a santai science company

SANTAI™
TECHNOLOGIES
quality since 2004

Santai Technologies Inc.

SepaBean™ machine

Flash Chromatography System

About Us

Santai Technologies is a technology company founded in 2004 and focused on providing separation and purification tools and services for professionals and scientists in pharmaceutical, biotechnology, fine chemicals, natural products and petrochemical industries. The products of Santai Technologies include the flash chromatography system SepaBean™ machine, SepaFlash™ series flash columns, the platform for chemical knowledge sharing as well as chemicals search and trading ChemBeanGo™, and smart hardware and software tools such as ChemBeanGo App.

SepaBean™ machine Flash Chromatography System

- Smart column holder for easy operation
- Real-time monitoring of solvent level
- Wireless operation through mobile devices
- 200 - 800 nm UV/Vis detector
- Built-in feature of separation method recommendation
- Built-in automatic fraction collector

- Binary/Quaternary solvent elution
- Emergency stop button for extra safety and protection
- Auxiliary column holder
- Maximum pressure up to 500 psi (34.5 bar) with built-in pressure alert module
- On-line full wavelength scanning
- Built-in air pump to purge the residual solvents

Chinese patents granted: ZL 2012 1 0320096.0 ZL 2015 1 0012855.0 ZL 2015 1 0312780.8 ZL 2015 1 0335132.4 ZL 2015 1 0341030.3

Features of SepaBean™ machine

- **Wireless Operation Through Mobile Devices**
  The flexible wireless control method is especially suitable for separation experiments that need to be protected from light or placed in an isolator .

- **Power Failure Recovery**
  The built-in power-off recovery function in the software minimizes the loss caused by accidental power failure.

- **Smart Column Holder**
  Column holder with touchpad could achieve automatic fixing of the flash column.*

- **Separation Method Recommendation**
  The software has a built-in separation method database that automatically recommends the most appropriate separation method based on the key information entered by the user, thereby improving work efficiency.

- **Fraction Collector**
  Tube racks with LCD display enable users to easily track the tubes containing collected fractions.

- **Local Network Data Sharing**
  Multiple instruments could form a local area network to facilitate internal data sharing and resource optimization in the laboratory.

- **RFID Technology**
  Automatic identification of current flash column information based on RFID technology, facilitating the use and maintenance of the columns.**

- **21-CFR Part 11 Compliance**
  The control software complies with FDA requirements for system safety (21-CFR Part 11), making the instrument more suitable for pharmaceutical R&D companies and laboratories.

Notes:

*Smart column holder is not applicable for SepaBean™ machine U.

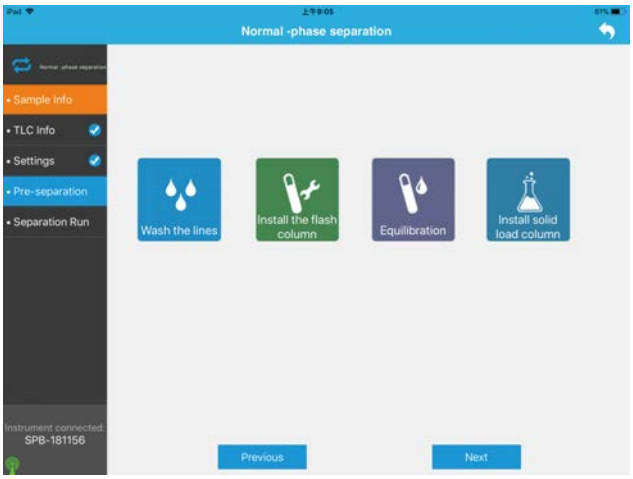
**RFID module is not applicable for SepaBean™ machine U or T.

Smart purification system makes the purification easier

The smart flash chromatography system SepaBean™ machine launched by Santai Technologies has the built-in feature of separation method recommendation. Even the beginners or non-professional chromatography operators could easily complete the purification task.

Smart purification with “Touch & GO” simplicity

SepaBean™ machine is operated through mobile device, with iconized UI, it is simple enough for the beginner and non-professional to complete routine separation, but also sophisticated enough for the professional or guru to complete or optimized a complex separation.



Built-In Method Database — Knowledge Retained

Researchers around the world spent numerous resources to develop methods of separating and purifying compound mixtures, whether it’s synthesized mixtures, or extracts from natural products, these valuable methods are usually stored in single location, isolated, disconnected, and become “information island” over the time. Unlike traditional flash instrument, SepaBean™ machine employs database and distributed computing technology to retain and share these methods across secured organizational network:

•Patented SepaBean™ machine has built-in relational database to store separation methods, researchers can query existing or update new separation method simply using compound name, structure or project code.

•SepaBean™ machine is network ready, multiple instruments within an organization can form a private channel, so that separation methods can be shared across the entire organization, authorized researchers can access and run these methods directly without having to re-develop the methods.

•SepaBean™ machine can discover and connect to peer instrument automatically, once multiple instruments are connected, data is automatically synced, researchers can access their methods in any connected instrument from any location.

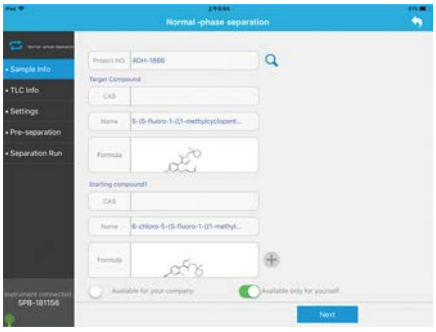
Unique “SepaBean™ Approach” results unique “SepaBean™ Advantage”

Three steps to a appproach the SepaBean™:

•Step 1: Join SepaBean™ machine to local area network (LAN) with or without internet access, multiple SepaBean™ instruments will be auto-connected and automatically synchronized with data;

•Step 2: Create user account for researchers before operating the machine for the first time;

•Step 3: Fill in compound information before separation, including key starting materials if the compound is synthesized.



SepaBean™ Advantage:

•Every single method and related data which researchers spent resources on developing is retained in the database and searchable across the entire authorized network, these methods and related data become valuable assets of the organization, including information of all the compounds synthesized and purified over the years.

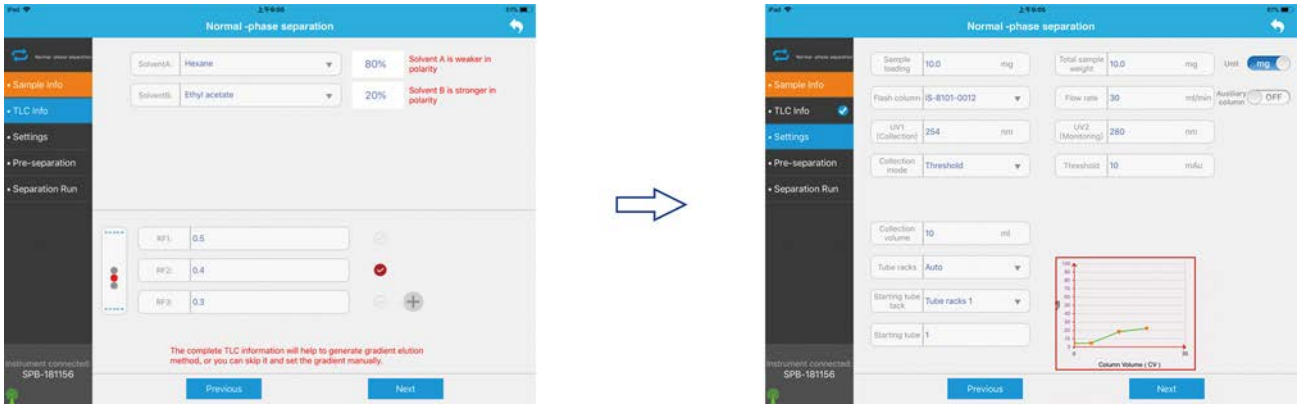
•Simply input compound information, such as name, CAS # or structure, previous matched or similar methods will pop up and you can follow the method to finish a separation, or start a new one so that other researchers can benefit from it.

•Non-interrupted separation. If the SepaBean™ machine was interrupted or replaced, you could continue the run

in another SepaBean™ machine, just install the interrupted flash column and test-tube rack in any connected SepaBean™machine nearby, log in and continue from where you left-off.

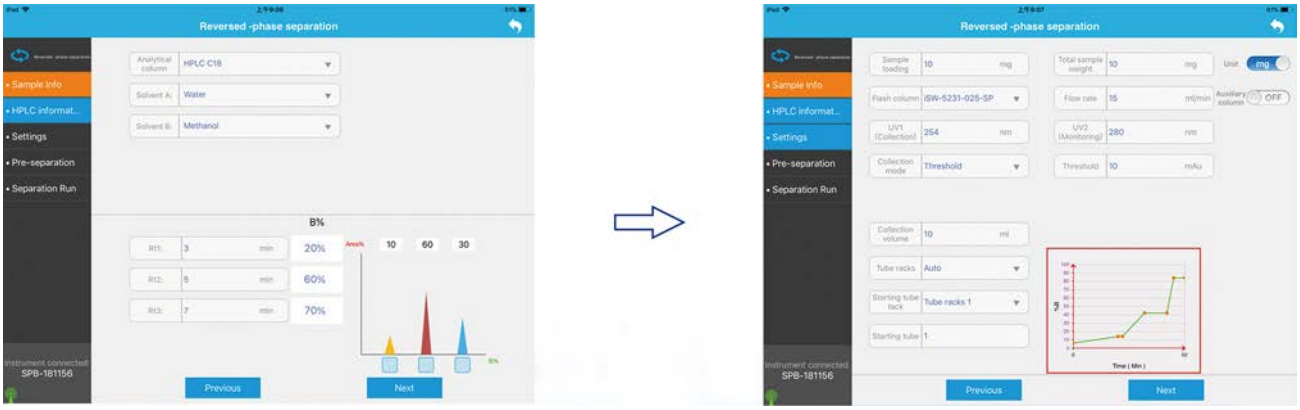
TLC-to-Gradient

Now, with the new feature of TLC-to-Gradient built in the control software of SepaBean™ machine, the whole sample preparation procedure is greatly accelerated. The user only needs to input the TLC information and the loading amount of the sample, the software will automatically recommend the proper flash column for the separation. Also the optimized elution gradient will be generated. As a result, the work efficiency can be significantly improved.



HPLC-to-Gradient

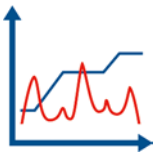
For reversed-phase separation, the control software of SepaBean™ machine can also help the user with smart recommendations. Input the analytical HPLC information, including the retention time of the sample, the percentage of Solvent B when specific component is eluted out, the peak area of the target product and the primary impurities, the elution gradient will be automatically generated.



User Interface

- **Streamlined operation**
  The simple parameter setting as well as the clear interface enables the user to easily understand and operate.

- **Collection methods**
  These collection methods are supported: all, threshold, slope, time, waste.



- **Real-time parameters modification during running**
  During separation running, the separation parameters could be modified at any time, including flow rate, gradient, collection volume, threshold value for collection, etc.

- **Gradient hold**
  The elution gradient could be hold during the separation procedure to improve the resolution of the components.

- **Flash column recommendation**
  The most proper flash column could be recommended according to the key sample information.

- **History records**
  The history records of the current user's experiments could be reviewed at any time.

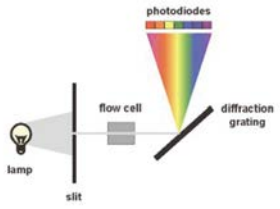
Detectors

- **Variable Dual Wavelength Diode Array Detector (DAD)**

  •Suitable for detecting the compounds with UV or visible light absorption

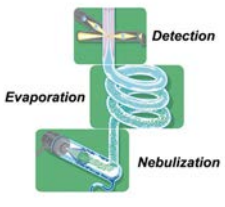
  •Built-in feature of full wavelength scanning for the easy determination of the maximum absorption wavelength of the sample, contributing to higher detection sensitivity as well as lower sample loss

  •Review of full wavelength scanning data in the history records could help the user evaluate the purity of the product, making the separation results more reliable



- **Evaporative Light Scattering Detector (ELSD)**

  Universal detector with high sensitivity, commonly used for analysis of compounds where UV detection might be a restriction and therefore compounds do not efficiently absorb UV radiation, such as sugars, lipids, polymers, fatty acids, amino acids, etc.



Choose the SepaBean machine that's right for you

Model	SepaBean machine U	SepaBean machine T	SepaBean machine	SepaBean machine 2	SepaBean machine 2S	SepaBean machine L
						
Description	Entry level model with all the features of SepaBean control software. Meet the demands of daily separation and purification, including normal phase and reversed phase separation.	Cost effective model with all features of SepaBean control software. Binary gradient with any combinations of two solvents. Optional ELSD to cover more types of samples.	Standard version. Binary gradient with four solvent lines, high pressure mixing. Optional ELSD to cover more types of samples.	Medium pressure model which could perfectly match with SepaFlash spin-welded columns for higher separation efficiency. Binary gradient with any combinations of two solvents, 3rd solvent as modifier, able to run complex separation conditions. Optional ELSD to cover more types of samples.	Improved medium pressure model with higher flow rate, up to 300 mL/min. Binary gradient with any combinations of two solvents, 3rd solvent as modifier, able to run complex separation conditions. Optional ELSD to cover more types of samples.	High flow rate model for large amount of sample purification, up to 300 grams in a single run. Binary gradient with any combination of two solvents.
Flow Range	1 - 100 mL/min (U100) 1 - 200 mL/min (U200)	1 - 200 mL/min	1 - 200 mL/min	1 - 200 mL/min	1 - 300 mL/min	50 - 1000 mL/min
Maximum Pressure	100 psi (6.9 bar, U100) 200 psi (13.8 bar, U200)	200 psi (13.8 bar)	200 psi (13.8 bar)	500 psi (34.5 bar)	400 psi (27.6 bar)	150 psi (10.4 bar)
Pumping System	Highly accurate, maintenance free ceramic pump	Highly accurate, maintenance free ceramic pump	Highly accurate, maintenance free ceramic pumps	Highly accurate dual piston pump	Highly accurate dual piston pump	Dual highly accurate, maintenance free ceramic pumps
Gradients	Two solvents, binary	Four solvents binary with any combinations of two solvents	Four solvents binary, high pressure mixing	Four solvents binary with 3rd solvent as modifier	Four solvents binary with 3rd solvent as modifier	Four solvents binary with any combinations of two solvents
Detector	Fixed wavelength (254 nm, optional other wavelength) or DAD variable UV (200 - 400 nm) or DAD vairable UV (200 - 400 nm) + Vis (400 - 800 nm) or ELSD	DAD variable UV (200 - 400 nm) or DAD vairable UV (200 - 400 nm) + Vis (400 - 800 nm) or ELSD	DAD variable UV (200 - 400 nm) or DAD vairable UV (200 - 400 nm) + Vis (400 - 800 nm) or ELSD	DAD variable UV (200 - 400 nm) or DAD vairable UV (200 - 400 nm) + Vis (400 - 800 nm) or ELSD	DAD variable UV (200 - 400 nm) or DAD vairable UV (200 - 400 nm) + Vis (400 - 800 nm) or ELSD	DAD variable UV (200 - 400 nm) or DAD vairable UV (200 - 400 nm) + Vis (400 - 800 nm)
Sample Loading Capacity	10 mg - 33 g	10 mg - 33 g	10 mg - 33 g	10 mg - 33 g	10 mg - 33 g	8 g - 300 g
Column Sizes	4 g - 330 g, up to 3 kg with adapters	4 g - 330 g, up to 3 kg with adapters	4 g - 330 g, up to 3 kg with adapters	4 g - 330 g, up to 3 kg with adapters	4 g - 330 g, up to 3 kg with adapters	800 g - 3 kg
Other Specifications	• Gradient types: isocratic, linear, step • Flowcell optical path length: 0.3 mm (default); adjustable from 0.3 mm to 2.4 mm • Spectral display: single/dual/all-wavelengths* • Sample loading method: manual load, automatic load with sample pump • Fraction collection method: all, waste, threshold, slope, time, mixed mode • Fraction collector: Standard: tubes (13 mm, 15 mm, 18 mm, 25 mm); Optional: French square bottle (250 mL, 500 mL) or large collection bottle; Customizable collection container • Control device: wireless operation through mobile devices • Certificate: CE, cTUVus**					

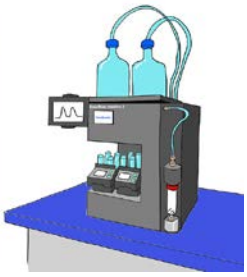
Notes:

**All-wavelength scanning function is not applicable for SepaBean machine U with fixed wavelength UV detector.*

***SepaBean machine T has received cTUVus certification.*

Applications

The Application of C18AQ Columns in the Purification of Strong Polar Peptides



During the purification procedure for these strong polar peptide samples by reversed-phase chromatography, a phenomenon called hydrophobic phase collapse will occur.

Compared with the regular C18 columns, the improved C18AQ columns are most suitable for the purification of strong polar or hydrophilic samples. In this application, a strong polar peptide was utilized as the sample and purified by a C18AQ column. As a result, the target product meeting the requirements was obtained and could be used in the following research and development.

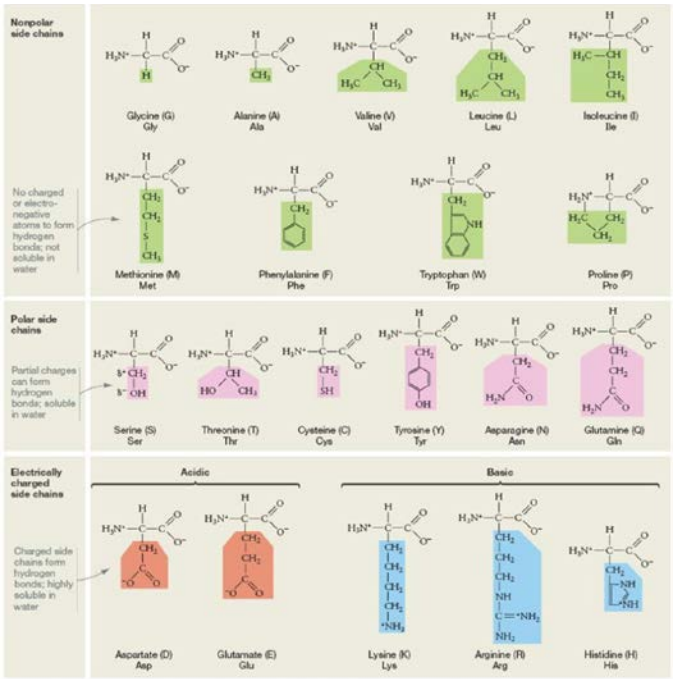


Figure 1. The chemical structure of 20 common amino acids.

Experimental setup:

Instrument	SepaBean™ machine 2			
Flash Cartridge	12 g SepaFlash™ C18 RP flash cartridge (spherical silica, 20 - 45 μm, 100 Å, Order nunber:SW-5222-012-SP)		12 g SepaFlash™ C18AQ RP flash cartridge (spherical silica, 20 - 45 μm, 100 Å, Order nunber:SW-5222-012-SP(AQ))	
Wavelength	254 nm, 220 nm		214 nm	
Mobile phase	Solvent A: Water Solvent B: Acetonitrile			
Flow rate	15 mL/min		20 mL/min	
Sample loading	30 mg			
Gradient	Time (CV)	Solvent B (%)	Time (min)	Solvent B (%)
	0	0	0	4
	1.0	0	1.0	4
	10.0	6	7.5	18
	12.5	6	13.0	18
	16.5	10	14.0	22
	19.0	41	15.5	22
	21.0	41	18.0	38
			20.0	38
	/	/	22.0	87
			29.0	87

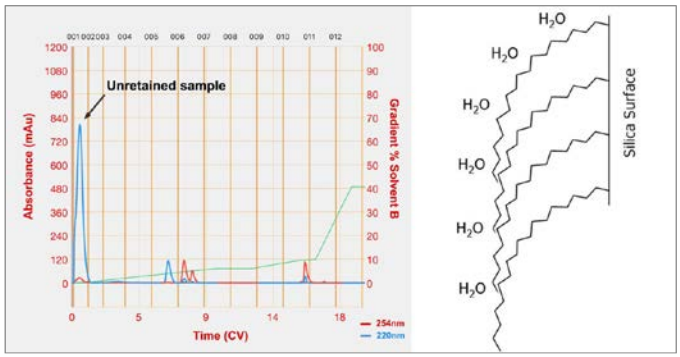


Figure 2. The flash chromatogram of the sample on a regular C18 cartridge.

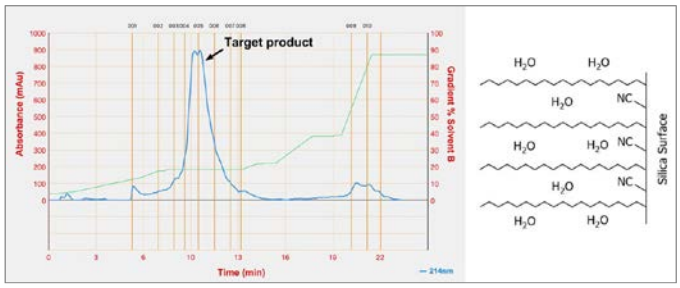
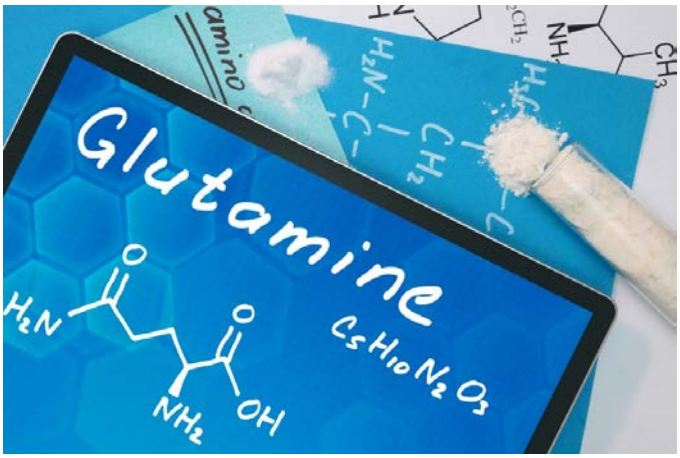


Figure 3. The flash chromatogram of the sample on a C18AQ cartridge.

C18AQ Cartridge and Its Application in the Purification of Glutamine Derivatives



In this application, the sample used was a highly polar glutamine derivative which cannot be dissolved in regular organic solvents such as n-hexane, ethyl acetate, etc. The sample can barely retain on regular reversed phase C18 cartridge. Considering the specific sample properties, the application engineers from Santai Technologies utilized a hydrophilic SepaFlash™ C18AQ cartridge combining with a flash chromatography system SepaBean™ machine for the sample purification. As a result, the target product meeting the purity requirement was obtained, suggesting a feasible solution for the fast purification of highly polar glutamine derivative samples.

Experimental setup:

Instrument	SepaBean™ machine T			
Flash Cartridge	12 g SepaFlash™ Bonded Series C18 cartridge (spherical silica, 20 - 45 μm, 100 Å, Order number:SW-5222-012-SP)		120 g SepaFlash™ Bonded Series C18AQ cartridge (spherical silica, 20 - 45 μm, 100 Å, Order number:SW-5222-120-SP(AQ))	
Wavelength	220 nm, 254 nm			
Mobile phase	Solvent A: Water Solvent B: Acetonitrile			
Flow rate	25 mL/min		40 mL/min	
Sample loading	300 mg		1.2 g	
Gradient	Time (min)	Solvent B (%)	Time (min)	Solvent B (%)
	0	0	0	0
	15	20	10.0	0
	/	/	12.0	2.0
			16.0	2.0
			17.5	95
			30.0	95

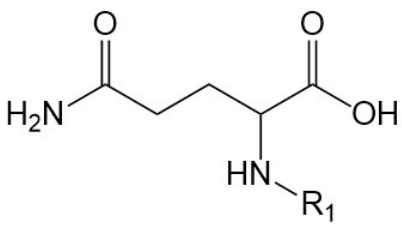


Figure 4. The chemical structure of glutamine derivative sample.

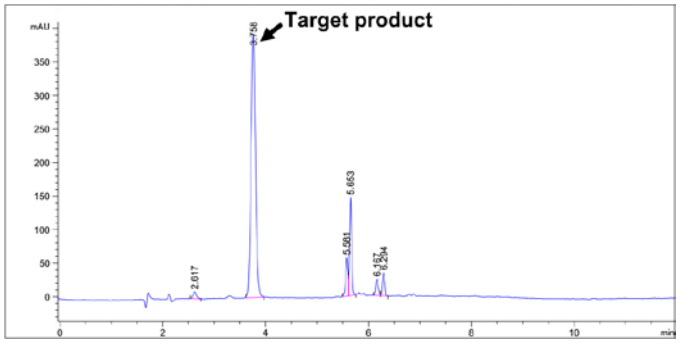


Figure 5. The chromatogram of the raw sample.

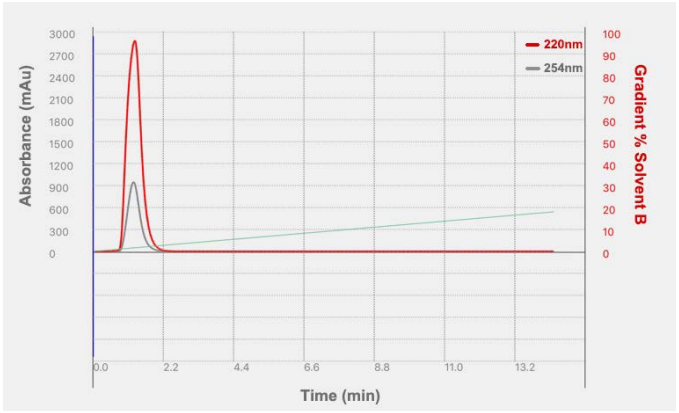


Figure 6. The flash chromatogram of the sample by a regular C18 cartridge.

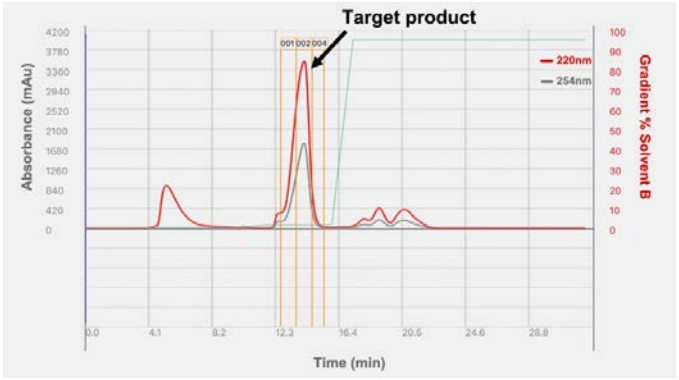


Figure 7. The flash chromatogram of the sample by a C18AQ cartridge.

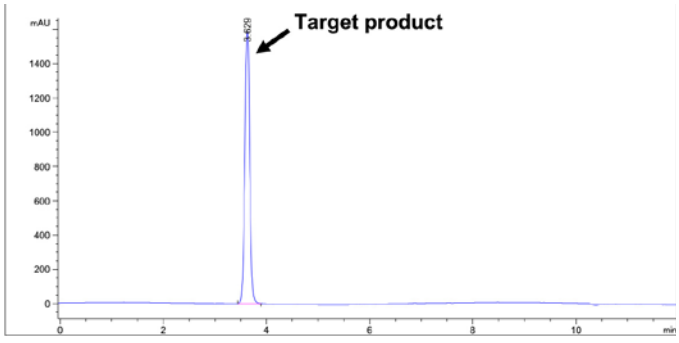


Figure 8. The HPLC chromatogram of the purified target product..

The Application of HILIC ARG Cartridge for the Purification of Strong Polar Thiazide Compound

In this application, the sample molecule contained a thiazide parent structure which led to poor separation by normal phase silica cartridge or regular C18 reversed phase cartridge. With the research and development by application engineers from Santai Technologies, a SepaFlash™ HILIC ARG cartridge combined with the preparative flash chromatography system SepaBean™ machine were successfully applied for the separation and purification of the sample.

Experimental setup:

Instrument	SepaBean™ machine T			
Flash Cartridge	12 g SepaFlash™ Bonded Series C18 cartridge (spherical silica, 20 - 45 μm, 100Å, Order number: SW-5222-012-SP)		120 g SepaFlash™ HILIC ARG cartridge (spherical silica, 20 - 45 μm, 100Å, Order number: SW-5622-120-SP)	
Wavelength	220 nm, 254 nm			
Mobile phase	Solvent A: water (0.1%TFA) Solvent B: acetonitrile (0.1%TFA)			
Flow rate	15 mL/min		50 mL/min	
Sample loading	100 mg		500 mg	
Gradient	Time (min)	Solvent B (%)	Time (min)	Solvent B (%)
	0	10	0	70
	10.0	90	35.0	0

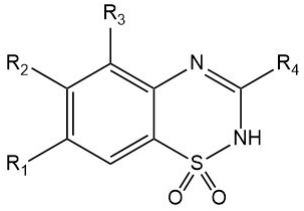


Figure 9. The chemical structure of the sample molecule.

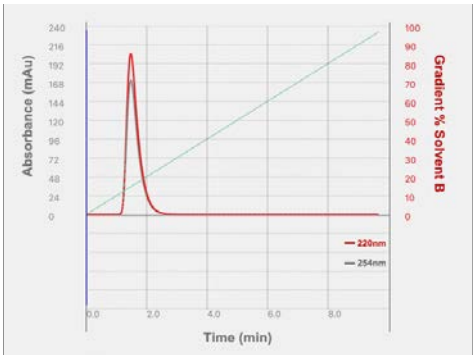
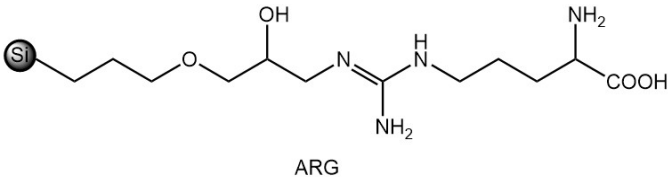


Figure 10. The flash chromatogram of the sample by a regular C18 reversed phase cartridge.



ARG

Figure 11. The schematic diagram of the stationary phase bonded to the surface of ARG separation media.

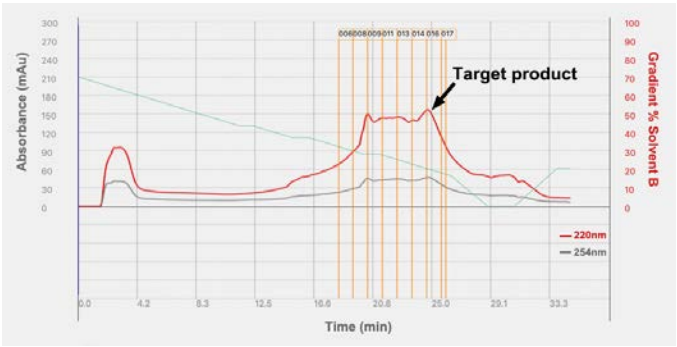


Figure 12. The flash chromatogram of the sample by a HILIC ARG cartridge.

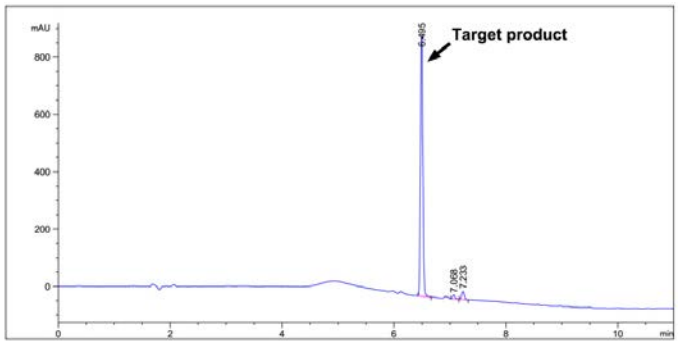


Figure 13. The HPLC chromatogram of the purified product.

The Application of ELSD in the Purification of Non-UV Absorbing Compounds

In chemical synthesis, many compounds are absent with UV absorption structures. For the purification of these compounds, commonly used UV detector cannot meet the requirement of real-time monitoring for the eluting procedure. In this application, a synthetic oligosaccharide molecule was used as the sample to show the application of ELSD in Flash purification.

Experimental setup:

Instrument	SepaBean™ machine T	
Flash Cartridge	12 g SepaFlash™ HILIC ARG cartridge (spherical silica, 20 - 45 μm, 100 Å, Order number: SW-5622-012-SP)	
Wavelength	254 nm, 280 nm, ELSD	
Mobile phase	Solvent A: water Solvent B: acetonitrile	
Flow rate	30 mL/min	
Sample loading	30 mg	
Gradient	Time (CV)	Solvent B (%)
	0	95
	8	80
	15	80
	23	53
	25	53
	32	25
	37	25

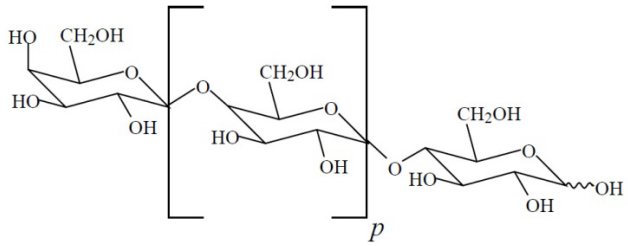


Figure 14. The chemical structure of an oligosaccharide sample.

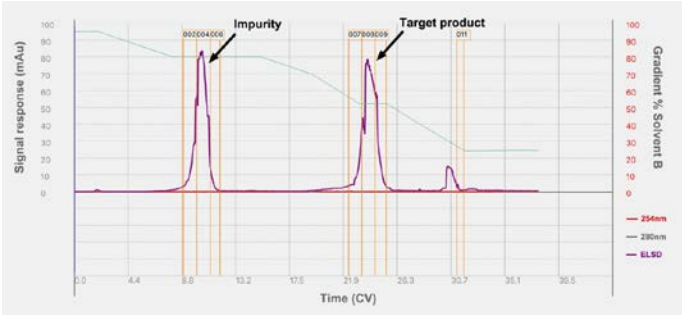


Figure 15. The flash chromatogram of the sample by a HILIC ARG cartridge.

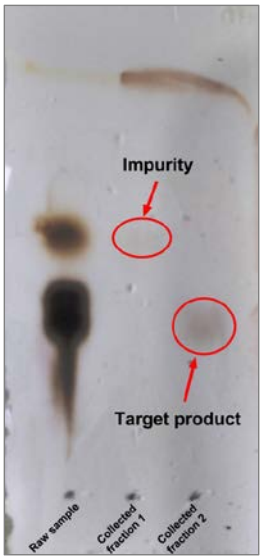
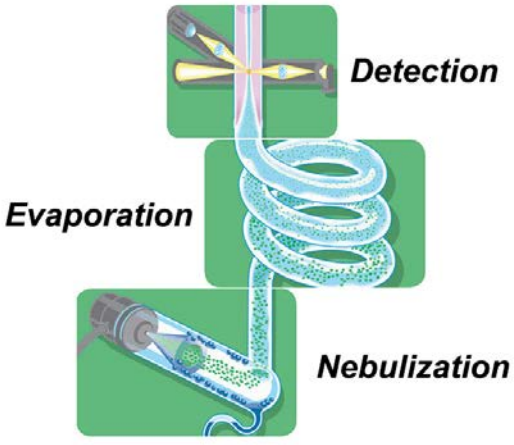


Figure 16. The TLC identification results of raw sample and collected fractions.



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