Model 6000 Evaporative Light Scattering Detector

- Universal HPLC detector can detect any low-volatile compound.
- Split and splitless dual mode can effectively solve more analyzing problems.
- The lifetime of laser light source is up to 30,000 hours with stable light source intensity.
- Brewster angle light trap is adopted scientifically reducing background noise validly.
- Anti-corrosion treatment is available for sensitive elements to detect corrosive substances, such as acids, bases.

More Sensitive

The detection of various traditional Chinese medicines and quality control of antibiotics can be performed by HPLC-ELSD according to 2010 version pharmacopeia.

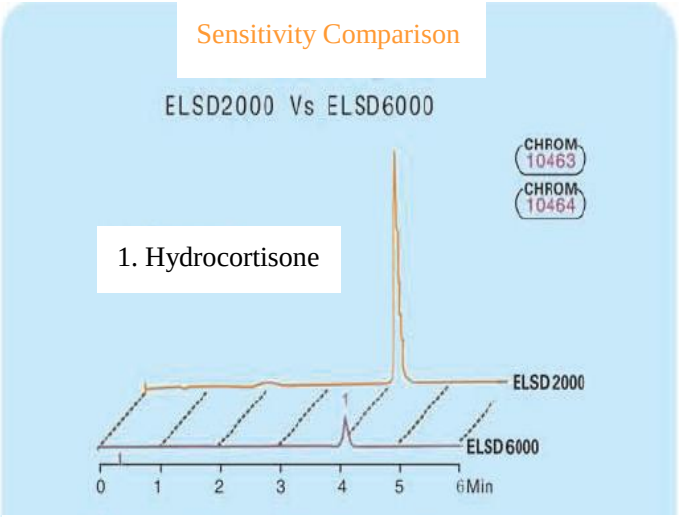
Detection Principle of ELSD 6000

After upgrade and perfection, Model 6000 features:

- Unique split and splitless dual mode.
- Four areas control temperature independently eliminating the interference of environment change to analysis results.
- Distinct self-detection is convenient for trouble-shooting.
- Large-screen LCD PC control is available for men-machine interaction.
- 90 ℃detection angle assures that ELSD is the virtual scattered light detector excluding the interference of fake signals.
- Mass constant flow meter insures that the flow of nebulizer gas is not affected by the change of system pressure.
- Optical cell and light trap come with anti-corrosive and inert tetrafluoroethylene coatings adding making-up function of light trap，reducing the maintenance requirements and background noise meanwhile increasing system durability.

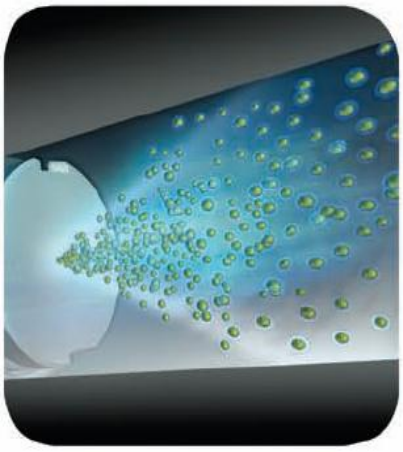
The sensitivity is more than one order of magnitude higher than ELSD 2000's.

Sensitivity Comparison

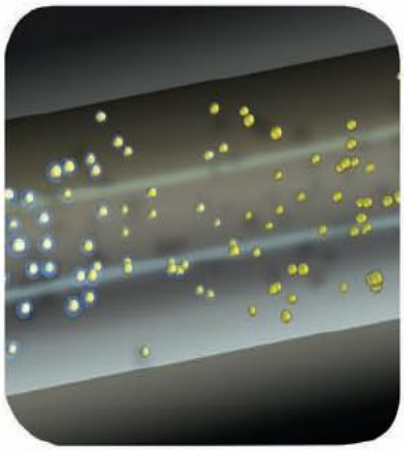


Column: Alltima™ C18, 5μm，250×4.6mm,
Mobile Phase:Water : Acetonitrile (55:45)
Flowrate: 1.0mL/min
Temperature: Ambient

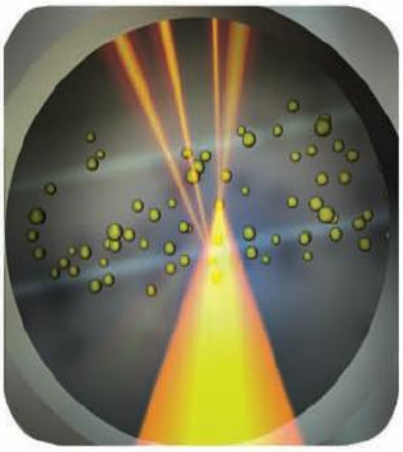
Detection Principle of ELSD



Step 1: Nebulization
Inside the nebulizer, the column effluent passes through a needle, mixes with nitrogen gas, and forms a dispersion of droplets.



Step 2: Evaporation
The aerosol droplets pass through a heated zone called the drift tube where the mobile phase evaporates leaving a fine mist of dried sample particles in solvent vapor.



Step 3: Detection
The sample particles enter an optical cell where they pass through a laser light beam. Light scattered by the sample particles is detected, generating an electrical signal.

Dr. Peaks Tech Tips

Model 6000 ELSD (Evaporative Light Scattering Detector 6000 Enhanced Sensitivity) is used in High Performance Liquid Chromatography (HPLC) system to analyze any compound less volatile than the mobile phase. With the unique detection principle, ELSD can detect difficult samples that other conventional HPLC detectors cannot regardless of the function group or the optical characteristics of samples, thus extend HPLC application range. ELSD are available for the following samples: carbohydrates, pharmaceuticals, lipids, triglyceride, underivatized fatty acids and amino acids, polymers, surfactants, nutraceuticals and combinatorial libraries, etc., especially ideal for the application of active ingredients without ultraviolet absorption function in antibiotics, Chinese herbal medicines or Chinese patent medicines, such as ginsenoside, ginkgolide, astragalus and various antibiotics.

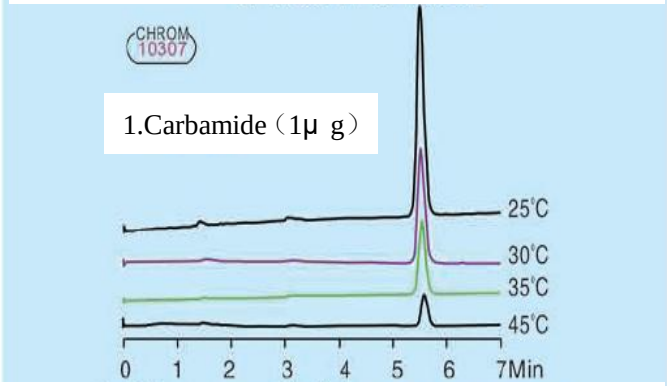
Splitless Mode- Available for Non-volatile Samples
Split Mode- Available for Semi-volatile Samples

As the response of ELSD is based on the amount of particles passing through optical cell, so maximum response can be obtained when 100% eluted samples are sent to detection cell. However, relatively low evaporating temperature and gas flow are needed when samples are semi-volatile, so split mode is adopted to distribute part of the samples for detection thus reduce the required evaporating temperature and gas flow.

ELSD 6000 can offer two operating modes simultaneously, allowing all possible mobile phases and samples to obtain optimum detection sensitivity and baseline stability. ELSDs of other brands can only reach the optimum operating state with either organic or aqueous mobile phase rather than both of them. ELSD 6000 overcomes above shortcomings and splitless mode (impactor off) is ideal for the analysis of non-volatile compounds by mobile phases with high organic content or ones with low water content/low flow(≤1.0mL/min). All samples after nebulization are sent to optical cell for detection, so this mode gives the optimum sensitivity for these applications. Split mode (impactor on) is ideal for the analysis of non-volatile and semi-volatile samples by mobile phases with high flow or high water content（up to 5.0mL/min, surging gradient included）. In split mode, the larger droplets in aerosol are eliminated via bypass, therefore, mobile phase can evaporate sufficiently even the temperature of drift tube is extremely low.

Split Mode Allows Evaporation at near Ambient Temperature, Optimizing Detection of Semi-volatile Samples

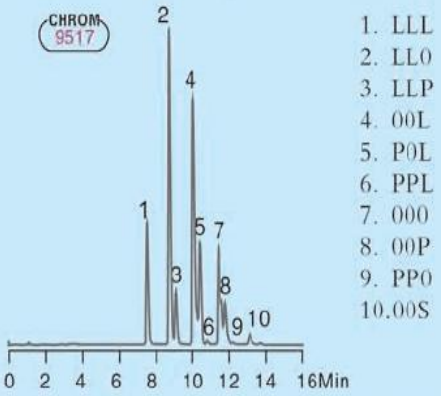
Analyzing Urea in Split Mode



Column: Prevail™ Sugar, 5μm, 250×4.6mm
Mobile Phase: A: Acetonitrile B: Water (85:15)
Flowrate: 1.0mL/min

Splitless Mode Are Available for Analysis with Organic Mobile Phase and/or Non-volatile Samples

Triglycerides in Sesame Seed Oil



Column: Alltima™ C18, 3μm,150×4.6mm
Mobile Phase: A:Dichloromethane B:Acetonitrile
Gradient:

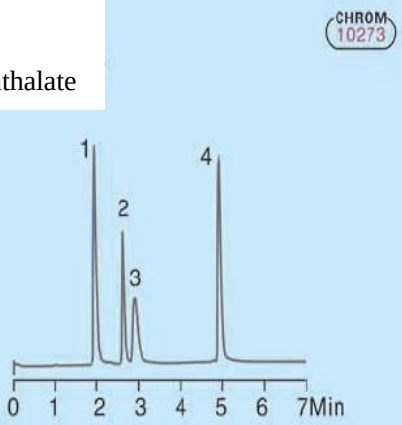
Time	0	10	18	20
%B	70	55	70	70

Flowrate: 1.0mL/min

Split Mode Allows Stable Baseline with Surging-gradient Mobile Phase

Mixed Liquor for Performance Test Is Selected by LC/MS

1. Aspartame
2. Cortisone
3. Reserpine
4. Dioctyl Phthalate



Column: Platinum™ C18, 3μm，20×4.6mm,
Mobile Phase : A: 0.05% Formic Acid in Water
B: 0.05% Formic Acid in Acetonitrile
Gradient:

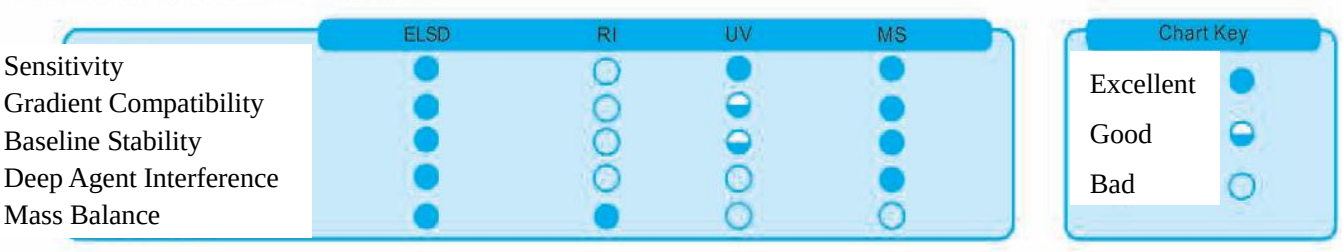
Time	0	3	7	10
% B	5	90	90	5

Flowrate: 1.0mL/min
Column Temperature: 40℃

The Advantages of ELSD Compared to Other HPLC Detectors

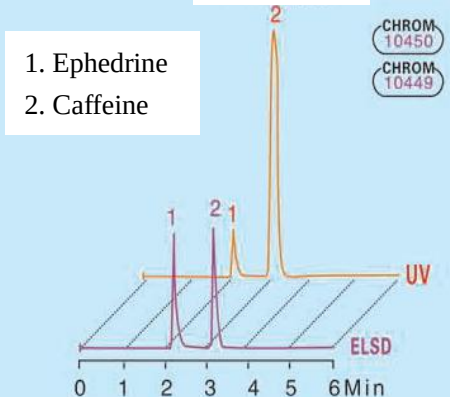
ELSD features superior universality to UV absorption detector, higher sensitivity than differential refraction detector and lower price, lower usage and maintenance requirements than mass spectrum, moreover, it is available for the development of quantitative analysis technology. Therefore, ELSD is widely used in the analysis technology field since it appears.

In addition, differential detection interfered by solvent front peaks results in complicated analysis and it is extremely sensitive to temperature leading to unstable baseline thus in incompatible to gradient elution. Baseline drift is a puzzling problem in surfing gradient when analytes with chromophoric group are detected by low-wavelength UV detector. Without these restrictions, ELSD can obtain stable baseline in multi-solvent gradient with better solution ratio and higher separating rate. Meanwhile, response of ELSD is independent of the samples' optical characteristics, therefore, it is not required that the samples must have chromophoric group or fluorophore when they are detected by ELSD, which can precisely reflect mass composition of samples.



ELSD Reflects the Mass Composition of Samples More Accurately than UV

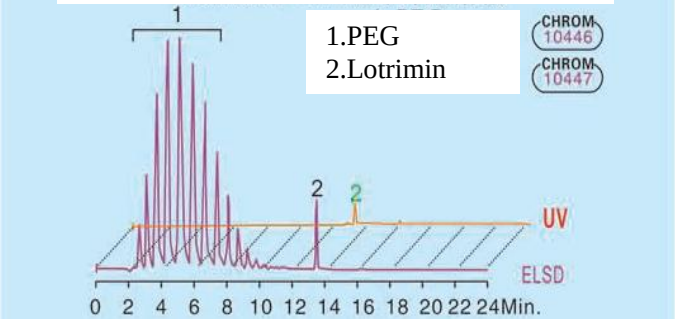
1:1 Mixture



Column: Alltima™ HP, EPS C18, 5μ m，150×4.6mm
Mobile Phase: 1% Acetic Acid: Methanol: Acetonitrile (70:20:10)
Flowrate: 1.0 mL/min
Temperature: Ambient

The Compounds ELSD Can Detect Rather than UV

Lotrimin®AF Local Topical Solution



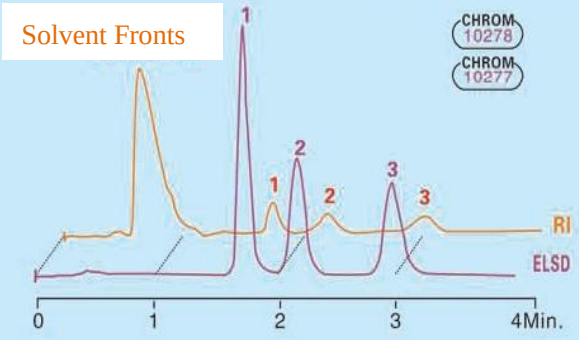
Column: Alltima™ C18, 5μ m，150×4.6mm
Mobile Phase: A: Water B: Methanol
Gradient:

Time	0	80	10	20	35
%B	30	50	100	100	30

Flowrate: 1.0 mL/min
Temperature: 40℃

ELSD Improves Baseline Stability and Detection Sensitivity Compared to RI

Solvent Fronts



1. Fructose 2.Glucose 3.Saccharose

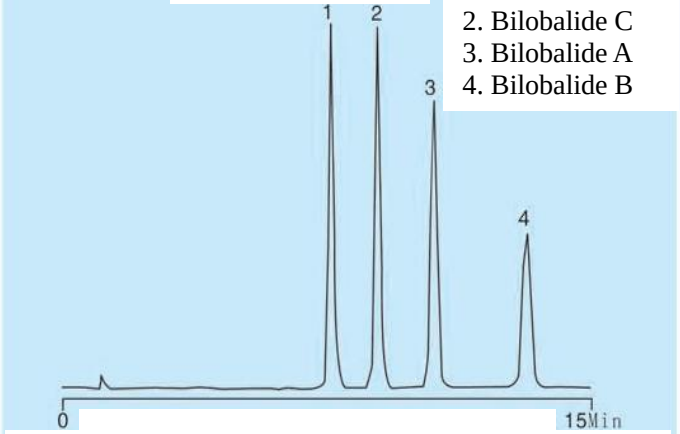
Column: Prevail™ Sugar, 5μ m，53×7mm High Speed Column (Part Number：35104)
Mobile Phase: Acetonitrile: Water (85:15)
Flowrate: 1.0 mL/min
Temperature: 30℃

Practical Applications of ELSD in China

Traditional Chinese medicine and Chinese patent medicine are China-specific and their active ingredients are all nature products most of which have no ultraviolet absorption function. Throughout identifying items of traditional Chinese medicine and Chinese patent medicine in pharmacopeia, the most common is thin-layer identification majority of which is performed by means of comparison and comparison of medicine materials. Because of complicated composition of traditional Chinese medicine and Chinese patent medicine, limited separation of thin-layer identification method, it is difficult to draw the conclusion and quantify the samples or it is likely to arrive at wrong conclusion. High Performance Liquid Chromatography (HPLC) with good separation degree, high reliability are more available in the identification of active ingredients of traditional Chinese medicine and Chinese patent medicine. However, analysis workers of traditional Chinese medicine always confront a trouble that it is difficult for UV detector to detect some active ingredients, such as ginseng saponins class, ginkgolide，steroids alkaloid without ultraviolet absorption or with weak absorption in ultraviolet terminal. As the universal detector, ELSD offers a valid detection method. A number of pharmaceutical research institutes and drug testing departments have analyzed various of active ingredients of traditional Chinese medicine, ginsenoside, notoginsenoside, astragaloside, ginkgolide, esculentoside, dioscin, fritillaria alkaloid, atractylenolide III std, etc. by HPLC-ELSD. Experiments demonstrate the good accuracy, reproducibility and high recovery rate of the method which can be recommended to use in the research and quality control of traditional Chinese medicine and Chinese patent medicine. As a valid detection method, HPLC-ELSD method has been listed in 2010 version pharmacopoeia. It also includes HPLC-ELSD detection method of many traditional Chinese medicines apart from HPLC-ELSD method of ginkgolide.

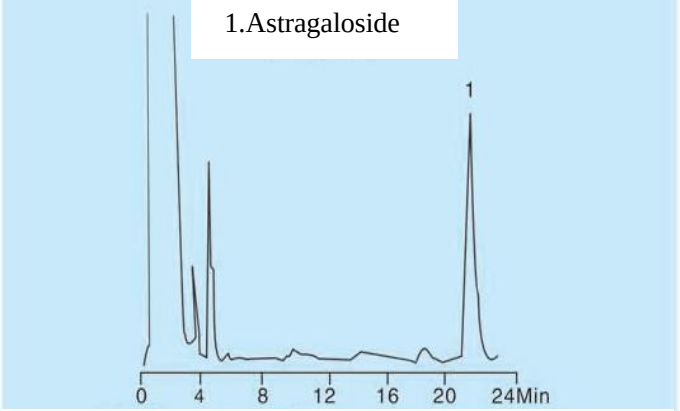
Serving as a method of antibiotic quality control , HPLC-ELSD are also approved by drug testing experts besides its application in traditional Chinese medicine. It has been listed in 2010 version pharmacopeia and provides new method for quantitative analysis of antibiotics. Besides, ELSD is applicable in other countless fields.

Bilobalide



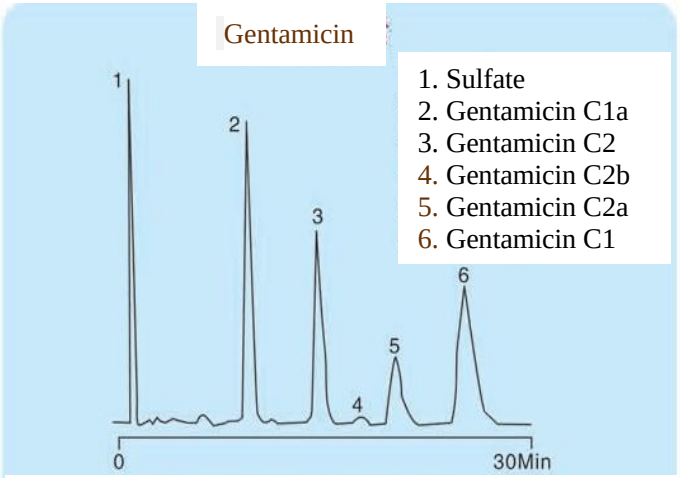
Column: Platinum™ C18, 5μm, 250×4.6mm
Mobile Phase: N-propanol:THF:Water= 1:14:85
Flowrate: 1. 0mL/min

Astragaloside



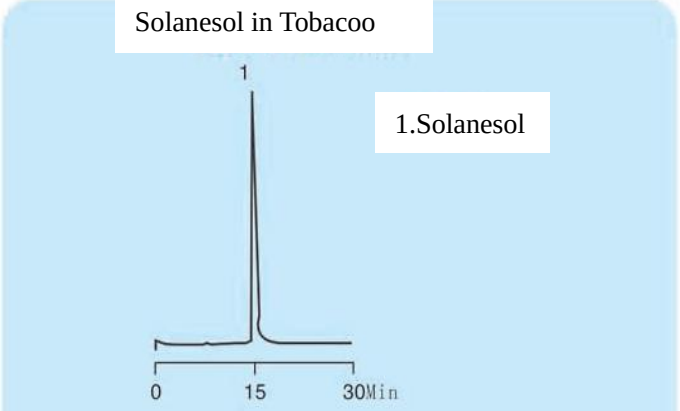
Column: Alltima™ C18, 5μm, 250×4.6mm
Mobile Phase: Acetonitrile- Water (35:65)
Flowrate: 1. 0mL/min

Gentamicin



Column: C18, 5μm，150×4.6mm
Mobile Phase: 0.2mol/L Trichloroacetic Acid-Methanol (94:6)
Flowrate: 0.60mL/min

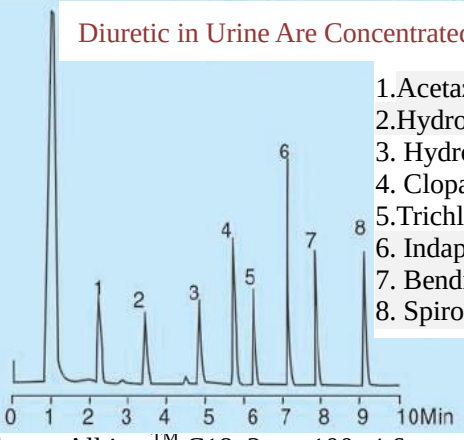
Solanesol in Tobacoo



Column: C18, 5μm, 250×4.6mm
Mobile Phase: Methanol- Acetonitrile- Tetrahydrofuran (39:24: 9.5)
Flowrate: 1. 0mL/min

ELSD Applications

Diuretic in Urine Are Concentrated by SPE



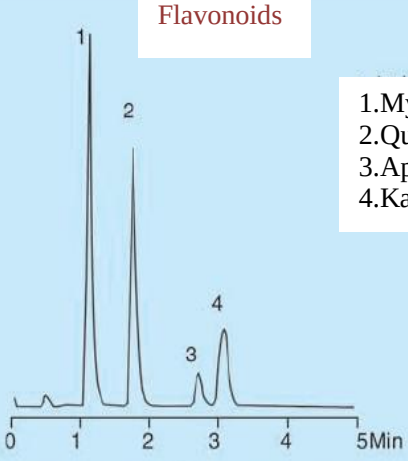
1.Acetazolamide
2.Hydrochlorothiazide
3. Hydrochlorothiazide
4. Clopamide
5.Trichlormethiazide
6. Indapamide
7. Bendroflumethiazide
8. Spironolactone

Column: Alltima™ C18, 3μm, 100×4.6mm
Mobile Phase: A: 0.1% TFA in 25mM Ammonium Acetate
B: 0.1% TFA in ACN
Gradient:

Time	0	10
%B	20	90

Flowrate: 1.0 mL/min

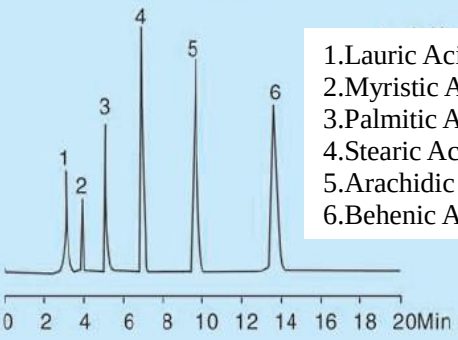
Flavonoids



1.Myricetin
2.Quercetin
3.Apigenin
4.Kaempferol

Column: Alltima™ C18, 3μm, 53×7mm
Mobile Phase: 0.1% TFA in water, pH 0.95: 0.1% TFA in ACN(65: 35)
Flowrate: 2.5mL/min

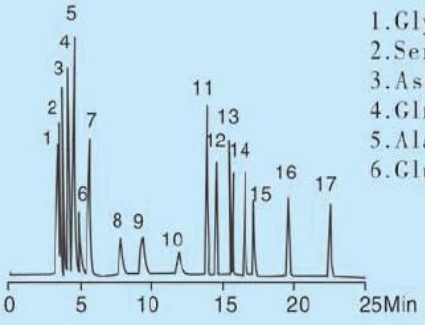
Underivatized Fatty Acids



1.Lauric Acid
2.Myristic Acid
3.Palmitic Acid
4.Stearic Acid
5.Arachidic Acid
6.Behenic Acid

Column: Prevail™ Organic Acid, 5μm， 150×4.6mm,
Mobile Phase: Acetonitrile :Methanol(75:25)
Flowrate: 1.0mL/min

Underivatized Amino Acids



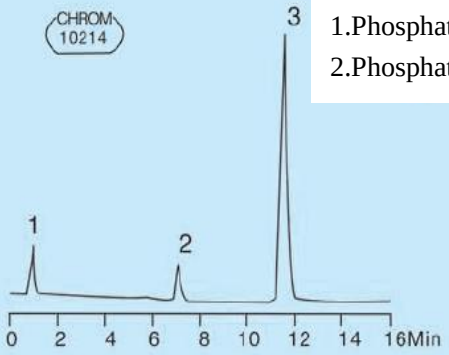
1.Gly
2.Ser/Asn
3.Asp
4.Gln
5.Ala/Thr
6.Glu
7.Cys/Lys
8.His
9.Pro
10.Arg
11.Val
12.Met
13.Tyr
14.Ile
15.Leu
16.Phe
17.Trp

Column: Prevail™ C18, 5μm， 250×4.6mm,
Mobile Phase: 5mM Heptafluorobutryic Acid pH 1.0w/0.7% TFA B: Acetonitrile
Gradient:

Time	0	6	8	25
%B	0	0	15	35

Flowrate: 1.0mL/min

Egg Yolk Phospholipids



1.Phosphatidylethanolamine
2.Phosphatidylcholine

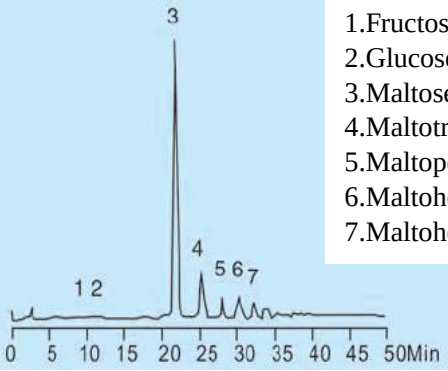
Column: Allsphere™ Silica, 3μm， 100×4.6mm
Mobile Phase: A: Isopropanol: Hexane: Water(58:40:2)
B: Isopropanol: Hexane: Water(52:40:8)
梯度：

Time	0	7	19	20
%B	0	100	100	0

Flowrate: 1.25mL/min

ELSD Applications

Imported Ale



1.Fructose
2.Glucose
3.Maltose
4.Maltotriose
5.Maltopentaose
6.Maltohexaose
7.Maltoheptaose

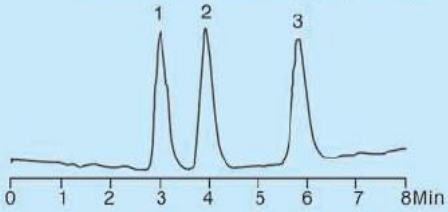
Column: Prevail™ Carbohydrate ES, 5μm, 250×4.6mm
Mobile Phase: A: Acetonitrile B:Water
Gradient:

Time	0	50
% B	20	35

Flowrate: 1.0mL/min

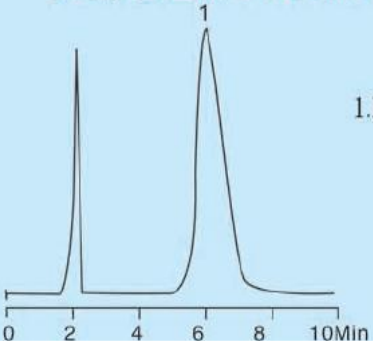
Glucopyranoside

1. n-Octyl Pyran Glucoside(50ng)
2. n-Decyl Pyran Glucoside(50ng)
3. n-Dodecyl Pyran Glucoside(50ng)



Column: Alltima™ C18, 3μm, 150×1mm
Mobile Phase: Methanol:Water (90:10)
Flow Rate: 50μ L/min

4% Polyethylene Glycol in 0.25M NaCl

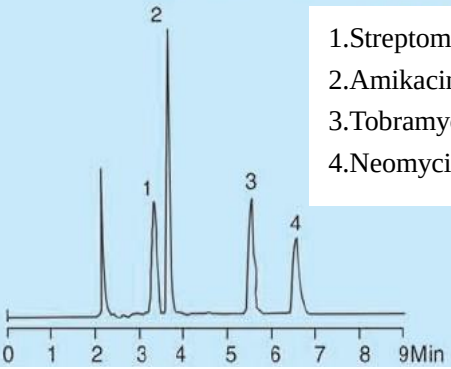


Column: Adsorbosphere® C8, 5μm, 250×4.6mm
Mobile Phase: A: Water B: Methanol
Gradient:

Time	0	20
%B	45	90

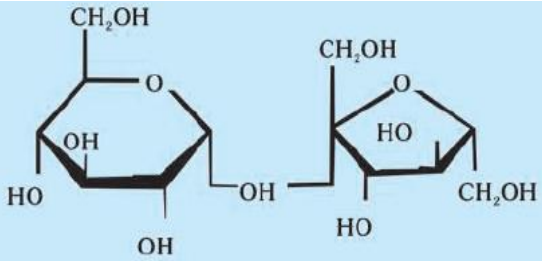
Flowrate: 1.0mL/min

Aminoglycoside Antiobiotics



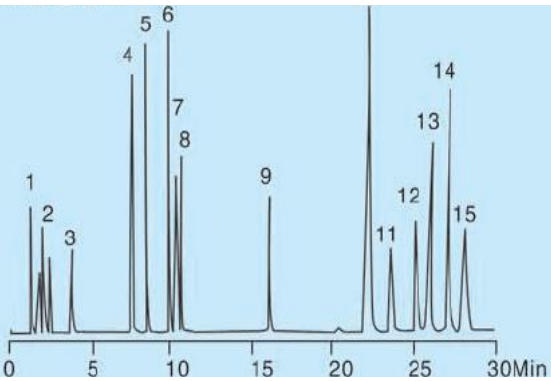
1.Streptomycin
2.Amikacin
3.Tobramycin
4.Neomycin

Column: Alltima™ C18, 5μm, 250×4.6mm
Mobile Phase: 0.3% Pentafluoropropionic Acid in Methanol:0.3% Pentafluoropropionic Acid in 43.4mM Ammonium Formate, pH 2.4(55:45)
Flowrate: 1.0mL/min



Water Soluble and Fat Soluble Vitamins Analysis

1.Thiamine 2.Ascorbic 3.Niacin 4.Nicotinamide
5.Pantothenic acid 6. Riboflavin
7. Cyanocobalamin 8. Biotin 9. Vitamin A
10.d- totaxin 11. G-totaxin 12.α-totaxin
13. Vitamin D2 14. Vitamin D3 15. Vitamin K



Column: Prevail® C18, 5μm, 150×4.6mm
Mobile Phase: A: 100% Water, PH3.2,
Adjusted by Formic Acid
B: Acetonitrile: Methanol (83:17)
Gradient:

Time	0	3	10	10.1	30
%B	0	0	45	100	100

Flowrate: 1.5mL/min

MODEL 6000 ELSD

MODEL 6000 Specifications	
Operating Mode	It offers split and splitless modes and either you can choose according to different operational requirements: Split mode is available for substances with relatively low boiling points in which the temperature of drift tube and volatilization of samples can be reduced to increase sensitivity. Whereas splitless mode is fit for substances with relatively high boiling points in which samples fully enter detection cell when passing through column to reach the maximum sensitivity.
Light Source	Photodiode with optical calibration system, wavelength: 650nm, maximum output: 30mw , conforming to FCC safety standard IIIB. The lifetime of light source is up to 30,000 hours during which light sensitivity maintain constant and the Brewster angle light trap can reduce background noise effectively.
Detection Angle	Photodiode detects scattered light from the angle of 90° ， avoiding that detectors provided by some dealers may receive reflected light thus produce fake signals when it detects samples the angle＞90° .
Detection Limit	Standard column, signal-to-noise ratio: 5, hydrocortisone, 2 ng. Narrow diameter column, signal-to-noise ratio: 5, hydrocortisone, 0.5 ng. Microbore column, signal-to-noise ratio: 5, hydrocortisone, 0.1 ng.
Temperature Range	Four areas-atomizer, drift tube, detection cell and exhaust port, control temperature independently, maintaining the constant temperature difference between spray jet and exhaust port and the constant dropping time of sample in drift tube. Temperature of drift tube can be set as ambient to 120℃and built-in temperature compensation system makes temperature control more precisely
Nebulizer Gas	0-5L/min, adjustable, controlled by built-in digital flowmeter, not affected by pressure change.
Nebulization Pressure	60-80PSIG
Making up Function	Yes
SFC Port	Yes
Auto-zero of Signal Output	Yes
Gas Switch Control	Automatically
Error-correction System	Gas flow, pressure and temperature is intelligently controlled and corrected via PC.
Safety Function	Auto alarm
Nebulizer Temperature Control	Constant temperature control throughout in split or splitless mode
Drift Tube Construction	High quality stainless steel construction (fragile glass or corrosive elements excluded)
Selection and Display of Operating Parameters	Storage up to 10 methods, fast and reliable instrument initialization, liquid crystal graphic display & numeric keypad control or PC, alternative.
Analog Outputs	0-1V or 0-10MV, dual option, five-range attenuation, adjustable
Sample Detection Range	Semi-volatile and non-volatile compounds
Power Requirements	120/240V, 50/60Hz
Dimensions	23.0” H×12.5” W×21.6” D
Weight	35lbs(16KG)
Warranty	1 year parts and labor with perfect service network

Please contact local sales manager for service.

Alltech Technology Ltd.
Add.: 119-17 Fawcett Road, Coquitlam, BC, V3K6V2, Canada
Website: www.chromsolution.com
E-mail: info@chromsolution.com