

Agilent 1290 Infinity Evaporative Light Scattering Detector (ELSD)

For Low Molecular Weight Compounds

Data Sheet



Introduction

Evaporative light scattering detectors (ELSDs) are ideal for detecting analytes with no UV chromophore as they do not rely on the optical properties of a compound. The Agilent 1290 Infinity Evaporative Light Scattering Detector (ELSD) is a high performance ELSD, benefitting from almost 20 years experience in the design and manufacture of ELSDs. The 1290 Infinity ELSD is the only ELSD that delivers subambient operation, for unrivalled detection of thermally labile analytes. Designed for the analysis of all compounds, the 1290 Infinity ELSD delivers evaporation down to 10 °C, providing maximum sensitivity for compounds with significant volatility below 30 °C. Programmable control of gas flow and temperature during an injection eliminates solvent gradient effects and maximizes response for improved accuracy. To detect everything you inject with high sensitivity, the 1290 Infinity ELSD is the ELSD of choice for all applications.

Key Benefits

- High sensitivity provides superb responses for all compounds, down to low nanogram levels.
- Subambient operation using a Peltier cooled evaporation tube delivers temperatures down to 10 °C, preventing degradation of the thermally labile compounds that other ELSDs cannot detect.
- Real-time control during an injection using programmable Dimension Software maintains maximum sensitivity throughout the run.
- Real-time gas programming using Dimension Software eliminates solvent enhancement effects during gradient elution, for excellent quantification.
- Low dispersion and high-speed data output rates are the perfect match for fast LC applications.
- Superb reproducibility below 2% gives reliable and accurate results.



Agilent Technologies

Key Benefits (Continued)

- Multivendor software control and data acquisition using Agilent ChemStation chromatography data system, and other vendors' interfaces, eliminates the need for an analog to digital converter.
- Rapid heating and cooling of the evaporator tube minimizes equilibration time.
- Full DMSO transparency ensures that responses from early eluting compounds are not hidden.
- Fully integrated with all Agilent analytical and preparative LC systems for the complete chromatographic solution.
- Complementary to LC/MS.

System Details

The 1290 Infinity ELSD delivers subambient evaporation down to 10 °C, providing maximum sensitivity for compounds with significant volatility below ambient temperature. The instrument benefits from fast data output rates and extremely low dispersion for fast LC, and delivers a universal response down to the low-nanogram range for truly representative analysis. Reproducibility is less than 2% for improved consistency of results. The 1290 Infinity ELSD offers real time gas management that eliminates solvent

effects to give a constant response across a gradient. Control and digital data collection come as standard for multivendor platforms so there is no need for an analog to digital converter. On-the-fly adjustment of light source intensity can save time during a run. All this in the smallest footprint available. Being complementary to LC/MS, and offering unrivalled flexibility and sensitivity, the 1290 Infinity ELSD is the ELSD of choice for the most demanding applications.

The Agilent Family of Evaporative Light Scattering Detectors

Evaporative light scattering detection is the powerful alternative to RI and UV, inject it and detect it, right down to low nanogram levels. ELSDs provide a universal response independent of the optical properties of the analyte so there is no loss of important information.

Agilent ELSDs can be used for a wide range of analytical techniques, including LC (analytical and preparative), LC/MS, SFC, high throughput screening, GPC/SEC, TREF, and GPEC. The range of application areas is equally broad, encompassing pharmaceuticals, nutraceuticals, combinatorial libraries, carbohydrates, lipids, phospholipids, triglycerides, fatty acids, amino acids, polymers, and surfactants.

Since the 1290 Infinity ELSD delivers subambient evaporation down to 10 °C, it provides maximum sensitivity for compounds with significant volatility below 30 °C. For nonvolatile compounds, where temperatures of 100 °C or above are required, the 1260 Infinity ELSD is the instrument of choice.

Choose the Right Agilent ELSD for Your Needs

	Agilent 1290 Infinity ELSD	Agilent 1260 Infinity ELSD
HPLC analysis:		
Nonvolatile compounds:	yes	yes
Semivolatile compounds:	yes	yes
Highly volatile compounds:	yes	x
Ambient GPC analysis:	yes	yes
High temperature GPC analysis:	x	x

Installation Qualification and Operation Qualification (IQ/OQ)

All Agilent ELSDs are rigorously tested to a high specification, and detailed IQ/OQ documentation is included with every unit before they are shipped. In addition, Agilent detectors can be incorporated into any LC system, a complete Qualification Workbook is provided to help you.

Uniform Mass Response

Agilent ELSDs are not dependent on a compound's optical properties so the ELSD provides a more uniform response than UV-VIS, making it the ideal detector for purity analysis or where calibration standards are not available.

Column: Agilent Polaris C18
4.6 × 150 mm, 5 μm
Eluent: Water/Acetonitrile 1:1
Flow rate: 1.0 mL/min
Injection volume: 10 μL
Detector: Agilent 1290 Infinity ELSD
(neb = 30 °C, evap = 30 °C,
gas = 1.4 SLM)

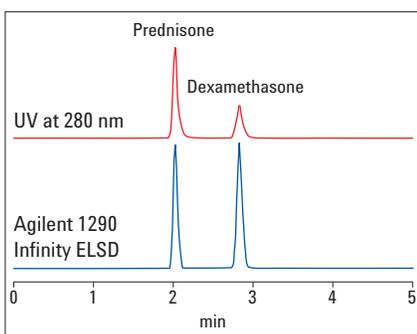


Figure 1
The Agilent 1290 Infinity ELSD delivers a more uniform mass response than UV from a 1:1 mixture.

Agilent ELSDs - Better by Design

Evaporative light scattering detection involves a three-stage process.

1. **Nebulization**—Using an inert gas stream to form a plume of uniformly sized droplets.
2. **Evaporation of the eluent**—Generating a plume of nonvolatile solute particles.
3. **Optical detection**—Where the intensity of scattered light is proportional to the mass of solute passing through the optical chamber.

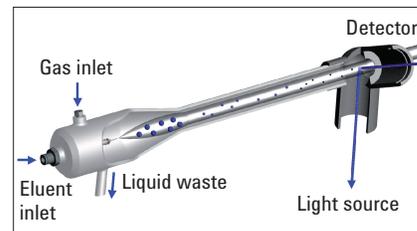
Nebulization

Efficient nebulization using low gas flow rates is a feature of Agilent ELSDs. Independent nebulizer temperature control and digital gas flow control provide excellent stability and reproducibility. Baseline noise is minimized by the removal of any poorly nebulized eluent through a drain port.

Evaporation

The nebulized stream passes through an independently temperature-controlled evaporator tube where solvent is removed at high temperature, leaving the less volatile solute particles behind.

The 1290 Infinity ELSD features patented¹ gas flow control technology with a short evaporator tube that gives an extremely low swept volume for minimal peak dispersion. This provides maximum resolution from the separation, especially important for work with small columns.



Optical detection

The solute particles are detected as they pass through the optical chamber. The high power LED and advanced design of the electronics delivers maximum sensitivity.

¹ UK Patent 0304253.8, US Patent 6/0238744

Fast LC

The excellent baseline stability across steep gradients and low dispersion characteristics combined with fast data output rates makes the 1290 Infinity ELSD ideal for fast LC.

Sample: Tertiary aminols
Column: C18 4 × 50 mm, 5 μm
Eluent A: Water + 0.1% Formic acid
Eluent B: Acetonitrile + 0.1% Formic acid
Gradient: 5% to 95% B in 5 minutes
Flow rate: 2.5 mL/min
Injection volume: 10 μL
Detector: Agilent 1290-ELSD (neb = 40 °C, evap = 50 °C, gas = 1.5 SLM)

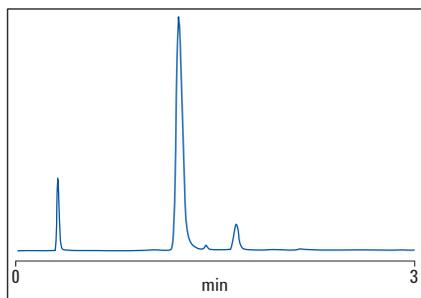


Figure 2
The Agilent 1290 Infinity ELSD provides a stable baseline even across steep, high speed gradients.

Unrivalled Uniform Response Across a Gradient

The 1290 Infinity ELSD is unique in its ability to control gas flows during a run to produce a uniform detector response across a gradient. This real-time benefit offers an alternative approach to mobile phase compensation when quantifying unknowns under gradient conditions.

Column: C18 2.1 × 150 mm, 5 μm
Eluent A: Water
Eluent B: Acetonitrile
Gradient: 5% to 95% B in 10 minutes
Flow rate: 1.0 mL/min
Injection volume: 10 μL (every minute)
Detector: Agilent 1290-ELSD (neb = 30 °C, evap = 30 °C)

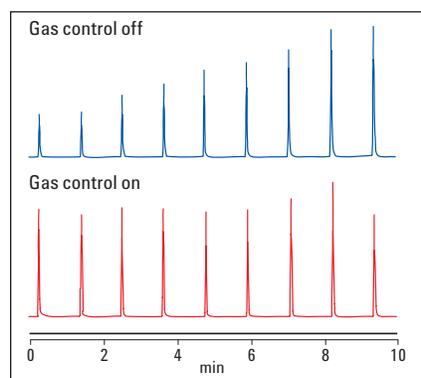


Figure 3
Real-time gas control using Dimension Software provides unrivalled uniformity across a gradient.

Subambient ELSD

The 1290 Infinity ELSD's unique cooled evaporation zone provides subambient operation to deliver unrivalled detection of low molecular weight compounds not seen by other ELSDs.

Sample: Parabens
Column: C18 2.1 × 150 mm, 5 μm
Eluent A: Water
Eluent B: Acetonitrile
Gradient: 5% to 70% B in 5 minutes; 70% to 95% B in 2 minutes
Flow rate: 0.2 mL/min
Injection volume: 10 μL
Detector: Agilent 1290-ELSD (neb = 30 °C, evap as shown, gas = 1.4 SLM)

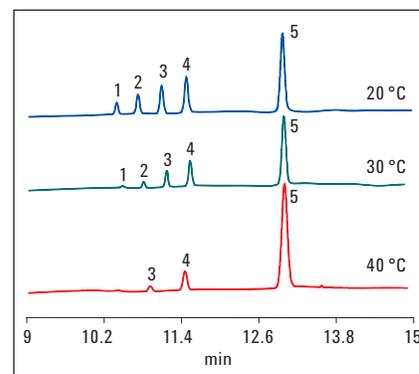


Figure 4
Improved detection of parabens using subambient ELSD with the Agilent 1290 Infinity ELSD (parabens mixture injected at 100 ng except heptyl at 160 ng).

Superb RSD

Excellent reproducibility below 2% gives reliable and accurate results. You can have complete confidence in your data.

Column: C18 4.6 mm × 150, 5 μm
Eluent: Water/Acetonitrile 40:60
Flow rate: 1.0 mL/min
Injection volume: 10 μL
Detector: Agilent 1290-ELSD (neb = 40 °C, evap = 40 °C, gas = 1.4 SLM)

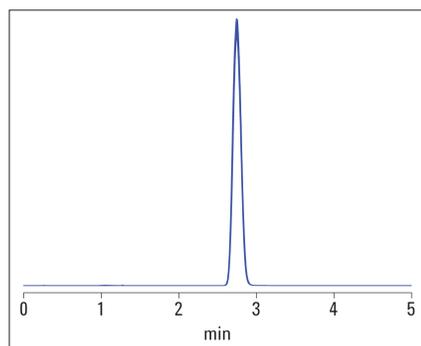


Figure 5
Fifty caffeine injections produce an RSD of 1.27%, demonstrating the superb reproducibility of the Agilent 1290 Infinity ELSD.

Fast Temperature Switching

For higher throughput of samples, the unique 1290 Infinity ELSD features rapid temperature equilibration. The detector cools from 50 °C to 30 °C, and *vice versa*, in just over 5 minutes. In addition to the enhanced detection of semivolatile compounds, the temperature controlled evaporator tube on the 1290 Infinity ELSD allows the user to rapidly change between temperature programs.

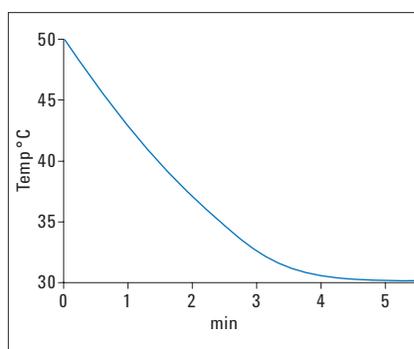


Figure 6
Fast temperature equilibration with the Agilent 1290 Infinity ELSD.

DMSO Transparency for High Throughput Screening

The vast majority of combinatorial libraries screened by high throughput methods are stored in dimethylsulfoxide (DMSO). UV and mass spectrometry will miss potential drug compounds that have no UV chromophore, so ELSD is commonly used. However, at the low evaporator temperatures required to detect volatile components, the presence of DMSO in the sample can mask the response of early eluting compounds. In the 1290 Infinity ELSD, the addition of a carefully controlled stream of gas to the evaporation step enables complete removal of the DMSO to take place without increasing the operating temperature.

Sample: 2 mg/mL in DMSO
Column: 4.6 × 150 mm, 5 μm
Eluent A: 0.1% HFBA in Water
Eluent B: 0.1% HFBA in Acetonitrile
Gradient: 5% to 30% B in 10 minutes, 30% to 80% B in 5 minutes
Flow rate: 1.0 mL/min
Injection volume: 20 μL
Detector: Agilent 1290 Infinity ELSD (neb = 25 °C, evap = 25 °C, gas as shown)

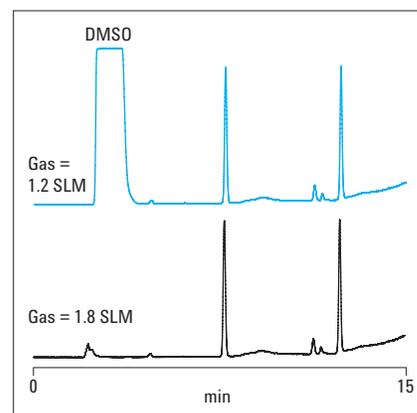


Figure 7
Increasing gas flow on the Agilent 1290 Infinity ELSD gives DMSO transparency.

Adding Value to LC/MS

The 1290 Infinity ELSD is fully complementary to LC/MS. The instrument can provide better data and support information for compounds that do not perform well on mass spectrometers, such as haloperidol, enhancing the value of your LC/MS system.

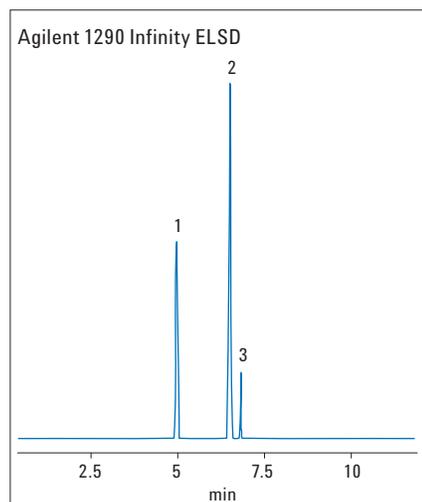
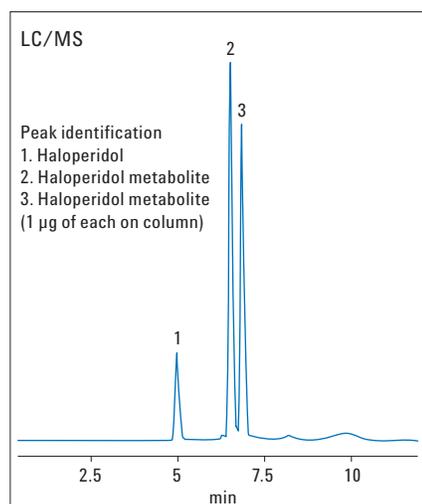


Figure 8
Coupling the Agilent 1290 Infinity ELSD with LC/MS reveals much greater detail in the analysis of haloperidol and its metabolites.

Use of the sophisticated 1290 Infinity ELSD software ensures improved detection of compounds not normally amenable to LC/MS.

Choosing Detector Settings

The unique patented gas flow operation of the 1290 Infinity ELSD makes it mobile phase independent. Instead,

settings are optimized according to the thermal sensitivity of compounds injected.

As a general rule, all solvents can be evaporated with nebulizer and evaporator temperatures at 30 °C and a gas flow of 1.6 SLM. This can be used as a starting point and adjustments made according to the sample injected (if necessary), see Table 1.

Compound class	Nebulizer temperature (°C)	Evaporator temperature (°C)	Gas flow (SLM)
Parabens	30	20	1.40
Vitamins	25	25	1.60
Phthalates	25	25	1.60
Analgesics	25	25	1.60
Sudan dyes	30	30	1.60
Glycerides	30	30	1.40
Alkaloids	40	40	1.40
Amino acids	50	50	1.60
Natural products	30	50	1.40
Antibiotics	40	85	1.20
Polar lipids	30	80	0.90
Carbohydrates	50	90	1.00

Table 1
Choosing detector settings.

Technical Specifications

Agilent 1290 Infinity ELSD		
Light source:	Laser 405 nm, 10 mW (Class 3B)	
Detector:	Photomultiplier tube digital signal processing	
Temperature range:	Evaporator	OFF, 10–80 °C (1 °C increments)
	Nebulizer	OFF, 25–90 °C (1 °C increments)
Gas requirements:	Flow rate	0.9 SLM to 3.25 SLM at 25 °C with integrated controlled gas shut-off valve
	Pressure operating range	60–100 psi (4–6.7 bar)
Eluent flow rate:	0.2–5 mL/min	
Analogue output:	0–1 V FSD	
Digital output:	24 bit digital data, 10, 40, or 80 Hz	
Communication:	Ethernet or Serial (RS232) Remote start input Remote A/Z Contact closure, TTL	
Instrument operation:	Graphical vacuum fluorescent display with keypad Real-time control through ELSD Dimension Software 10 predefined methods	
PC operation (software):	Standalone control software utilities, Agilent ChemStation control software, Agilent EZChrom Elite control software	
Power requirements:	100–240 VAC ± 10% AC 50/60 Hz 2A max	
Detector status:	Standby, run	
Size:	Unpackaged	200 × 450 × 415 mm (w × d × h)
Weight:	Unpackaged	13 kg
Safety features:	Gas shut off valve, vapor and leak detection, Laser Interlock	

Ordering Information

Product description	Part number
Agilent 1290 Infinity ELSD (110 or 240 V) including ChemStation driver	G4261B
Agilent ELSD Dimension Software	PL0890-0375
Agilent ELSD Driver for ChemStation	PL0890-0370

www.agilent.com/chem/elsd

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