controlled by software, VWR ELSD 100 automatically adapts the gain setting to avoid any off-scale saturation of the detector: enhanced determination of very low percentage of impurities.
- Direct linearity on the global dynamic range: enhanced correlation coefficients.
- Minimized band broadening due to an innovative cell design and a wide choice of nebulizers. Four nebulizers are available to optimize your applications. Nebulizers cover a wide flow rate range from a few $\mu\text{L}/\text{min}$ to several mL/min , in addition there is a nebulizer optimized for U-HPLC and a nebulizer specifically optimized for SFC. These nebulizers can be easily changed to meet the specific requirements of the application. In addition, all parts of VWR ELSD 100 are designed to provide the lowest dispersion, so that the observed peak widths are similar to those obtained with the most advanced UV/Vis detectors (typically below 1 second in U-HPLC)
- Complete Remote Control: gas, heater, photo-detector and light source can be automatically switched off at the end of a series of analyses.



TECHNICAL SPECIFICATIONS

Components	
Detection	SAGA-Enhanced Photodiode board
Light Source	Blue High power laser, with elapsed time counter and high performance power management
Temperature Range	Ambient to 100°C
Nebulizer	Low Flow, HPLC, UHPLC, SFC
Eluent Flow Rate	50 $\mu\text{L}/\text{min}$ to 2 mL/min
Typical Sensitivity	< 250 pg
Data	
Analog Output	0 - 1 Volt
Gain Settings	1 to 7 or SAGA (patented dynamic auto-gain)
Noise Filter	Dedicated numerical algorithm
Data Rate	Up to 100 Hz
Communication	
Selection & Display	OLED Display with illuminated keypad
Events	Contact closure, TTL for Ready, Autozero
Power-down Methods	Frontpanel or driver activated, with or without delay
Computer Interface	USB or RS-232
Software	Drivers (option): Openlab EZChrom®, Openlab Chemstation®, Chemstation®, EZChrom®, Clarity®, Chromeleon®
External requirements	
Power	100V to 240V (50Hz/60Hz)
Gas Supply	Nitrogen or Air 3.5bar/51psi (Less than 3L/min)
Dimensions	250mm (10in) W - 330mm (13in) H - 530mm (21in) D
Weight	15.5kg (33lbs)

is committed to user satisfaction with every VWR ELSD detector, and provides you with:

- A Worldwide distribution network at your service.
- On-site installation and training.
- Full SOP (Standard Operating Procedures) including IQ, OQ, PQ.
- Technical and applications support.
- Web-access to applications in many fields.
- User seminars, on and off-site.
- Flexible service contract options.
- Easy-to-order spare parts and accessories.

Quality Control and Educational Laboratories

VWR ELSD 80 ELSD combines sensitivity, reliability, and accuracy for your analyses, thanks to the unrivalled VWR ELSD low-temperature technology.

VWR ELSD 80 ELSD presents a number of innovative features including a unique low-temperature technology, with a competitive price. The evaporation drift tube design optimizes both efficiency and sensitivity. In addition, you can control the system locally or via a PC (with RS-232 activated models) thanks to drivers. A remote shut down mode is also provided to minimize cost and enhance system lifetime.



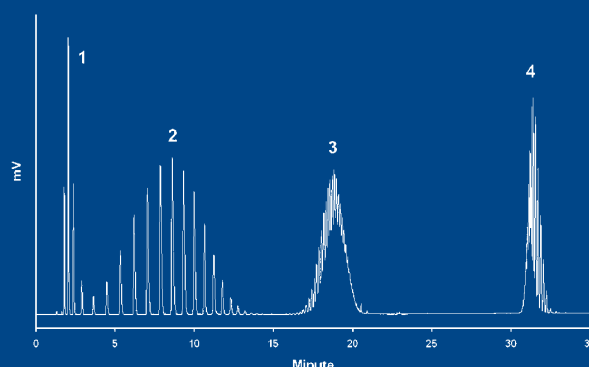
Chromatogram of the simultaneous HPLC/ELSD analysis of several surfactants

Features and Benefits:

- Low-temperature evaporation of the mobile phase: optimizes sensitivity of thermally labile and semi-volatile compounds.
- Enhanced sensitivity using digital signal treatment: an innovative signal processing algorithm minimizes noise and optimizes sensitivity.
- Minimized band broadening thanks to an innovative cell design and a choice of nebulizers. Two nebulizers, HPLC and Flash Chromatography, are available to optimize your applications. These nebulizers cover the flow rate range from 100µL/min to 5mL/min and can be easily changed to meet your application requirements. In addition, all parts of VWR ELSD 80 are designed so that the observed peak widths are similar to those obtained with UV/Vis detectors.
- Complete Remote Control: gas, heater, photomultiplier and light source can be automatically switched off at the end of a series of analyses.

Typical Application: Surfactants

The high sensitivity and time saving potential of ELSD are evident in the HPLC/ELSD analysis of mixtures of polymers in a single run which is not feasible with alternative methods such as RI, UV and MS detection.



- 1 - PEG 200,
- 2 - PEG 600,
- 3 - PEG 2000,
- 4 - Triton X100.

Injection Volume: 2µL

Column: Acclaim Surfactant Plus (3µm, 3.0 x 150mm), 30°C

Eluent: A - Ammonium acetate, 100mM, pH5; B - Acetonitrile

Gradient: 0-0.1 minute: 2%B, 0.1-20 minutes: from 2%B to 20%B, 20-30 minutes: 20%B to 50%B, 30-35 minutes: 50%B

Flow Rate: 0.6mL/min

High Performance and High Throughput

VWR ELSD 85 combines total remote control with excellent sensitivity and provides the standard solution in Low-Temperature Evaporative Light-Scattering Detection for HPLC, U-HPLC, and SFC.



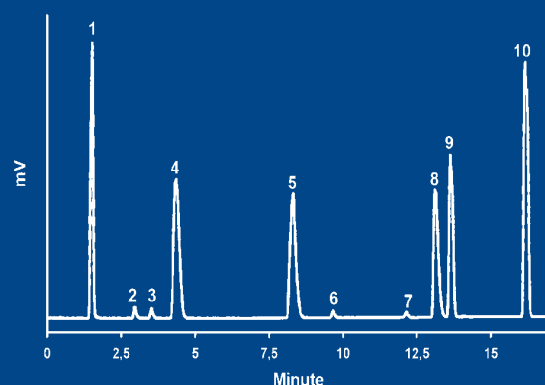
Multimodal stationary phase HPLC/ELSD chromatogram of the simultaneous analysis of polar and non-polar, neutral, acidic and basic pharmaceutical drugs and their counterions

Features and Benefits:

- Low-temperature evaporation of the mobile phase: optimizes sensitivity of thermally labile and semi-volatile compounds.
- Enhanced sensitivity using digital signal treatment: an innovative signal processing algorithm minimizes noise and optimizes sensitivity.
- Minimized band broadening thanks to an innovative cell design and a wide choice of nebulizers. Six nebulizers are available to optimize your applications. Four nebulizers cover the flow rate range from 5µL/min to 5mL/min, additionally there is one nebulizer optimized for U-HPLC and another one specifically for SFC. All these nebulizers can be easily changed to meet the requirement of the application. In addition, all parts of VWR ELSD 85 are designed to provide the lowest dispersion, so that the observed peak widths are similar to those obtained with the most advanced UV/Vis detectors.
- Complete Remote Control: gas, heater, photomultiplier and light source can be automatically switched off at the end of a series of analyses.

Typical Application: Polar, non-polar, neutral, acidic, basic API and their counterions

- The outstanding combination of multimodal columns with a unique detection mode such as ELSD can provide simple, direct and simultaneous analyses of active pharmaceutical ingredients of different chemical structures and their respective counterions.



1 - Acetaminophen, 2 - Sodium, 3 - Potassium, 4 - Hydrocortisone, 5 - Procainamide, 6 - Chloride, 7 - Nitrate, 8 - Miconazole, 9 - Losartan, 10 - Dichlofenac

Injection Volume: 2µL

Column: Acclaim Trinity P1 (3µm, 2.1 x 150mm), 30°C

Eluent: A - 80% Ammonium acetate 20mM, pH5 / 20% Acetonitrile; B - 30% Ammonium formate 200mM, pH3 / 70% Acetonitrile

Gradient: 0-2 minutes: 0%B, 2-17 minutes: from 0%B to 100%B

Flow Rate: 0.35mL/min

High Performance and High Throughput

VWR ELSD 90 ELSD combines total remote control with unrivalled sensitivities compared to all other aerosol-based detectors. It provides the ultimate solution in low-temperature evaporative light-scattering detection for HPLC, U-HPLC, and SFC, resulting from a new optical head design based on laser technology. This detector shows a number of innovative features including the ability to select the best nebulizer and a unique low-temperature technology. The evaporation drift tube design optimizes both efficiency and sensitivity. In addition, you can control the system locally or via a PC thanks to drivers. A remote shut down mode is provided to minimize consumable cost and enhance system lifetime.

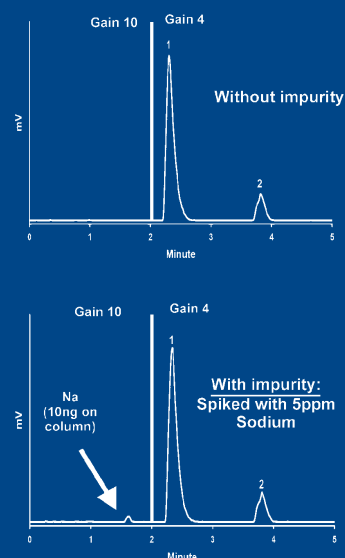


Chromatograms of the simultaneous HPLC/ELSD analysis of imipramine and its counterion, with and without an impurity (sodium, 5ppm)

Features and Benefits:

- Low-temperature evaporation of the mobile phase: optimizes sensitivity of thermally labile and semi-volatile compounds.
- New optical head design based on a selected laser: provides the highest signal-to-noise ratio for all compounds (typical sensitivity down to the mid picogram level on column).
- Enhanced sensitivity using digital signal treatment: an innovative signal processing algorithm minimizes noise and optimizes sensitivity.
- Dynamic range of over four orders of magnitude: enhanced determination of very low percentage of impurities.
- Direct linearity on the global dynamic range: enhanced correlation coefficients.
- Minimized band broadening thanks to an innovative cell design and a wide choice of nebulizers. Six nebulizers are available to optimize your applications. Four nebulizers cover the flow rate range from 5µL/min to 5mL/min, additionally there is one nebulizer optimized for U-HPLC and another one specifically for SFC. All these nebulizers can be readily and quickly changed to meet the requirement of the application. In addition, all parts of VWR ELSD 90 are designed to provide the lowest dispersion, so that the observed peak widths are similar to those obtained with the most advanced UV/Vis detectors (typically below 1 second in U-HPLC).
- Complete Remote Control: gas, heater, photomultiplier and light source can be automatically switched off at the end of a series of analyses.

1- Impurity assessment



1 - Imipramine (API: 10 000ppm),
2 - Cl (Counterion)

Injection Volume: 2µL
(20µg Imipramine, 10ng Sodium on column)

Eluent: Acclaim Trinity P1
(3µm, 2.1 x 150mm), 35°C

Gradient: Ammonium acetate
50mM, pH5 / Acetonitrile (60:40)

Flow Rate: 0.5mL/min

Typical applications: impurity assessment and response consistency

Aerosol-based detectors are very useful to pharmaceutical analysis, particularly those which provide the best sensitivity and reproducibility, a wide dynamic range, a correct direct linearity and response consistency, and which can suit both conventional HPLC and U-HPLC. VWR ELSD 90 meets perfectly well these requirements. As an example, two case studies are presented on impurity assessment and response consistency.



VWR ELSDs are designed to integrate into any lc or sfc system, from any Manufacturer. They can also be directly controlled and data collected via drivers with The following major chromatography software:

- OpenLAB® (ChemStation and EZChrom editions)
- ChemStation®
- EZChrom®
- Chromeleon®
- Xcalibur®
- Clarity®

CASE STUDIES:

Case 1

Lipids

ELSD solves the major problems common to other HPLC detectors: lack of sensitivity, incompatibility with multi-solvent gradients. This state-of-the-art technique is ideally suited to non-chromophoric compounds, such as lipids and phospholipids.

ELSD is also highly useful where the mobile phase contains a chromophore, such as Acetone, which blanks out the UV detector.

Injection Volume: 2µL

Column: Hypersil GOLD (1.9µm, 2.1 x 200mm), 60°C

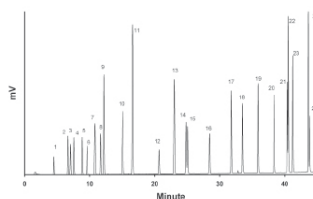
Eluent: A - MeOH/ACN/H₂O/Formic acid (500:300:198:2); B -

MeOH/Acetone/Formic acid (598:400:2)

Gradient: 0-3 minutes: 100%A, 3-43 minutes: from 100%A to 100%B

Flow Rate: 0.3mL/min

Chromatogram of the simultaneous HPLC/ELSD analysis of fatty acids, fatty alcohols, fat-soluble vitamins, mono-, di- and triglycerides and related compounds



- 14 - Docosanol
- 15 - α-Tocopherol (Vit. E)
- 16 - Phylloquinone (Vit. K1)
- 17 - Squalene
- 18 - Diolein
- 19 - Trilaurin
- 20 - Trilinolenin
- 21 - Trimyrustin
- 22 - Coenzyme Q10
- 23 - Trilinolein
- 24 - Tripalmitin
- 25 - Triolein

Case 2

Inorganic Ions

ELSD can dramatically simplify the analysis of inorganic ions in aqueous samples. A broad range of volatile buffers can be used to separate the ions. Since the mobile phase and buffers are vaporized before the ions are detected, the need for ion suppression is eliminated. This example shows a generic method to determine rapidly and simultaneously inorganic cations and anions.

Injection Volume: 2µL

Column: ZIC-HILIC (3.5µm, 2.1 x 150mm), 40°C

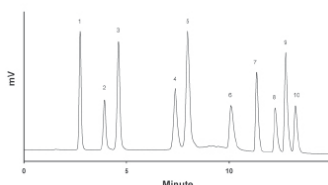
Eluent: A - Ammonium formate 20mM, pH3; B - Acetonitrile

Gradient: 0-3 minutes: 20%A, 3-10 minutes: from 20%A to 80%A, 10-15 minutes: 80%A

Flow Rate: 0.3mL/min

Brand names are trademarks of their respective companies.

Chromatogram of the simultaneous HILIC/ELSD analysis of inorganic anions and cations



- | | |
|---------------------|---------------------|
| 1 - NO ₃ | 6 - PO ₄ |
| 2 - Br | 7 - SO ₄ |
| 3 - Cl | 8 - Zn |
| 4 - K | 9 - Mg |
| 5 - Na | 10 - Ca |

Case 3

SFC

Supercritical Fluid Chromatography is gaining an increasing interest. It presents many advantages compared to other chromatography techniques and it has emerged as a powerful « green » technology in industries such as pharmaceutical, agricultural, food and environmental, etc. The following example demonstrates that the combination of SFC / ELSD provides a much simpler and quicker relevant alternative to Gas Chromatography for the fast screening of impurities in Biodiesel.

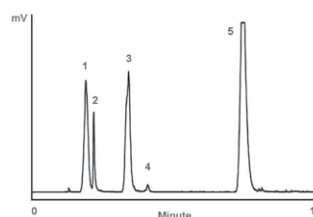
Injection Volume: 5µL

Column: Diol (5µm, 4.6 x 250mm)

Eluent: CO₂ / Ethanol (isocratic, 95:5); P (out) = 15MPa

Flow Rate: 3mL/min

Chromatogram of SFC/ELSD analysis of ASTM D6584 standard for biodiesel quality determination



- 1 - Triolein
- 2 - Pyridine (standard sample solvent)
- 3 - 1,3 Diolein
- 4 - Glycerol
- 5 - Monoilein

(Courtesy of Dr. Eric Lesellier, University of Orléans, France)

Chromatography Services

The VWR service department accompanies and supports you and your chromatography system throughout the instrument's entire life, by providing customised service packages to optimise your results and keep costs down.

Installation and qualification

Our service engineers install and commission your chromatography system including expert qualification and maintenance using specially calibrated instruments and certificated test samples. The work is carried out using authorised Standard Operating Procedures and can be used to compile the necessary IQ, OQ and PQ documentation.

A team of software specialists is available to help you with all questions relating to data management; they install and validate your system either in an individual workstation or as part of your client-server system. Subsequently, they can monitor your systems over their entire lifespans.

We keep your system running

Regular expert maintenance keeps your analytical systems reliable and maintains the value of your investment. A maintenance contract increases the overall productivity of the system and generates more time for the user for other important tasks. Such a maintenance contract can be adapted to frequency of maintenance and qualification and to the type of work performed.



8 Good reasons for establishing a service contract with VWR

1. Extended guarantee

If on purchasing new equipment you take out a service contract, your guarantee automatically increases to three years.

2. Manufacturer's competence for optimal functionality

Your apparatus will be regularly checked by competent service technicians certificated by the relevant manufacturer.

3. Calculable costs

The costs involved for service and repair are completely calculable as they are covered by the contractual flat rate.

4. Reduction of operating costs

The early recognition of wear and tear and technical defects prevents costly repairs, annoying downtime and prolongs the useful life of the equipment.

5. Priority treatment

As a service contract customer, your repairs will be treated with priority.

6. Operational safety

Regular servicing increases the operational safety of your equipment.

7. Minimum administrative effort and expense

VWR coordinates and monitors your service requirements and carries them out at your convenience.

8. Original spare parts

In carrying out service and repairs, only original parts are used.

SPECIFICATIONS	VWR ELSD 100	VWR ELSD 90	VWR ELSD 85	VWR ELSD 80	VWR ELSD LC	VWR ELSD FP
Components						
Detection	SAGA-Enhanced Photodiode board	Photomultiplier (PMT)	Photomultiplier (PMT)	Photomultiplier (PMT)	Photodiode	Photodiode
Light Source	Blue High power laser, with elapsed time counter and high performance power management	10mW - 405nm Laser Elapsed Time Counter	Blue LED Elapsed Time Counter	Blue LED Elapsed Time Counter	Blue LED Elapsed Time Counter	Blue LED Elapsed Time Counter
Temperature Range	Ambient to 100°C					
Nebulizers	Low Flow, HPLC, UHPLC, SFC	HPLC, Low Flow, Micro, CC, U-HPLC, SFC	HPLC, Low Flow, Micro, CC, U-HPLC, SFC	HPLC, Flash	LC	Flash
Eluent Flow Rate	50 µL/min to 2 mL/min	5µL/min to 5mL/min	5µL/min to 5mL/min	100µL/min to 5mL/min	200µL/min to 2mL/min	100µL/min to 5mL/min
Typical Sensitivity	250 pg	500pg	1ng	5ng	5ng	100ng
DATA						
Analog Output	0 - 1 Volt					
Gain Settings	1 to 7 or SAGA (patented dynamic auto-gain)	1 to 12 - Factor 211 (2048)	1 to 12 - Factor 211(2048)	1 to 12 - Factor 211 (2048)	1 to 7	1 to 8
Filter	Dedicated numerical algorithm	Moving Average (0 - 0.5 - 1 - 2 10)	Moving Average (0 - 0.5 - 1 - 2 10)	Moving Average (0 - 0.5 - 1 - 2 10)	Dedicated Numerical Algorithm	Moving Average (0 - 0.5 - 1 - 2 10)
Signal Amplification	SAGA (Software Automated Gain Adjustment)				SAGA (Software Automated Gain Adjustment)*	SAGA (Software Automated Gain Adjustment)*
Data Rate	Up to 100 Hz	100Hz	100Hz	40Hz	40Hz	10Hz
COMMUNICATION						
Display and Selection	OLED Display with illuminated keypad	Liquid Crystal Display and Keypad	Liquid Crystal Display and Keypad	Liquid Crystal Display and Keypad	OLED Display and Keypad	OLED Display and Keypad
Events	Contact Closure, TTL for Ready, Autozero					
Powerdown Methods	Frontpanel or driver activated, with or without delay	Shut-off: Gas, Light Source, Heating and/or PMT Cleaning Mode	Shut-off: Gas, Light Source, Heating and/or PMT Cleaning Mode	Shut-off: Gas, Light Source, Heating and/or PMT Cleaning Mode	Shut-off: Gas, Light Source, Heating and/or PMT Cleaning Mode	Shut-off: Gas, Light Source, Heating and/or PMT Cleaning Mode
Computer Interface	USB or RS-232	USB, RS-232	RS-232	RS-232 (option)	USB, RS-232	USB, RS-232
Software	Openlab EZChrom®,Openlab Chemstation®, Chemstation®, EZChrom®,Clarity®, Chromeleon®					
EXTERNAL REQUIREMENTS						
Power	100V to 240V (50Hz/60Hz)	230V/50Hz or 115V/60Hz	230V/50Hz or 115V/60Hz	230V/50Hz or 115V/60Hz	100V to 240V (50Hz/60Hz)	100V to 240V (50Hz/60Hz)
Gas Supply	Nitrogen or Air 3.5bar/51psi (Less than 3L/min)	Nitrogen or Air 3.5bar (less than 3L/min)	Nitrogen or Air 3.5bar (less than 3L/min)	Nitrogen or Air 3.5bar (less than 3L/min)	Nitrogen or Air 3.5bar (less than 3L/min)	Nitrogen or Air 3.5bar (less than 3L/min)
Dimensions	250mm (10in) W - 330mm (13in) H - 530mm (21in) D	"250mm (10in) W 480mm (19in) H 550mm (22in) D"	"250mm (10in) W 480mm (19in) H 550mm (22in) D"	"250mm (10in) W 480mm (19in) H 550mm (22in) D"	"250mm (10in) W 330mm (13in) H 530mm (21in) D"	"250mm (10in) W 330mm (13in) H 530mm (21in) D"
Weight	15.5kg (33lbs)	18.5kg (41lb)	18.5kg (41lb)	18.5kg (41lb)	15kg (33lb)	15kg (33lb)

Specifications are subject to change as part of our ongoing product improvement program.

VWR is committed to user satisfaction with every VWR ELSD detector, and provides you with:

- A Worldwide distribution network at your service.
- On-site installation and training.
- Full SOP (Standard Operating Procedures) including IQ, OQ, PQ.
- Technical and applications support.
- Web-access to applications in many fields.
- User seminars, on and off-site.
- Flexible service contract options.
- Easy-to-order spare parts and accessories.

An Industry Standard for Evaporative Light-Scattering Detection

The arrival of the Ultra Fast HPLC has fueled the demand for technology capable of both qualitative and quantitative analysis of complex mixtures at high speed.

VWR ELSD technology has been validated by extensive applications within the drug discovery, pharmaceutical and nutraceutical industries. VWR ELSD detectors are used in every major pharmaceutical company and in hundreds of biotechnology laboratories in industry and universities.

For many research and process requirements, complementary detection by VWR ELSD has proven indispensable to high quality LC/MS and other HPLC procedures. VWR ELSD is particularly valuable for effective compound library screening, where sample characterization may be incomplete. With other ELS detectors, volatilization could limit the detection capability of the platform, resulting in loss of vital data.

By combining reliability and sensitivity, VWR ELSD detectors have taken their place in the armamentarium of excellent techniques for medicinal chemistry.

Description	Pk	VWR Catalog Number
ELSD LC HPLC low temperature evaporative light scattering detector, 100 - 230 V	1	903-0283
ELSD FP preparative low temperature evaporative light scattering detector, 100 - 230 V	1	903-0282
ELSD 100 HPLC low temperature evaporative light scattering detector, 100 - 230 V	1	903-0630
ELSD 100 UHPLC low temperature evaporative light scattering detector, 100 - 230 V	1	903-0631

Description	Pk	VWR Catalog Number
ELSD 90 HPLC low temperature evaporative light scattering detector, 230 V, EU-plug	1	903-0271
ELSD 90 UHPLC low temperature evaporative light scattering detector, 230 V, EU-plug	1	903-0273
ELSD 85 HPLC low temperature evaporative light scattering detector, 230 V, EU-plug	1	903-0234
ELSD 85 HPLC low temperature evaporative light scattering detector, 115 V	1	903-0235
ELSD 85 UHPLC low temperature evaporative light scattering detector, 230 V, EU-plug	1	903-0236
ELSD 85 UHPLC low temperature evaporative light scattering detector, 115 V	1	903-0237
ELSD 85 HPLC low temperature evaporative light scattering detector for use with lower flow rates, 230 V, EU-plug	1	903-0238
ELSD 85 HPLC low temperature evaporative light scattering detector for use with lower flow rates, 115 V	1	903-0239
ELSD 85 HPLC low temperature evaporative light scattering detector for use with micro flow rates, 230 V, EU-plug	1	903-0240
ELSD 85 HPLC low temperature evaporative light scattering detector for use with micro flow rates, 115 V	1	903-0241
ELSD 85 HPLC low temperature evaporative light scattering detector for use with combinatorial chemistry applications, 230 V, EU-plug	1	903-0242
ELSD 85 HPLC low temperature evaporative light scattering detector for use with combinatorial chemistry applications, 115 V	1	903-0243
ELSD 85 HPLC low temperature evaporative light scattering detector for use with super critical fluid chromatography, 230 V, EU-plug	1	903-0244
ELSD 85 HPLC low temperature evaporative light scattering detector for use with super critical fluid chromatography, 115 V	1	903-0245
ELSD 80 HPLC low temperature evaporative light scattering detector, 230 V, EU-plug	1	903-0247
ELSD 80 HPLC low temperature evaporative light scattering detector, 115 V	1	903-0248
ELSD 80 HPLC low temperature evaporative light scattering detector for use with combinatorial chemistry applications, 230 V, EU-plug	1	903-0249
ELSD 80 HPLC low temperature evaporative light scattering detector for use with combinatorial chemistry applications, 115 V	1	903-0250

Description	Pk	VWR Catalog Number
EZChrom 3.3.2 SP2 driver for HPLC low temperature evaporative light scattering detector (ELSD) for models ELSD 80, ELSD 85, ELSD 90, ELSD LC, ELSD FP and ELSD 100	1	903-0246
Chromleon® driver for HPLC low temperature evaporative light scattering detector (ELSD) for models ELSD 80, ELSD 85, ELSD 90, ELSD LC, ELSD FP and ELSD 100	1	903-0278
ChemStation™ B driver for HPLC low temperature evaporative light scattering detector (ELSD) for models ELSD 80, ELSD 85, ELSD 90, ELSD LC, ELSD FP and ELSD 100	1	903-0279
OpenLAB ChemStation™ driver for HPLC low temperature evaporative light scattering detector (ELSD) for models ELSD 80, ELSD 85, ELSD 90, ELSD LC, ELSD FP and ELSD 100	1	903-0280
OpenLAB EZChrom driver for HPLC low temperature evaporative light scattering detector (ELSD) for models ELSD 80, ELSD 85, ELSD 90, ELSD LC, ELSD FP and ELSD 100	1	903-0281

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