Get Insight into the SepaBean™ Machine with Engineer: Evaporative Light Scattering Detector

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Chromatography Application Note
AN011

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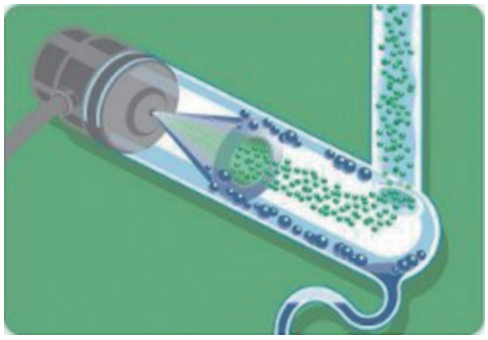
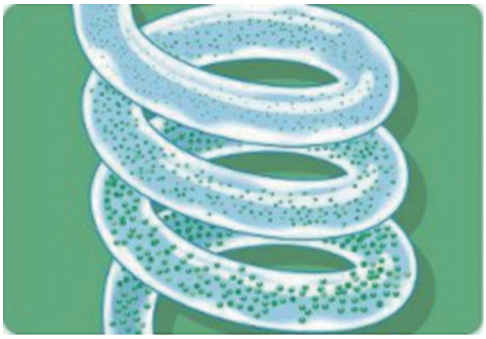
In today's technical lecture, we will introduce the latest product from Santai Technologies, the Evaporative Light Scattering Detector (hereinafter referred to as ELSD), a mass-type universal detector for preparative liquid chromatography. Different from UV or fluorescence detector which requires the presence of a chromophoric group or electroactive group in the sample molecule, the signal response of ELSD is independent of the optical properties of the sample. Any sample with a lower volatility than the mobile phase can be detected. The signal response of ELSD is proportional to the mass of the sample and can therefore be used to determine the purity of a sample or to detect unknowns. Compared with ELSD, refractive index (RI) detector is also a kind of universal detector. However, due to its low sensitivity as well as incompatibility with gradient elution, the application range of RI detector is limited. Furthermore, mass spectrometry (MS) is another type of universal detector. Nevertheless, the application of MS detector is also limited due to high cost and complex operation. In conclusion, for its high sensitivity, wide application ranges, simple operation and relatively low cost, ELSD is employed by more and more researchers in the detection of a wide range of non-UV absorbent samples including carbohydrates, phospholipids, amino acids, fatty acids, steroids, saponins, polymers, etc.
Next, we will introduce the detection principle of the SepaFlash™ FP LT-ELSD launched by Santai Technologies. There are three steps included in the detection procedure.

Step 1: Nebulization



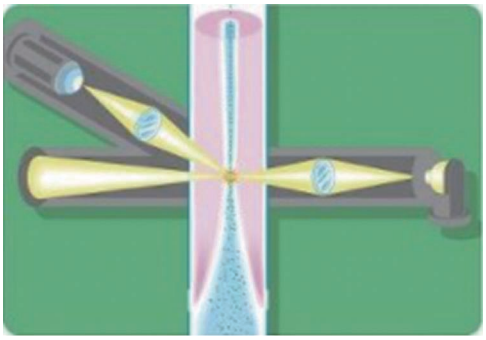
The eluent from the column is mixed with an inert gas and goes through the narrow orifice of a nebulizer to generate a homogeneous mist. This fine mist is composed of droplets of mobile phase containing the compound of interest.

Step 2: Evaporation

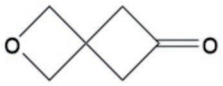


The nebulized eluent goes through a heated drift tube to evaporate the mobile phase. Solute molecules are obtained from the mist using a heated evaporation (drift) tube and then transferred into the flow cell of the detector.

Step 3: Detection



The stream of solute particles enters a flow cell which includes a light source and a photodiode. The light emitted by the light source collides with the solute particles, and the scattered light is detected by the photodiode and converted into an electrical signal.
In the following part, a pharmaceutical intermediate is utilized as a sample to show the application of ELSD in sample purification. The chemical structure of a pharmaceutical intermediate is shown as Figure 1.



2-oxaspiro[3.3]heptan-6-one

Figure 1. The chemical structure of a pharmaceutical intermediate.

According to its chemical structure, this compound has no UV absorption. Therefore the commonly used UV detector cannot be used for real-time monitoring of the sample during the flash separation procedure. However, as a universal detector, ELSD could meet the demand instead of UV detector. The experimental settings are listed in the Table 1. Figure 2 shows the flash chromatogram of the sample.

Table 1. The experimental settings of the flash purification.

Instrument	SepaBean™ machine T	
Cartridges	12g SepaFlash™ Standard Series flash cartridge (irregular silica, 40-63μm, 60Å, Order number: S-5101-0012)	
Detector	UV:254 nm;280 nm SepaFlash™ FP LT-ELSD	
Mobile Phase	Solvent A: Petroleum Ether Solvent B: Ethyl Acetate	
Flow Rate	System: 30 mL/min Split flow for ELSD: 0.5 mL/min	
Sample Load	600 mg	
Gradient	CV	Solvent B (%)
	0	0
	11	18
	15	18
	21	34
	24	34

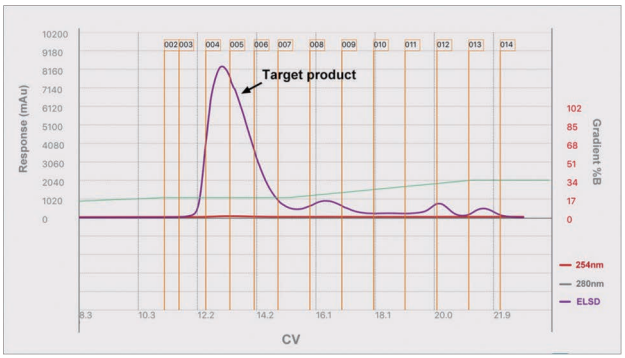


Figure 2. The flash chromatogram of a pharmaceutical intermediate.

As shown in Figure 2, the non-UV absorbent sample is successfully detected and purified by the SepaBean™ machine combined with SepaFlash™ FP LT-ELSD, suggesting a practical method for the preparative purification of these compounds.
For further information on detailed specifications of SepaBean™ machine, or the ordering information on SepaFlash™ series flash cartridges, please visit our website:
http://www.santaitech.com/en/index.php .

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