Waters 2420 ELSD

Waters 2420 ELSD- Evaporative Light Scattering Detector - Universal detector with high sensitivity to the compounds, without chromophore. The device is designed to analyze a broad range of compounds, such as hydrocarbons, polysaccharides, lipids, vegetable oils, fatty acid oligomers. The 2420 is an excellent alternative to refractometric detectors to work in the gradient, works with a wide range of mobile phases and additives, including ion-pair reagents. 2420 detectors less sensitive to the fluctuations of the mobile phase and temperature than refractometric detectors. 2420 detector can be operated as part of the Alliance or the system with mass spectrometer under the direct control software Empower or MassLynx (with option FractionLynx), or can operate as a separate module.

Technical specifications:

Optical System	
Optics	Optical bench with a heated (constant temperature of 50 ° C).
Light Source	Polychrome tungsten halogen lamp, mounted on the front panel, set at the factory, can be installed user.
The timer Lamp	History of the lamps on the clock and the inclusion of being on the serial number.
Calibration lamps	Sizing / normalization of photomultiplier tubes to compensate for degradation over time.
Detector	Photoelectric multiplier.
Sizing FEU	Individually for each FEU, is via a built-in diagnostics.
The range of stresses	0-1250 VDC.
Normalization of lamps	Special diagnosis based on demand and when you turn adjusts the decline in output lamps.
Operating specifications	
Nebulizer	2 option completely replaces the user, are

	mounted on the front panel, bezotvertochnaya construction, with heating.
The flow elyuenta for high-speed spray of choice	From 300 to 3000 mkl per minute
The flow elyuenta for nizkoskorostnogo dispenser of choice	Between 50 and 500 mkl per minute
Temperature Control dispenser	Heater 0-100%, the management of temperature.
Gas	Nitrogen, minimum pressure 65 psi.
Installed a gas pressure	From 3 to 60 psi, built in diagnostics to calibrate the sensor flow.
Temperature range drift tube	Step 0,1 ° C, accuracy control 0,1 ° C.
Maximum flow elyuenta	100% water with 3 ml / min, high-speed spray.
Set filters	Filter Hemminga, 0-5,0 seconds to move 0.1 seconds.
Keyboard	24 keys.
Display	128h64 pixel, the backlight.
Figures.	
Range	0,1-2000 svetorasseivayuschih units (full scale).
Analog outputs	Two (2) fully programmable output: a signal detector in svetorasseivayuschih units and the temperature at the choice of spray, drift tube, or an external module heating column (subject to availability). From 0 to 2 V to user-defined fracture.
The range of signal analog outputs	From -0.1 V to 2.0 VDC, fully enhanced.
Settings attenuator	10-20000 svetorasseivayuschih units (LSU) in full scale, 10-20000 mV.
Out RS232	Used for diagnostics and service updates embedded software.
Digital data	The information in 24 bit, 10 Hz via Ethernet-connected.
Programming.	
Programming isolated detector	Fully programmed for the time saved 10 of methods, each up to 50 events; Switching on / off lights; The Office of PMT increased from 0 to 1000; Controlling the flow of gas to be placed by

	pressure from 3 to 60 psi, detection of problems; Automatic reset output; Marker signal for the chart (chart mark); Exit AUX; Programming threshold.
Control ambient temperature	An external module heating columns, steel, the temperature of the surrounding exposed to 150 ° C with a step 0,1 ° C.
Compatible Software	MassLynx v 4.0 SP2; Empower Software; Digital data dimension of 24 bits.
Data transfer rate	1,2,5,10 Hz.
Diagnosis when you turn	Checking Reference values of energy lamps, displays, the work carried out tests of optics and electronics.
Events at entrances / exits	Entrances: Auto-zeroing; Switching on / off lights; Early injection; Conclusion markernogo signal output detector; Exits: Stopping the flow, when problems with the supply of gas, etc.; Programmable contact, closing on time or at the threshold.
Electrical specifications.	
Output voltage range	85-264 VAC.
The range of input frequencies	47-63 Hz.
Maximum input power	420 VA
Dimensional specifications.	
Dimensions	29 x 19 x 50,8 ShxVxG.
Weight	13,6 kg.
Operating humidity range	From 20% to 80% without condensation.
Operating temperature range	4-40 ° C.
Warranty	2000 hours on the lamp, 1 year.
Compliance with rules	CE Mark CSA C-tick and UL

What is Evaporative Light Scattering Detection?

Evaporative Light Scattering detection (ELSD) is a HPLC detection technique based on the ability of particles to scatter light when they pass through a beam of light. The detector will respond to compounds that are less volatile than the mobile phase. Evaporative light scattering therefore offers an alternative detection strategy for compounds that do not have a UV chromophore, and, unlike refractive index detectors, ELSD is compatible with gradient analyses. Evaporative light scattering detection is compatible with a wide range of flow rates and mobile phase compositions and can be part of a multi-detection scheme (for example: PDA/MS/ELSD).

Waters 2420 ELSD features:

• High sensitivity and low noise performance
• Time-controlled temperature, photomultiplier tube (gain) and gas pressure
• Controlled by Waters Empower Software and MassLynx version 4.0 SP2 Software
• Front panel control and up to 10 method storage
• Controls Waters column heater module (CHM)
• Ultimate temperature control utilizing heat at both the nebulizer and drift tube as well as a heated optics bench
• Smallest commercially available detector allowing it to be stacked with other Waters detectors
• Full qualification methodology: IQ/MQ/OQ/PQ for the detector, system and software including test solutions are available
• Supports multiple flow rates and dispersion requirements by providing multiple nebulizers

Serviceability and usability:

• Front-mounted user replaceable long-life lamp
• Snap in nebulizer mounting
• Calibrated high sensitivity long life PMT
• User diagnostics, including lamp history
• Fail-safe devices such as automatic solvent shut-off switch and leak management

Benefits of the 2420 ELSD:

• High signal-to-noise performance from unique design features, low noise electronics and sophisticated control
• Application flexibility by fully controlling all parameters, especially temperature
• Full control and time programming whether standalone or by a data system means that methods development can be automated and streamlined
• PMT gain control by time programming allows the user to optimize S/N for each peak
• Low temperature solvation is available when required for labile compounds
• Increasing the temperatures at the nebulizer and the drift tube allows the unit to support high flow rates efficiently without losing sensitivity, avoiding blockages and minimizing dispersion, in conjunction with multiple nebulizer availability

• Multiple high-power heating supports fast warm up times
• Full qualification methodology: IQ/MQ/OQ/PQ for the detector, system and software including test solutions are available
• Supports multiple flow rates and dispersion requirements by providing multiple nebulizers

Technology and Design

An ELSD has three basic elements: nebulizer, desolvation tube (often referred to as a drift tube) and scattering chamber. In summary, a solvent stream is nebulized and the droplets formed in the nebulizer are entrained in a flow of gas. The droplets are evaporated in the desolvation region and, if there was nonvolatile analyte present in the solvent stream, dry particles remain which are carried along in the flowing gas and solvent vapor stream. A beam of light intersects the path of the flowing stream. If dry particles are present, they scatter light. The scattered light is measured and the intensity of this light is a function of the size and number of such particles. Evaporative Light scattering detection is useful for wide range of compounds and compound classes including:

• Carbohydrates
• Polymers/Copolymers/Blends
• Polymer additives
• Pharmaceuticals
• Lipids and fatty acids
• Amino acids
• Surfactants
• Nutraceuticals

Nebulization

Column effluent is passed through a narrow needle and mixed with gas (typically nitrogen, but any dry, particulate free gas can be used) to produce an aerosol of droplets. The 2420 nebulizers are tailored to flow rate, a high flow nebulizer for flow rates of 0.30 – 3.0 mL/minute, and a low flow nebulizer for flow rates of 0.05 – 0.50 mL/minute. Nebulizer gas flow rate can be adjusted to optimize detector signal and minimize noise. High gas flows give smaller droplets that require less heat to evaporate off the solvent to leave the non-volatile sample. Lower gas flows give large droplets (which generally generate larger particles, giving larger signals), but require more heat to evaporate the solvent, leaving the non-volatile sample and can, if the solvent is not fully evaporated away, cause noise. Droplets that are too large to pass into the drift tube are removed via a siphon tube to waste. The nebulizer region can be heated to improve evaporation and increase signal; this temperature setting should be determined experimentally.

Desolvation (Drift Tube)

Nebulized droplets are driven into the drift tube by the carrier gas and diffuse down the drift tube. Once in the drift tube, particles are generated by the evaporation of the mobile phase components leaving the nonvolatile portion of eluent as particles. Ideally, the drift tube is heated to a temperature that facilitates solvent removal without sample depletion. Higher drift tube temperatures are more efficient at removing solvent, but may evaporate semi-volatile sample components leading to a reduction in signal. Optimal drift tube temperatures are best determined experimentally for each individual compound of

interest. When dealing with totally unknown sample components, users should use the lowest drift tube temperature that adequately evaporates the mobile phase at its given flow rate.

Detection

The scattering chamber is the equivalent of the flow cell in UV/Visible detectors. Incident light is generated from a quartz-halogen lamp and passes through a series of lenses and mirrors into the scattering chamber where it interacts with the sample particles. A photomultiplier tube detects light scattered by particles and the resulting signal is output to a data collection device (directly to Empower™ or MassLynx™ software, or other software through a SAT/IN™ module). The optics bench is also heated to avoid condensation of evaporated mobile phase components. After detection, the particle stream and evaporated solvent are exhausted from the detector.

Linearity

ELSD's are not spectrometric detectors; therefore, they do not obey Beer's Law and are fundamentally non-linear. Scattering is independent of the particle's chemical properties. It is a function of multiple processes including Rayleigh scattering, Mei scattering, refraction and reflection. The size and shape of the particle, number of particles, and the wavelength of the incident light all impact light scattering. The absolute detector response is a mixture of all scattering types, although any one type may predominate in a given sample. Calibration curves produced by an ELSD best fit to quadratic equations, but may also be fit to log/log curves.