**Low Temperature Evaporative Light Scattering Detectors**

**SEDEX LT-ELSD™**

THE RESULT OF 25 YEARS OF EVOLUTION

**EXPERIENCE**

In our laboratory at the University of Geneva, we are using SEDEX LT-ELSD technology for more than 20 years as a complementary tool in our detector and to develop LC-MS Joint analyses since the prerequisite concerning the nature of the mobile phase is solved. We have a long-term collaboration with the manufacturer, SEDERE, to demonstrate the extent of each detector in the pharmaceutical field. Their latest product, namely SEDEX LT, is more sensitive than the previous generation and still robust, reliable, easy-to-use and robust across applications.

Jean-Luc Veuthey, Ph.D. & Davy Guillarme, Ph.D.

**Professor & Senior lecturer School of Pharmaceutical Sciences, University of Geneva**

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**Bibliography**

The Evaporative Light-Scattering Detector as a Tool for the Analysis of Lipids by High-Performance Liquid Chromatography. M. Ganzera, H. Stuppner, Current Pharmaceutical Analysis, 2005, 1, 135-144.


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**Specifications**

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**Technical and applications support.**

**SEDERE is committed to user satisfaction with every SEDEX 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.
- User seminars, on and off-site.
- User seminars, on and off-site.

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**FEATURES**

- High sensitivity for semi-volatiles and thermo-sensitive compounds.
- Lowest background noise to provide excellent SN ratio.
- Optimization of peak shape and peak width.
- Compatibility 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.

**CASE 4**

**UNDERIVATIZED AMINO ACIDS**

Analysis of amino acids has typically been complicated by the absence of suitable chromophores in naturally occurring amino acids. Using LT-ELSD™, sensitivity is excellent with detection limits as low as 2ng on column. In a study, twenty nine amino acids have been separated and quantified within 20min with no sample pre-treatment step for derivatization.

**Injection Volume:** 2µL

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

**Gradient:** 0 minute: 6%B, 0-3.1 minutes: from 6%B to 56%B

**Column:** Acquity BEH C18 (1.7µm, 2.1 x 50mm), 25°C

**Flow Rate:** 0.25mL/min

**Chromatogram of SFC/ELSD analysis of ASTM D6584 standard solution**

11 - Proline, 10 - Lysine, 9 - Ketoprofen, 8 - Hydrocortisone, 7 - Lecithin, 6 - Noscapine, 5 - Sulfamethoxazole, 4 - Acebutolol, 3 - Chloroprocaine, 2 - Caffeine, 1 - Sulfanilamide, 11 - Proline, 10 - Lysine, 9 - Ketoprofen, 8 - Hydrocortisone, 7 - Lecithin, 6 - Noscapine, 5 - Sulfamethoxazole, 4 - Acebutolol, 3 - Chloroprocaine, 2 - Caffeine, 1 - Sulfanilamide

**CASE 5**

**U-HPLC**

The pharmaceutical discovery environment requires an increasing number of high-throughput methods to identify potential drug candidates. In this respect, the powerful and versatile LT-ELSD™ is the detector of choice because of its high sensitivity and excellent technology which provides the smallest peaks within the best separation and high data rate. This detector offers an application which combines an ultra-fast liquid chromatography system with LT-ELSD™ technology to determine the identity, purity, and quantity of small molecules. In this case, high speed, SEDEX LT-ELSD™ technology has proven indispensable for high quality LC/MS analysis.

**Injection Volume:** 2µL

**Eluent:** A - H2O + (0.5% TFA, 0.3% HFBA); B - Acetonitrile

**Column:** Acquity UPLC XB C18 (1.8µm, 1.7 x 50mm), 25°C

**Flow Rate:** 0.25mL/min

**Chromatogram of U-HPLC analysis of active pharmaceutical ingredients**

1 - Triolene, 2 - Caffeine, 3 - Chlorophenylalanine, 4 - Acebutolol, 5 - Sulfadiazine, 7 -_Valine, 8 - Methionine, 10 - Artesunate, 11 - Proline, 12 - Histidine, 13 - Theanine, 14 - Arginine, 15 - Valine, 16 - Methionine, 18 - Isoleucine, 19 - Valine, 20 - Norleucine, 21 - Threonine, 22 - Tryptophan

**ORDERING INFORMATION**

Standards kits 115 Y 230 Y

**SEDEX HPLC**

- HPLC Version (RS232 activated) 80001S 80000S
- Micro LC Version 85601 85600
- Prep. Chromatography & Melting Point 85001 85000
- Micro LC Version 85601 85600
- Prep. Chromatography & Melting Point 85001 85000
- Prep. Chromatography & Melting Point 85001 85000
- Prep. Chromatography & Melting Point 85001 85000

**SEDEX UHPLC**

- HPLC Version 85901 85900
- Prep. Chromatography & Melting Point 85601 85600
- Prep. Chromatography & Melting Point 85001 85000
- Prep. Chromatography & Melting Point 85001 85000
- Prep. Chromatography & Melting Point 85001 85000

**SEDEX SPE**

- Standards Version 50000

**SEDEX FP**

- Standards Version 40000
Low Temperature Evaporative Light-Scattering Detectors

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. SEDEX LT 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 SEDEX 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 SEDEX LT 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 GSF™, go through an optical head designed to measure the scattered light. GSF™ involves the addition of gas to focus the solute particles within the optical head for enhanced detection and safety.

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 of our competitors’ 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.

Caffeine Injection

Better Detection of Semi-Volatile Solutes with SEDEX LT-ELSD™

Poor Detection of Semi-Volatile Solutes with High Temperature Evaporation

• All SEDERE 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.
SEDEX Model LC combines sensitivity, reliability, and accuracy for all your analytical works, thanks to unrivaled SEDEX technology.

The SEDEX Model 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.

FEATURES AND BENEFITS:

- Optimizes sensitivity of non-volatile, thermally labile and semi-volatile compounds.
- Minimized band broadening thanks to a dedicated SEDEX LC HPLC nebulizer and an innovative cell design. This nebulizer covers the flow rate range from 200µL/min to 2mL/min and can be easily mounted and dismounted.
- With SAGA (SEDEX Automated Gain Adjustment)*, an innovative gain control available when it is driver-controlled by software, SEDEX 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 SEDEX ELSD can detect chromophoric and non-chromophoric molecules in a single gradient HPLC analysis with an excellent sensitivity, thanks to SEDEX technology. The following example shows a method for a quick and simultaneous determination of terpenic lactones and flavonoids present in Ginkgo Biloba.

CHROMATOGRAM OF FOUR TERPENIC LACTONES AND THREE FLAVONOIDs BY HPLC/ELSD

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

Injection Volume: 1µL
Column: Hypersil Gold (1.9µm, 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
SEDEX Model FP combines simplicity, reliability, and robustness for all your purification works, thanks to unrivalled SEDEX technology.

The SEDEX Model 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, SEDEX 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 SEDEX FP nebulizer and an innovative cell design. This nebulizer covers the flow rate range from 100µL/min to 5mL/min and can be readily and quickly mounted and dismounted.
- With SAGA (SEDEX Automated Gain Adjustment)*, an innovative gain control available when it is driver-controlled by software, SEDEX 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, SEDEX 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
SEDEX Model 80 LT-ELSD™ combines sensitivity, reliability, and accuracy for your analyses, thanks to the unrivalled SEDEX low-temperature technology.

SEDEX Model 80 LT-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.

**Features and Benefits:**

- Low-temperature evaporation of the mobile phase: optimizes sensitivity of thermally labile and semi-volatile compounds.
- 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 100 µL/min to 5 mL/min and can be easily changed to meet your application requirements. In addition, all parts of SEDEX Model 80LT 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 LT-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.

**Injection Volume:** 2 µL

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

**Eluent:**
- A - Ammonium acetate, 100 mM, pH 5
- 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:** 0.6 mL/min
SEDEX Model 85 LT-ELSD™ 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.

**FEATURES AND BENEFITS:**

- Low-temperature evaporation of the mobile phase: optimizes sensitivity of thermally labile and semi-volatile compounds.
- 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 SEDEX Model 85LT 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 LT-ELSD™ can provide simple, direct and simultaneous analyses of active pharmaceutical ingredients of different chemical structures and their respective counterions.

**MULTIMODAL STATIONARY PHASE HPLC/ELSD CHROMATOGRAM OF THE SIMULTANEOUS ANALYSIS OF POLAR AND NON-POLAR, NEUTRAL, ACIDIC AND BASIC PHARMACEUTICAL DRUGS AND THEIR COUNTERIONS**

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

**Injection Volume:** 2µL

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

**Eluent:** A - 80% Ammonium acetate 20mM, pH 5 / 20% Acetonitrile; B - 30% Ammonium formate 200mM, pH 3 / 70% Acetonitrile

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

**Flow Rate:** 0.35mL/min
SEDEX Model 90 LT-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.

**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).
- 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 SEDEX Model 90 LT 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.

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

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

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

**Flow Rate:** 0.5mL/min

**Chromatograms of the simultaneous HPLC/ELSD Analysis of Imipramine and its Counterion, With and Without an Impurity (Sodium, 5ppm)**

1. Impurity assessment

- Without impurity
- With impurity

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1. Imipramine (API: 10 000ppm),
2. Cl (Counterion)
**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. SEDEX Model 90 LT-ELSD meets perfectly well these requirements. As an example, two case studies are presented on impurity assessment and response consistency.

**Injection Volume:** 2µL  
**Column:** Halo C18 (2.7µm, 2.1 x 150mm), 30°C  
**Eluent:** H2O / Acetonitrile (85:15)  
**Flow Rate:** 0.5mL/min

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**SEDEX DRIVERS**

SEDEX ELS Detectors 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®
LT-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. LT-ELSD™ is also highly useful where the mobile phase contains a chromophore, such as Acetone, which blanks out the UV detector.

**CASE 1**
**LIPIDS**

Unlike RI Detection, LT-ELSD™ allows gradient elution. Gradient elution provides increased resolution of sugars in minimal time, impossible with RI and isocratic elution. Moreover, lower detectable limits (sensitivity) can be improved by orders of magnitude. Nanomole and picomole detectability are obtained with the improved sensitivity of LT-ELSD™. Mono-, oligosaccharides and polyols are easily and rapidly characterized by gradient HPLC with LT-ELSD™. Previously, RI detection entailed slow and tedious programmed flow, often up to several hours. LT-ELSD™ also enables analysis of high “DPs” which is an important advantage.

**Injection Volume**: 2µL
**Columns**: 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

**CASE 2**
**CARBOHYDRATES**

**Injection Volume**: 2µL
**Columns**: Intakel UK-Amino (3µm, 3.0 x 250mm), 60°C
**Eluent**: A - H2O; B - Acetonitrile
**Gradient**: 0-6 minutes: 10%A, 6-20 minutes: from 10%A to 25%A, 20-25 minutes: 25%A
**Flow Rate**: 0.7mL/min

**CASE 3**
**INORGANIC IONS**

LT-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**: 3µL
**Columns**: ZIC-HILIC (3.5µm, 2.1 x 150mm), 48°C
**Eluent**: A - Ammonium formate 20mM, pH3; B - Acetonitrile
**Gradient**: 0-3 minutes: 20%B, 3-10 minutes: from 20%B to 80%B, 10-15 minutes: 80%B
**Flow Rate**: 0.3mL/min

Brand names are trademarks of their respective companies.
OUT OF MORE GETTING YOUR OF HPLC, U-HPLC, LCMS, AND SFC ANALYSIS

Introducing SEDEX detectors

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

As the industry leader, SEDEX leverages decades of experience and customer knowledge to continually bring the latest for High Sensitivity, High Flexibility and High reliability detector performance for chromatography laboratories.

The unparalleled selection of five SEDEX LT-ELSD™ models can satisfy both high performance requirements and budget limitations for all analytical and preparative chromatography applications from basic research to quality control.

Evaporative Light Scattering Detection (ELSD) provide a Universal Detector for the following analysis technologies:

• Standard HPLC
• U-HPLC
• HPIC
• HPLC
• LC
• GC
• 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 any compounds less volatile than the middle phase, including those with no chromophore or vastly differing extinction coefficients.

The detection mode is able to accurately measure a wide range of analytes with consistent response and it is therefore an extremely useful technique to get the complete picture of complex samples. In some cases, SEDEX LT-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 derivatization step) or Inorganic Ions (without the need of any additional post-column device).

SEDEX LT-ELSD™ is commonly used in Industrial, Governmental Research and University research and control laboratories.

CASE 4

UNDERIVATIZED AMINO ACIDS

Analysis of amino acids has typically been complicated by the absence of adequate chromatographs in naturally occurring amino acids. Using LT-ELSD™, sensitivity is excellent with detection limits as low as 2ng on column study; twenty two amino acids have been separated and quantified within 20min without any sample preparation step for derivatization.

Injection Volume: 2µL Column: Acquity BEH C18 (5µm, 4.6 x 250mm), 25°C Gradient: 0 minute: 6%B, 0-3.1 minutes: from 6%B to 56%B Flow Rate: 0.5mL/min

CASE 5

U-HPLC

The pharmaceutical discovery environment requires an increasing number of rapid high-throughput methods such as UHPLC to be able to identify small quantities of each compound in the test, and the detector of choice because of its universality, high sensitivity, and optimized technology, which provides the smallest peak widths, the best symmetry, and high data rate. This example shows an application which combines an ultra-fast liquid chromatography system with LT-ELSD™ to determine pharmaceutically relevant chiral-compounds such as artemesin and its analogs.

Injection Volume: 5µL Column: Acquity UPLC BEH C18 (1.7µm, 2.1 x 50mm), 25°C Gradient: 0-3 minutes: 100%A, 3-10 minutes: from 0%B to 5%B, 10-20 minutes: from 5%B to 100%A Flow Rate: 0.3mL/min

CASE 6

HPLC

Supercritical Fluid Chromatography is gaining an increasing interest. It presents many advantages compared to other chromatography techniques as it has started to provide a powerful and efficient technology in industries such as pharmaceutical, agricultural, food and environmental etc. The following example demonstrates that the combination of SFC-LT-ELSD™ provides a much simpler and quicker alternative to Gas Chromatography for the fast screening of impurities in Biocatalysis.

Injection Volume: 2µL Column: Hichrom Diol (5µm, 4.6 x 150mm) Gradient: 0 minute: 95%B, 0-3 minutes: from 95%B to 5%B Flow Rate: 0.3mL/min

ORDERING INFORMATION

Standards Sets 115 V 230 V
SEDEX 85 LT-ELSD™
HPLC Version 85001 85000
UHPLC Version 85010 85009
SEDEX 85 LT-ELSD™
HPLC Version 85051 85050
UHPLC Version 85050 85049
Low Temp. Version 85011 85010
Micro L/C Version 85045 85040
SFC Version 85051 85050
SEDEX 85 LS232 actuated
HPLC Version 800015 800005
Standards Version 50000
SEDEX 85
Standards Version 40000

EXPERIENCE

An Industry Standard for Evaporative Light-Scattering Detection

The arrival of the Ultra Fast HPLC has fueled the demand for technology capable of both high-throughput and high-quality analysis at high speed. SEDEX LT-ELSD™ technology is often the complementary technique of choice in many applications within the drug discovery, pharmaceutical and chemical development industries, creating detectors for many research and process requirements, complementary detection by SEDEX LT-ELSD™ long proves indispensable in high quality and/or other HPLC procedures. SEDEX LT-ELSD™ is particularly valuable for the characterisation of semipurified compounds, which may be incompletely converted. With other ELSD detectors, volatilization could lead the detection capability of the platform, rendering it of little use.

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

The integration of the SEDEX ELSD in our preparative chromatography system was very fast and easy. This detector has proven to be a reliable solution for our customers who want to collect non-UV absorbing compounds. Thanks to its simplicity of use and its robustness this ELSD doesn’t require any particular expertise from the user. It can really be integrated in any preparative chromatography system as an easy and affordable “universal” detector.

Bogers, Antoon Ph.D
Product Group Manager
Prep. Chromatography & Analytical
BSL2/BSL1 Labouratorium AG

Sensitivity Flexibility Experience

Features

• High sensitivity for non-volatiles and thermo-sensitive compounds.
• Linear background noise to provide excellent SN ratio.
• Optimization of peak shape and peak width.
• Compatibility of operating protocols.
• Compatibility of rehydration with any HPLC protocol.
• Prevents contamination of detector components.
• User friendly, low maintenance system.
• Integrate readily with HPLC software with drivers.
### Specifications

**SEDEX LT-ELSD™**

**Components**

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</table>

**Temperature Range**

- Ambient to 185°C
- Ambient to 180°C
- 180°C - 250°C
- 180°C - 250°C
- 180°C - 250°C

**Flow Rate**

- 100µL/min to 5mL/min
- 200µL/min to 2mL/min
- 300µL/min to 5mL/min
- 300µL/min to 5mL/min
- 300µL/min to 5mL/min

**Data**

- Analog Output: 0 - 1 Volt
- Total Sensitivity: 150mV
- Emissivity: 0.9
- Automatic Gain Adjustment
- Automatic Gain Adjustment
- Automatic Gain Adjustment
- Automatic Gain Adjustment
- Automatic Gain Adjustment

**Software**

- Drivers (option)
- Users Manual
- Application Note
- Calibration Note
- Users Manual
- Application Note
- Calibration Note
- Users Manual
- Application Note
- Calibration Note
- Users Manual
- Application Note

**External Requirements**

- Power: 100V to 240V 50Hz/60Hz
- Power: 100V to 240V 50Hz/60Hz
- Power: 100V to 240V 50Hz/60Hz
- Power: 100V to 240V 50Hz/60Hz
- Power: 100V to 240V 50Hz/60Hz

**SEDERE is committed to user satisfaction with every SEDEX detector, and provides you with:**

- **Flexibility:**
  - Comprehensive service contracts.
  - Technical and applications support.

- **Sensitivity:**
  - Wide range of applications in many fields.
  - User seminars, on and off-site.

- **Experience:**
  - Comprehensive service contracts.
  - Technical and applications support.

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**CASE 4**

**UNDERIVATIZED AMINO ACIDS**

Analysis of amino acids has typically been complicated by the absence of suitable chromatographic systems in naturally occurring amino acids. Using LT-ELSD™, sensitivity is excellent with detection limits as low as 2ng on-column. In this study, twenty-four amino acids have been separated and quantified within 20min without any sample preparation step for derivatization.

**Injection Volume:** 2µL
**Column:** Diol (5µm, 4.6 x 250mm)
**Flow Rate:** 0.3mL/min
**Gradient:** from 5%B to 35%B

**CASE 5**

**U-HPLC**

Despite much interest in recent years, Supercritical Fluid Chromatography (SFC) is not widely used. One of the main reasons is the cost and complexity of the equipment required. SEDEX LT-ELSD™ provides a much simpler and quicker relevant solution for our customers who want to collect non-UV absorbing compounds. Thanks to its simplicity of use and its robustness, SEDEX LT-ELSD™ doesn't require any particular expertise from the user. It can really be integrated in any preparative chromatography system as an easy and affordable "universal" detector.

**Injection Volume:** 2µL
**Column:** Red C18 (4.6 x 100mm)
**Flow Rate:** 1.0 mL/min (max. 1.5 mL/min for 3µm, 10 mL/min for 5µm)
**Gradient:** 0-3 minutes: 100%A, 3-10 minutes: from 0%B to 5%B, 10-20 minutes: from 5%B to 35%A

**CASE 6**

**HPLC**

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

**Injection Volume:** 2µL
**Column:** Diol (5µm, 4.6 x 250mm)
**Flow Rate:** 1.5 mL/min
**Gradient:** 0-3 minutes: 100%A, 3-10 minutes: from 0%B to 5%B, 10-20 minutes: from 5%B to 35%A

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**SEDEX-LT-ELSD™**

An Industry Standard for Evaporative Light-Scattering Detection

The arrival of the Ultra Fast HPLC has fueled the demand for technology capable of both high accuracy and quantitative analysis of complex mixtures at high speed. SEDEX-LT-ELSD™ technology has been validated in various applications within the drug discovery, pharmaceutical and industrial industries. SEDEX detectors are used in many major pharmaceutical companies and in hundreds of biochemistry laboratories in industry and universities.

For many research and process requirements, complementary detection by SEDEX-LT-ELSD™ long-pass enrichment is in high quality using other HPLC procedures. SEDEX-LT-ELSD™ is particularly valuable for high sensitivity, immunity to noise, and label-free detection which may be incomparable. With other ELSD detectors, visualization could lead the detection capability of the platform. This is one of the first cases for biodiesel quality determination.

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

**ORDERING INFORMATION**

<table>
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<tr>
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</table>

*Case 4* Chromatogram of the HPLC/LT-ELSD analysis of underivatized amino acids

*Case 5* Chromatogram of the HPLC/LT-ELSD analysis of test active pharmaceutical ingredients

*Case 6* Chromatogram of SFC/LT-ELSD analysis of AstraZeneca standard for biodiesel quality determination
In our laboratory at the University of Geneva, we are using SEDEX LT-ELSD technology for more than 20 years as a complementary tool in LC detection and to develop LC-MS/MS protocols since the prerequisite concerning the nature of the mobile phase is easier. We have a long-term collaboration with the manufacturer SEDERE in demonstrating the amount of each detector in the pharmaceutical field. Our latest product, namely, SEDEX LT is more sensitive than the previous generation and still robust, flexible and easier-to-use andcost-effective.

Jean-Luc Vedder, Ph.D. & Zeny Guiller, Ph.D. Professor and Director School of Pharmaceutical Sciences, University of Geneva

**Bibliography**


