

The word "HALO" is written in a white, serif font. A bright orange, glowing ring is positioned around the top of the letter "O".

HALO®

innovated by

advancedmaterialstechnology

Cannabinoid Separation Using HALO[®] LPH-C18



Conner McHale
Technical Support Specialist
Advanced Materials Technology

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Presentation Outline

- **Advanced Materials Technology**
 - Superficially Porous Particles (SPP)
 - Product Portfolio
- HALO® 90Å, LPH-C18
- Cannabis Potency Testing Method Development
- HALO® 1.5 mm ID
- Technical Resources



Founded in 2005 by Tim Langlois and Joe DeStefano

First company to commercially manufacture sub 3 μm superficially porous particles – *Fused-Core*[®]

Personnel

- >50 employees

Facility

- Fully equipped state of the art laboratories
- All operations handled in Wilmington, DE
 - R&D, Applications, QA/QC, Manufacturing, Sales and Marketing

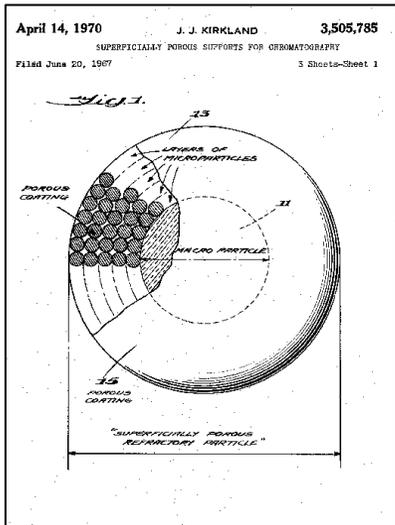
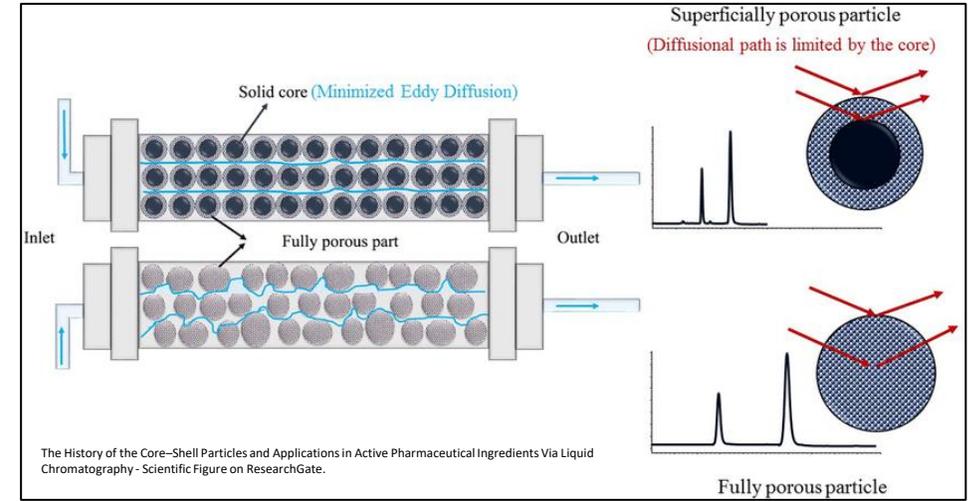
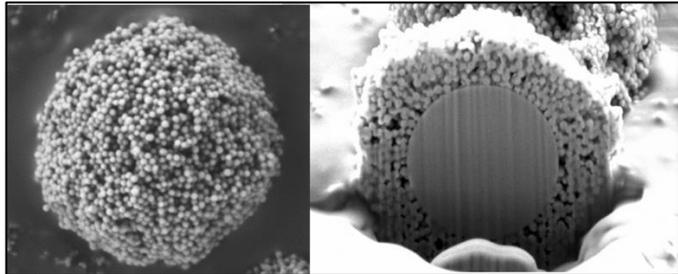
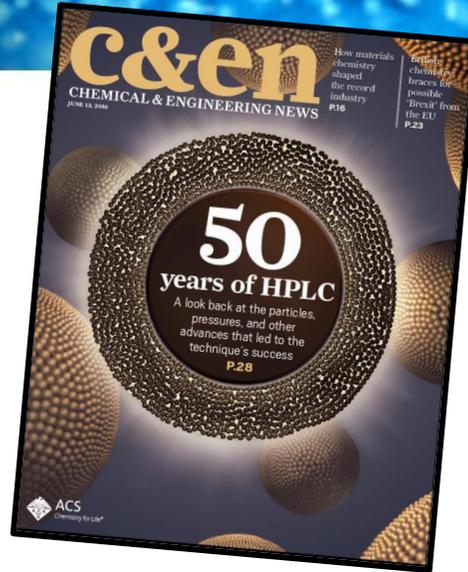


AMT is a company of innovators and continues to grow and deliver enabling materials to market. Our incredible team is our greatest resource.

Superficially Porous Particle Technology (SPP)



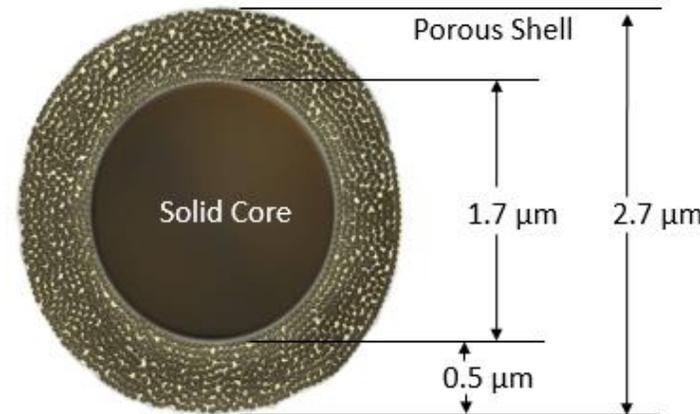
- High Purity Silica Particles (2, 2.7, 3.4, 5 μm)
- Bonded Phase Shell Fused to Solid Core
- Shell Consists of Different Pore Sizes (90, 160, 400, 1000 \AA)



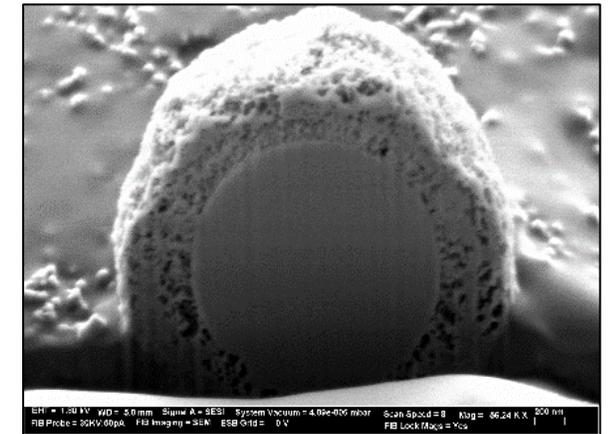
3,505,785
SUPERFICIALLY POROUS SUPPORTS FOR CHROMATOGRAPHY
 Joseph J. Kirkland, Wilmington, Del., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del., a corporation of Delaware
 Filed June 20, 1967, Ser. No. 647,506
 Int. Cl. B01d 15/08
 U.S. Cl. 55-67
 8 Claims

ABSTRACT OF THE DISCLOSURE
 This invention relates to an improvement in chromatography and chromatographic columns. A novel packing of superficially porous refractory particles for use in chromatography has been prepared consisting of a plurality of discrete macroparticles with impervious cores and having irreversibly joined thereto a coating of a series of sequentially adsorbed like monolayers of like colloidal inorganic microparticles. The coating is characterized by being uniform and of predetermined thickness. In preferred embodiments, the cores would be ceramics, preferably glass spheres, and the coating would consist of monolayers of colloidal refractory particles, preferably silica, in a structure of predetermined thickness and porosity.

Shell with pores

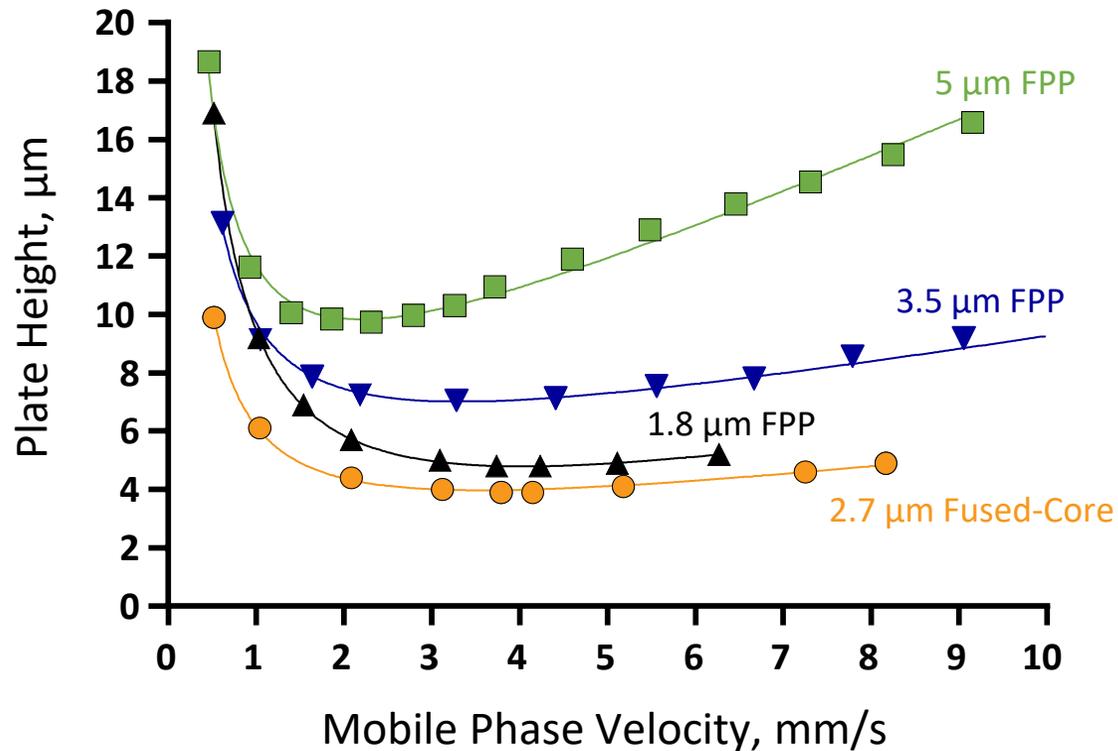


SEM Particle Cross-section



How SPP Benefits Separations?

Speed and Efficiency



J.J. DeStefano, T.J. Langlois, & J.J. Kirkland, *J. Chromatogr. Sci.*, 2008, 46(3), 254-260

Effect of Particle Size and Type

Columns: 4.6 x 50 mm
 5 μm FPP C18
 3.5 μm FPP C18
 1.8 μm FPP C18
 2.7 μm HALO C18

Solute: naphthalene
 Mobile phase: 60% ACN/40% water
 Temperature: 24 °C

van Deemter Equation

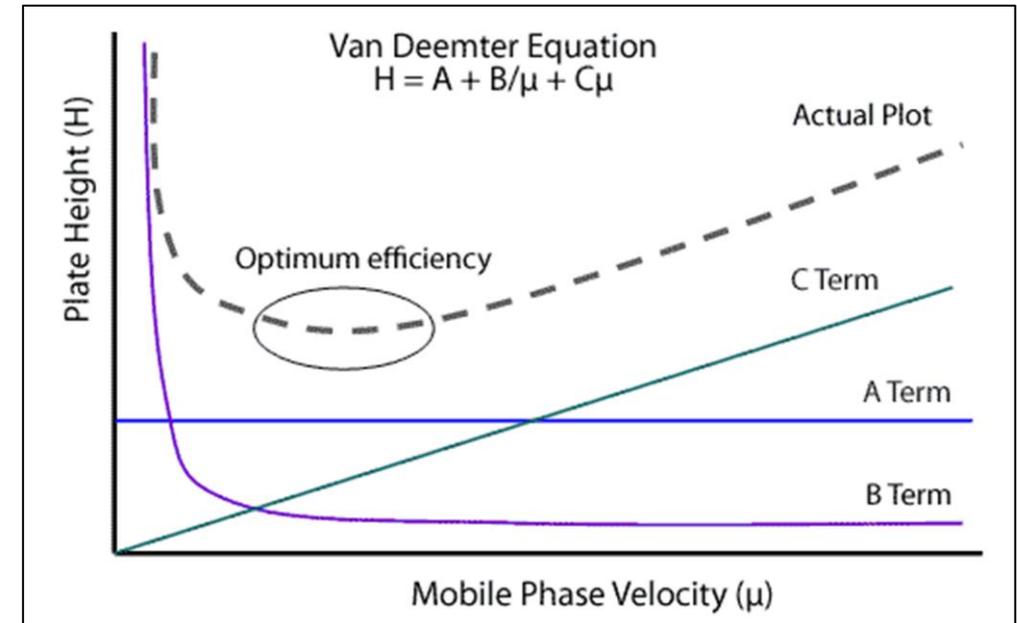
H = height equivalent to theoretical plate

A = eddy diffusion term (particle size and how well bed was packed) **30 - 40% smaller**

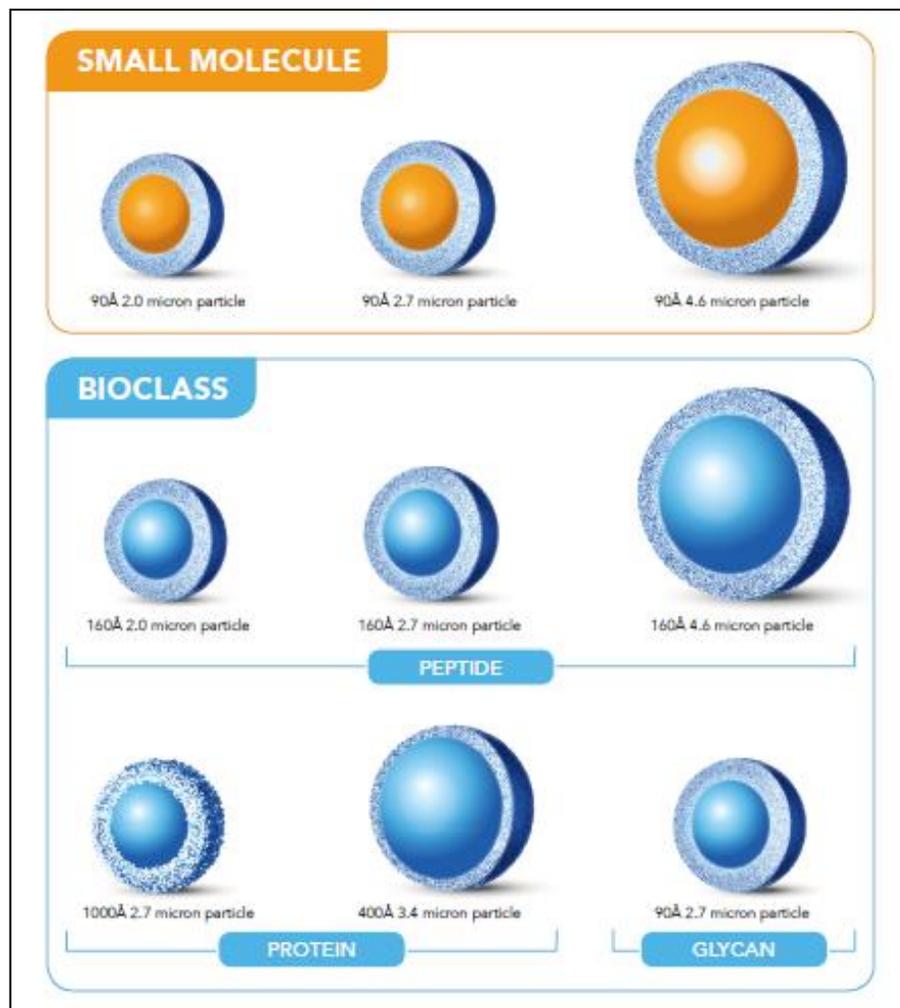
B = longitudinal diffusion term **25 - 30% smaller**

C = resistance to mass transfer term (kinetics of the analyte b/w mobile phase and stationary phase)

μ = mobile phase linear velocity (L/t₀)

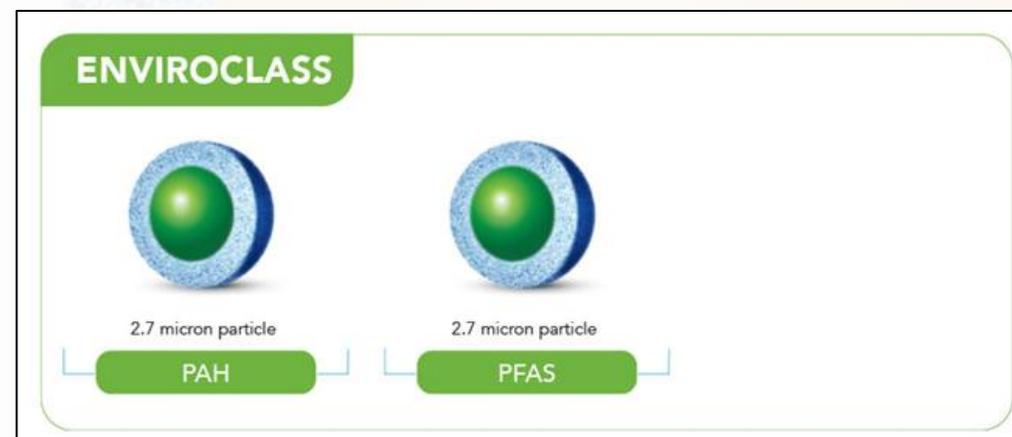


$$H = A + \frac{B}{\mu} + C\mu$$



Portfolio of Products

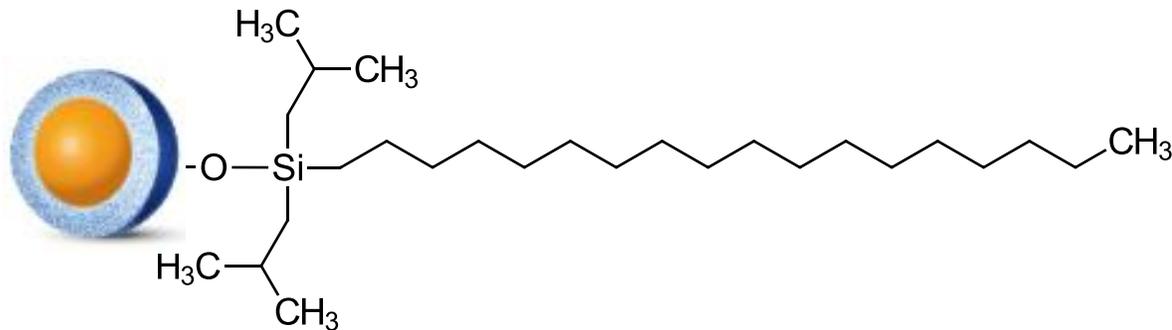
- Varying particle morphologies to meet separation needs (particle size, core size, shell thickness, pore size)
- Various chemistries for selectivity of analytes across small molecule to large molecule
- Many different column dimensions from capillary to semi-prep.



HALO 90 Å, 2.7 μm LPH-C18

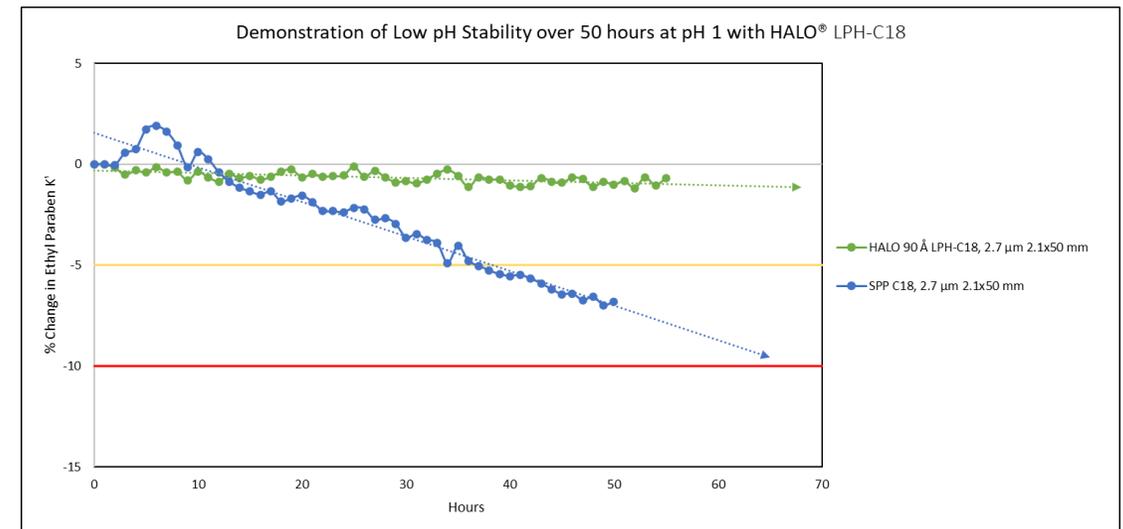


Introducing a low pH compatible, 90 Å, superficially porous particle C18 phase useful for any chromatographer running under low pH conditions. The sterically protected ligand reduced acidic hydrolysis which enables low pH mobile phases to be used without sacrificing column performance over time.



SPECIFICATIONS

Ligand: diisobutyloctadecylsilane	USP Designation: L1	Endcapped: No
Particle Size: 2 μm, 2.7 μm	Carbon Load: 6.5%	Low pH Limit /Max T: 1/90 °C
Pore Size: 90 Å	Surface Area: 2 μm: 120 m ² /g 2.7 μm: 135 m ² /g	High pH Limit/Max T: 8/40 °C



Pertinent for Cannabis because we prefer low pH to suppress acidic cannabinoids and improve peak shape

A California marijuana company is being sued over the potency of its joints

By Zoe Sottile and Claudia Dominguez, CNN
Published 1:39 PM EDT, Wed October 26, 2022



More potent pot tends to be priced higher in California
Market share and price of legal marijuana by listed level of THC, 2020

THC LEVEL	SHARE OF TRANSACTIONS	RETAIL PRICE/GRAM
Very Low <7%	0.3%	\$8.40
Low 7-14	4.0	5.31
Medium 14-21	39.8	7.37
High 21-28	44.7	11.06
Very High >=28	11.1	12.89

Cured flower products only.
SOURCE: FLOWHUB

Pharmacokinetics of Phytocannabinoid Acids and Anticonvulsant Effect of Cannabidiolic Acid in a Mouse Model of Dravet Syndrome

Lyndsey L. Anderson,^{1,4} Ivan K. Low,¹ Samuel D. Banister,^{1,8} Iain S. McGregor,^{1,4} and Jonathon C. Arnold^{1,2,3}

¹Lambert Initiative for Cannabinoid Therapeutics, Brain and Mind Centre, The University of Sydney, Sydney, New South Wales 2050, Australia

²Discipline of Pharmacology, Faculty of Medicine and Health, The University of Sydney, Sydney, New South Wales 2006, Australia

³School of Chemistry, Faculty of Science, The University of Sydney, Sydney, New South Wales 2006, Australia

⁴School of Psychology, Faculty of Science, The University of Sydney, Sydney, New South Wales 2006, Australia

Journal of Natural Products

Article

Table 3. Physicochemical Properties of Phytocannabinoid Acids

phytocannabinoid	molecular weight	pK _a	log P	TPSA (Å)	rotatable bonds	CNS MPO score
CBCA	358.4	2.87	6.91	66.76	8	3.79
CBDA	358.5	2.91	6.63	77.76	7	3.59
CBDVA	330.4	2.91	5.94	77.76	5	4.04
CBGA	360.5	2.92	7.35	77.76	10	3.23
CBGVA	332.4	2.92	6.46	77.76	8	3.68
THCA	358.4	2.89	6.25	66.76	5	4.12

Buffer	pKa	Operating pH range
Phosphate, pK1	2.1	1.1-3.1
pK2	7.2	6.2-8.2
pK3	12.3	11.3-13.3 (not advisable)
Citrate, pK1	3.1	2.1-4.1
pK2	4.7	3.7-5.7
pK3	5.4	4.4-6.4
Formate	3.8	2.8-4.8
Acetate	4.8	3.8-5.8
Tris (hydroxymethyl)- aminomethane	8.3	7.3-9.3 (use at 8.0 or below)

Selection of formic acid/
ammonium formate: MS
friendly and acidic
cannabinoid pKa values
are ~3

Standardizing Cannabis Lab Testing Nationally



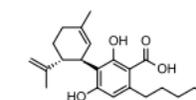
NCLC recommends that the following cannabinoids be included in a standardized potency panel for all products:

- Δ9-THC
- Δ9-THCA
- Δ8-THC
- CBD
- CBDA
- CBN
- CBNA
- CBG
- CBGA

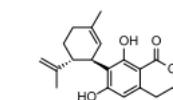
Further, the group recommends that any cannabinoid on the label should be required to be on the cannabinoid testing panel for all products, such cannabinoids to include, but not be limited to, the following:

- CBDV
- CBDVA
- THCV
- THCVA
- CBL
- CBLA
- CBC
- CBCA
- Δ10-THC
- Δ9,11-THC
- THCO acetate
- HHC

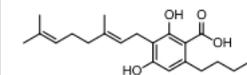
Journal of Natural Products



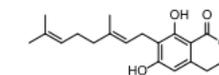
cannabidiolic acid (CBDA)



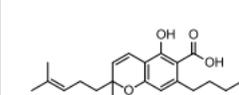
cannabidivarinic acid (CBDVA)



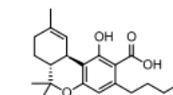
cannabigerolic acid (CBGA)



cannabigerovarinic acid (CBGVA)



cannabichromenic acid (CBCA)

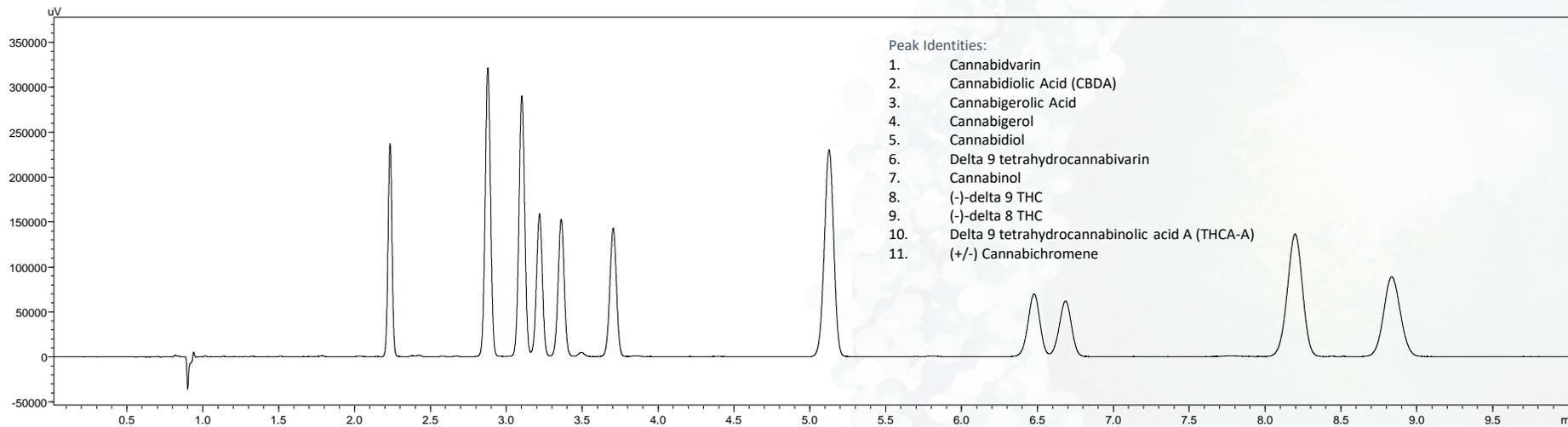
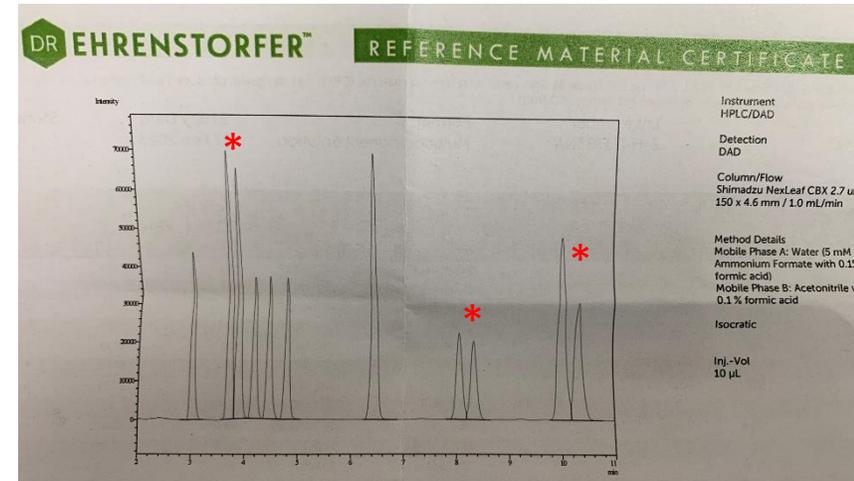


tetrahydrocannabinolic acid (THCA)

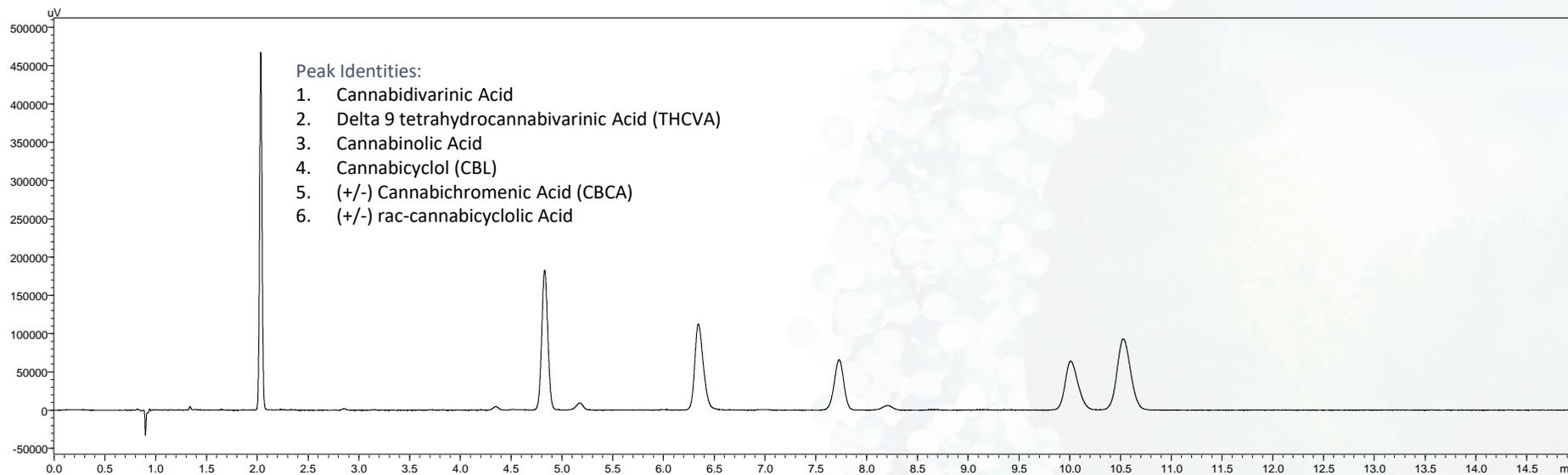
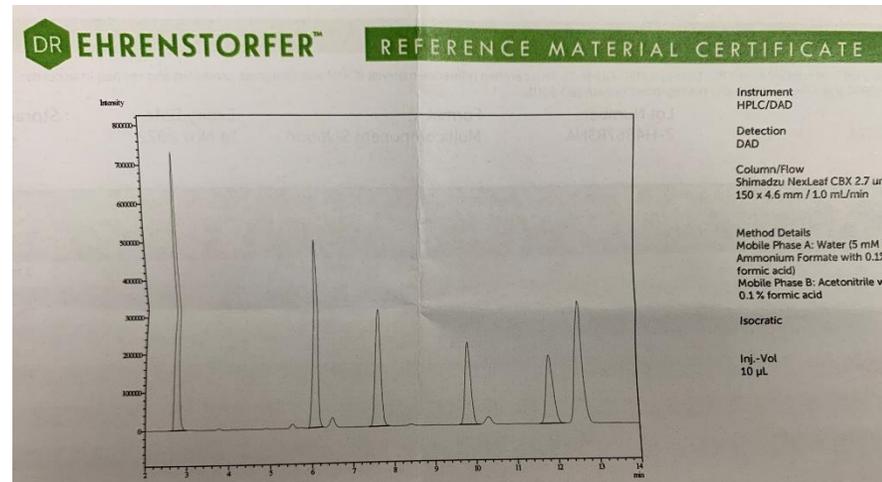
Figure 1. Chemical structures of phytocannabinoid acids used in this study.

Testing Conditions:

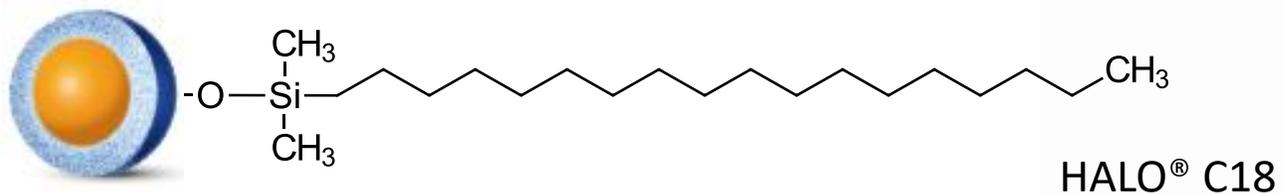
Mobile Phase: A: 5mM Ammonium Formate, 0.1% Formic Acid
 B: Acetonitrile, 0.1% Formic Acid
 Isocratic Separation: 75% B
 Instrument: Shimadzu Nexera X2
 Wavelength: PDA, 228 nm
 Injection: 1 µl
 Temperature: 30°C
 Flow Rate: 1.5 mL/min.
 Back Pressure: 345 bar
 Sample: LGC DRE-A50000255AL
 Sample Solvent: 75/25 ACN/ Water
 Column: HALO 90Å LPH-C18, 2.7µm, 4.6 x 150mm



Testing Conditions:
 Mobile Phase: A: 5mM Ammonium Formate, 0.1% Formic Acid
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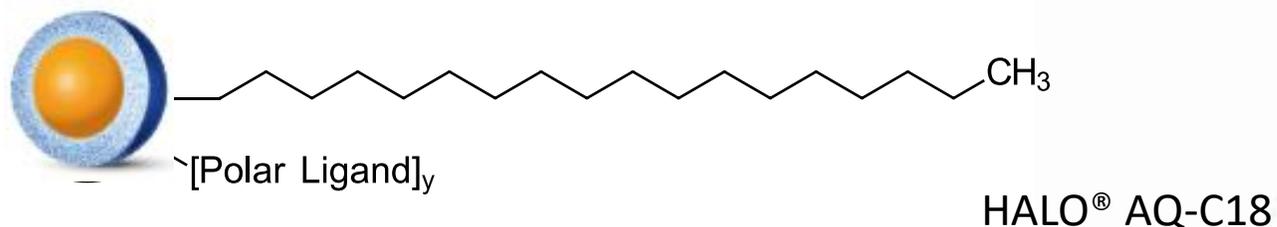


Another C18 Column?



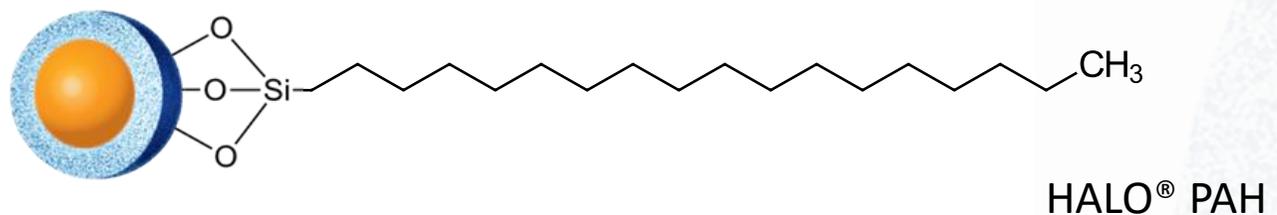
Features and Benefits

- The standard for retaining and separating a broad range of analytes polarities



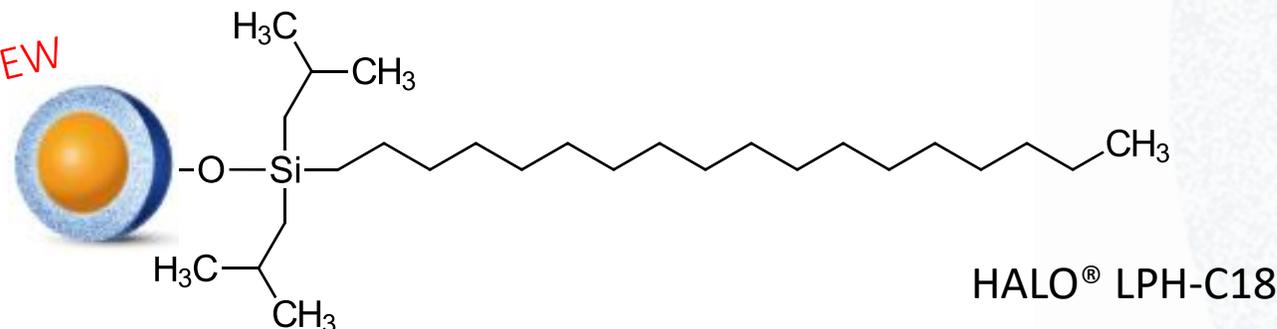
- Resistant to dewetting, making it 100% aqueous mobile phase compatible

- Enhanced retention and selectivity for polar molecules



- Optimized for polycyclic aromatic hydrocarbons (PAH)

- polymeric bonding that promotes shape selectivity.



- Optimized for small molecule reversed-phase HPLC separations employing mobile phases with very low pH and elevated temperature for acidic and neutral compounds.

Cannabinoid HALO Phase Screening



HALO vs. Others

Testing Conditions:

Mobile Phase: A: 5mM Ammonium Formate, 0.1% Formic Acid

B: Acetonitrile, 0.1% Formic Acid

Isocratic Separation: 75% B

Instrument: Shimadzu Nexera X2

Wavelength: PDA, 228 nm

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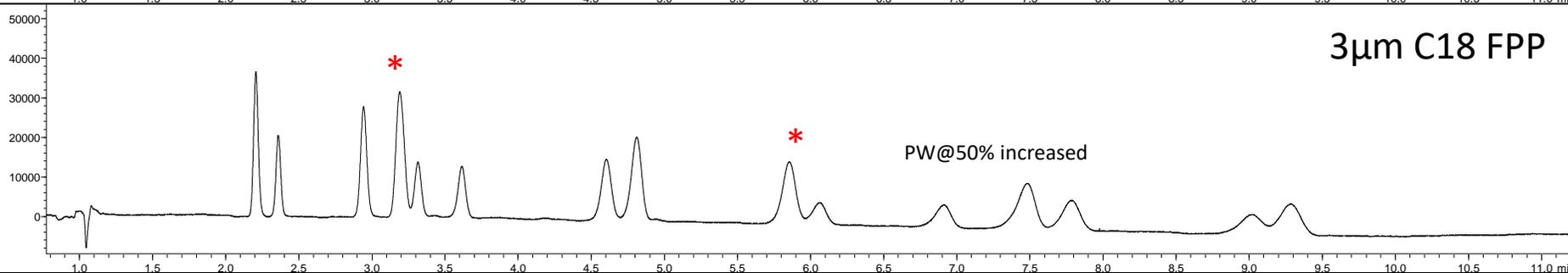
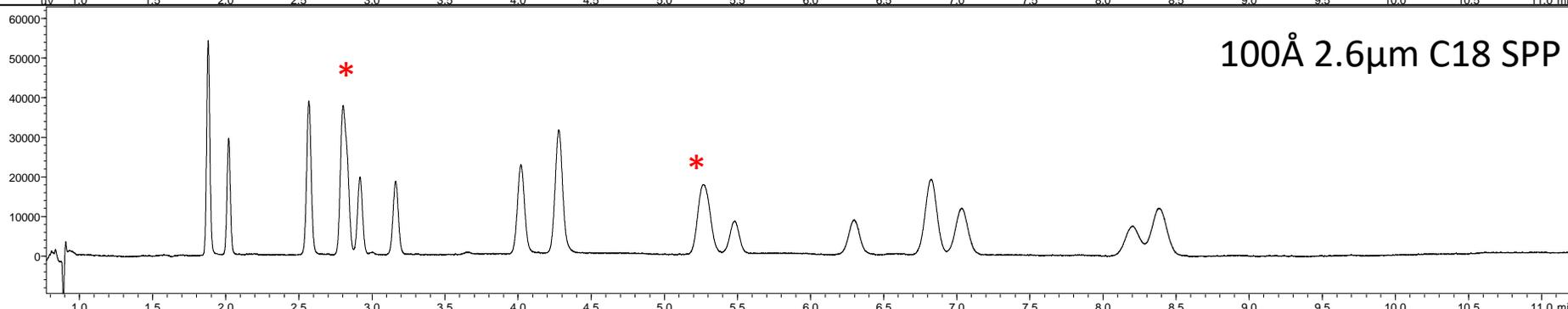
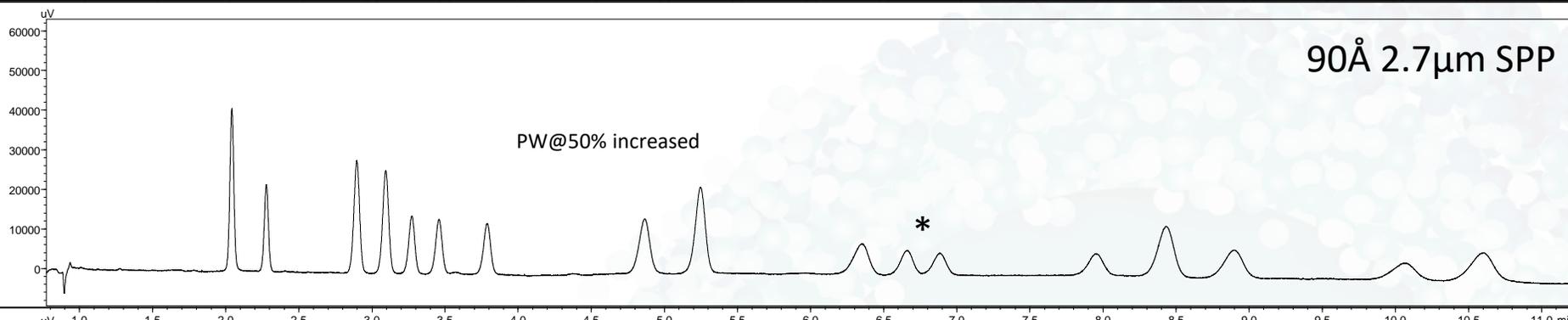
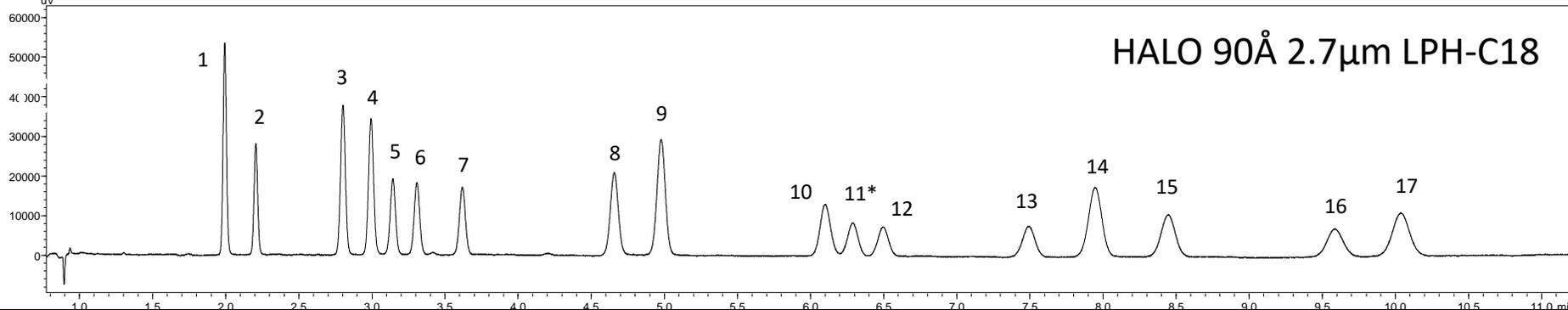
Flow Rate: 1.5 mL/min.

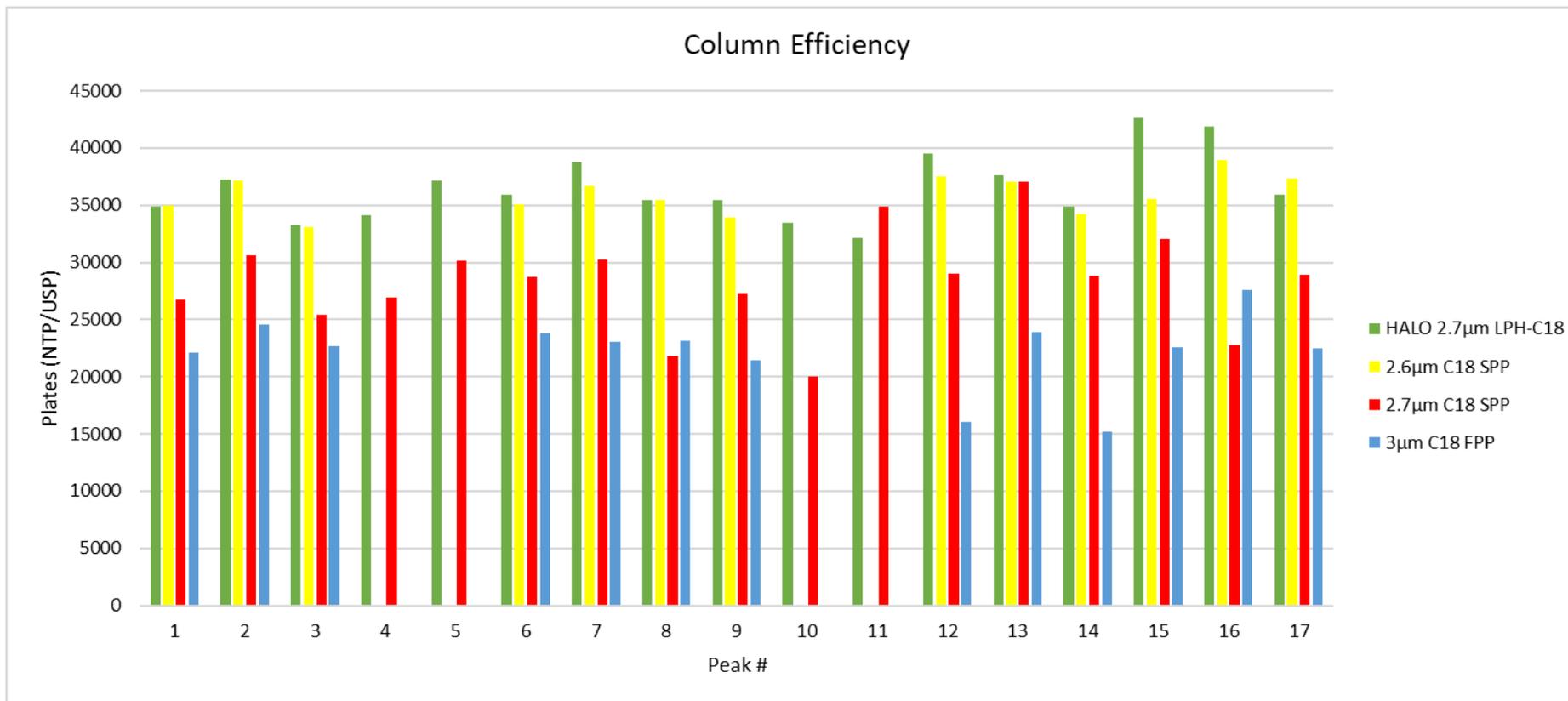
Sample Solvent: 75/25 ACN/ Water, 0.1% FA

Column Dimension: 4.6 x 150mm

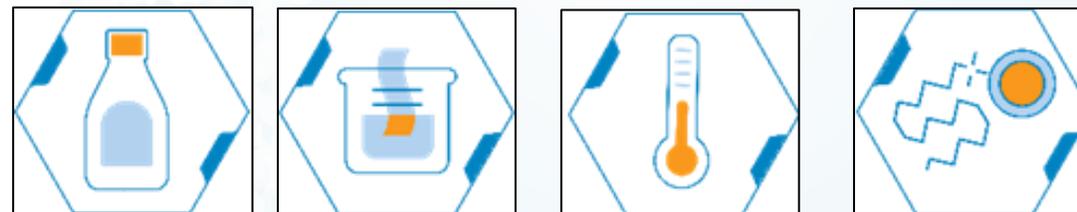
PEAK IDENTITIES

1. Cannabidivarinic acid (CBDVA)
2. Cannabidivarin (CBDV)
3. Cannabidiolic acid (CBDA)
4. Cannabigerolic acid (CBGA)
5. Cannabigerol (CBG)
6. Cannabidiol (CBD)
7. Tetrahydrocannabivarin (THCV)
8. Tetrahydrocannabivarinic acid (THCVA)
9. Cannabinol (CBN)
10. Cannabinolic acid (CBNA)
11. delta 9- Tetrahydrocannabinol (D9-THC)
12. delta 8- Tetrahydrocannabinol (D8-THC)
13. Cannabicycol (CBL)
14. Cannabichromene (CBC)
15. Tetrahydrocannabinolic acid A (THCA-A)
16. Cannabichromenic acid (CBCA)
17. Cannabicyclolic acid (CBLA)





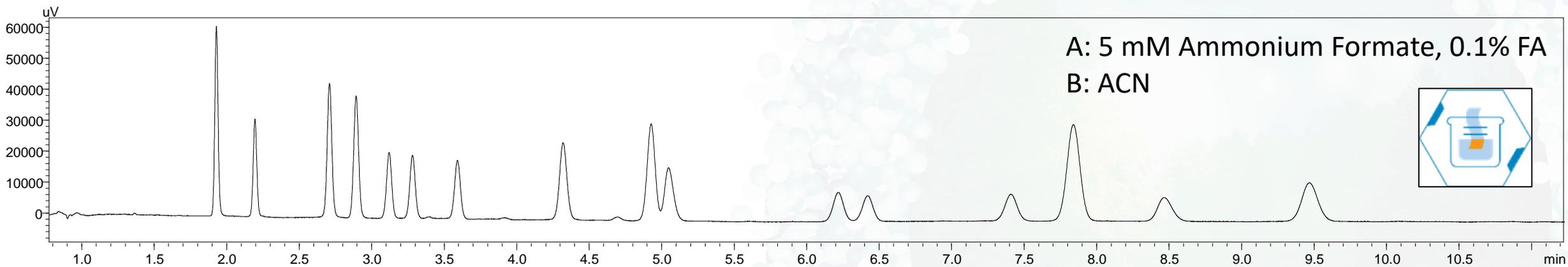
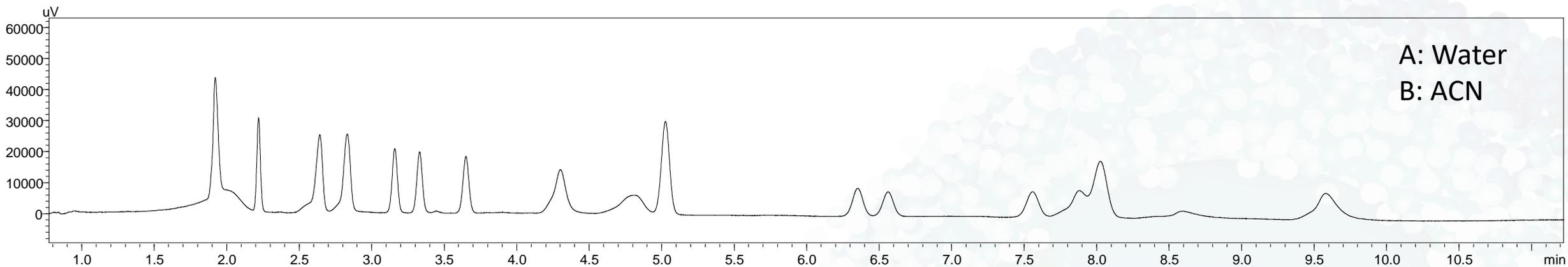
Method Development



Acidic Modifiers

Table 3. Physicochemical Properties of Phytocannabinoid Acids

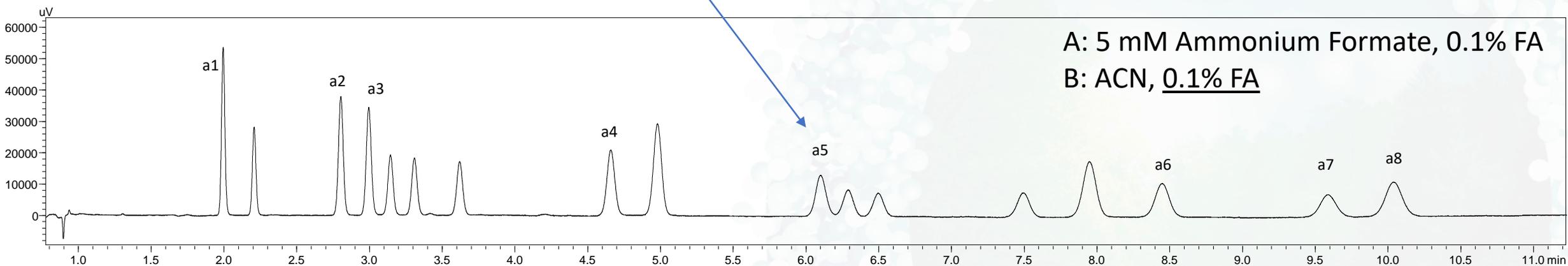
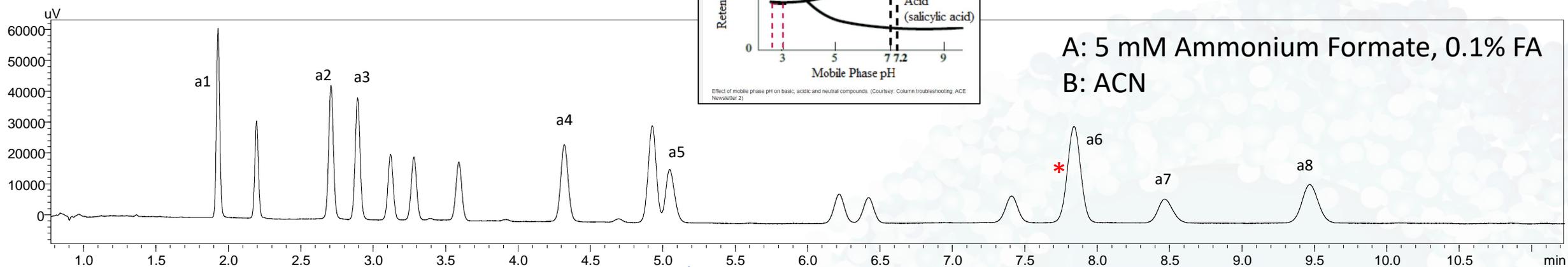
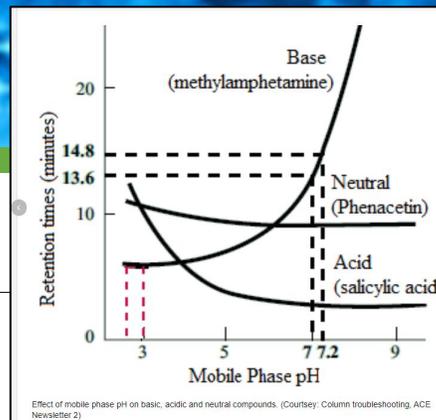
phytocannabinoid	molecular weight	pK _a	log P	TPSA (Å)	rotatable bonds	CNS MPO score
CBCA	358.4	2.87	6.91	66.76	8	3.79
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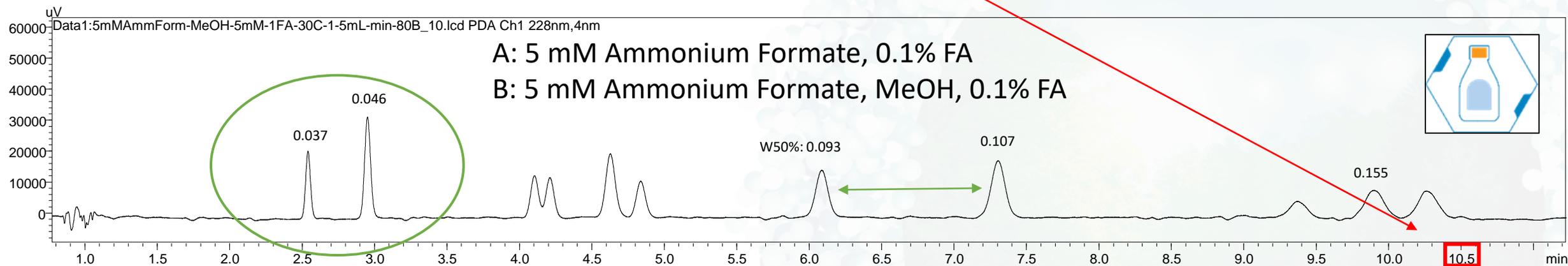
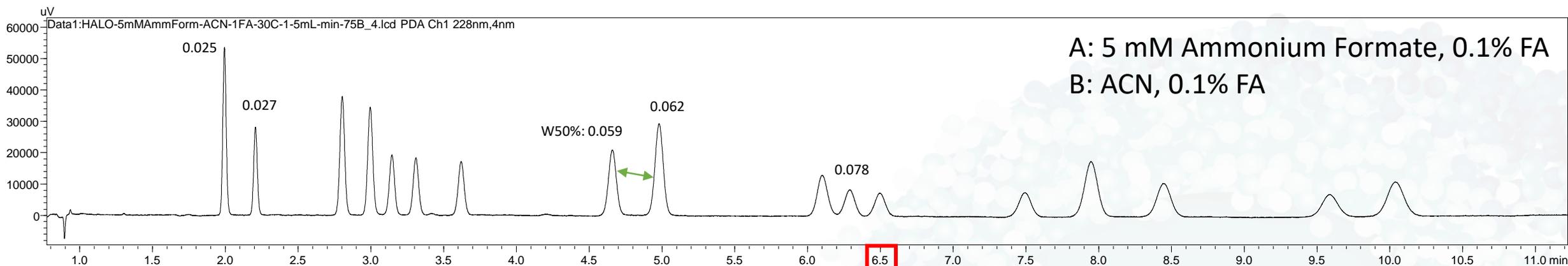


pKa

HALO®

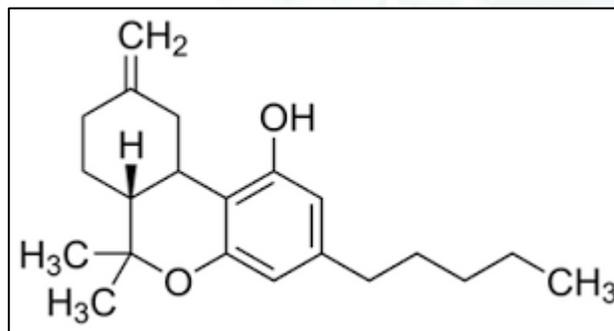
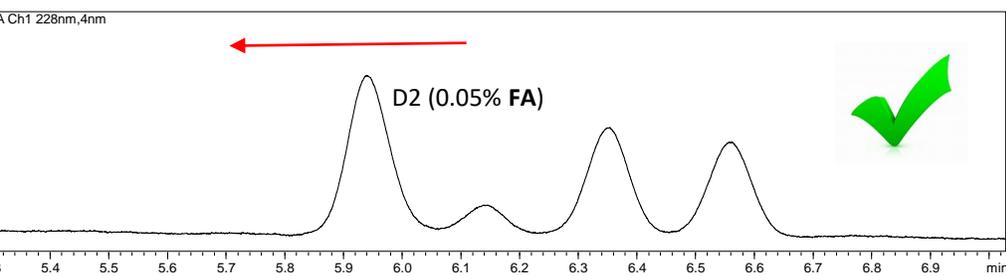
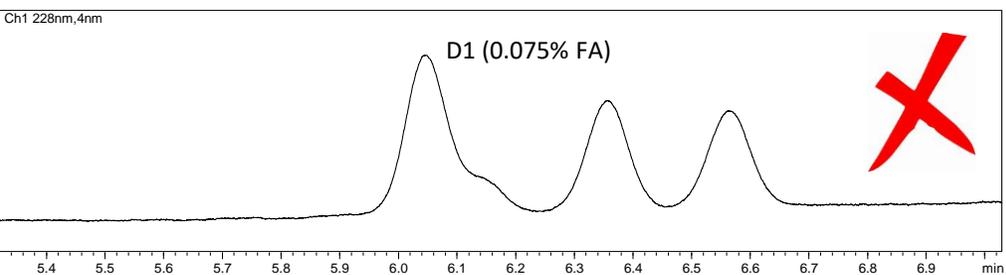
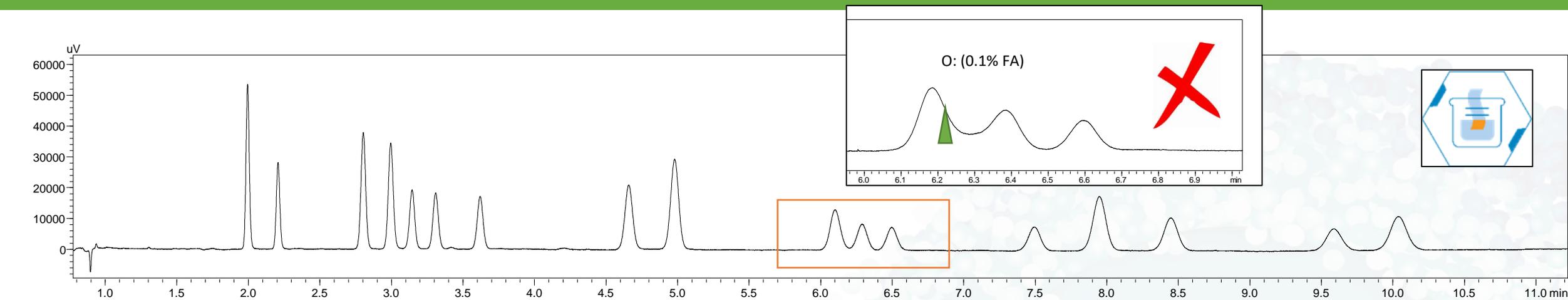


Don't Forget About Methanol!

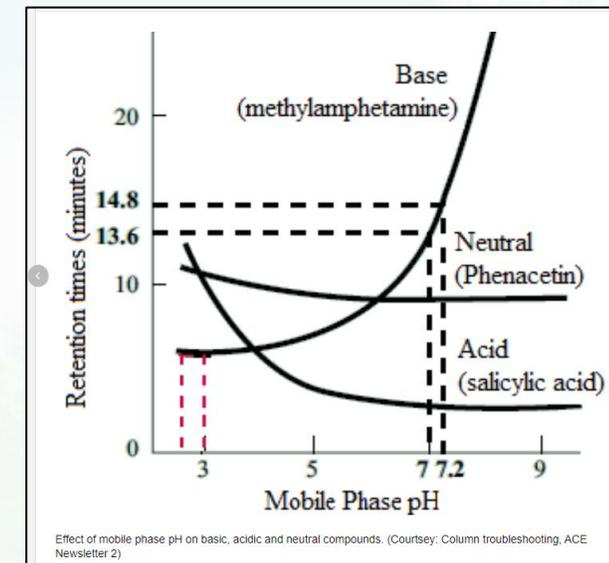


-some resolution benefits, changes in selectivity, however, wider peak widths (lower sensitivity) and coelutions using methanol

More than 100 Cannabinoids: Exo-THC Analysis



Exo-THC is also known as Delta-9,11-THC. And while this isomer is a known byproduct formed during the synthesis of THC (dronabinol), it can also be formed by many of these post-extraction processes used to "clean up" the extracts.



Mix of 18 Cannabinoids: HALO 90Å LPH-C18

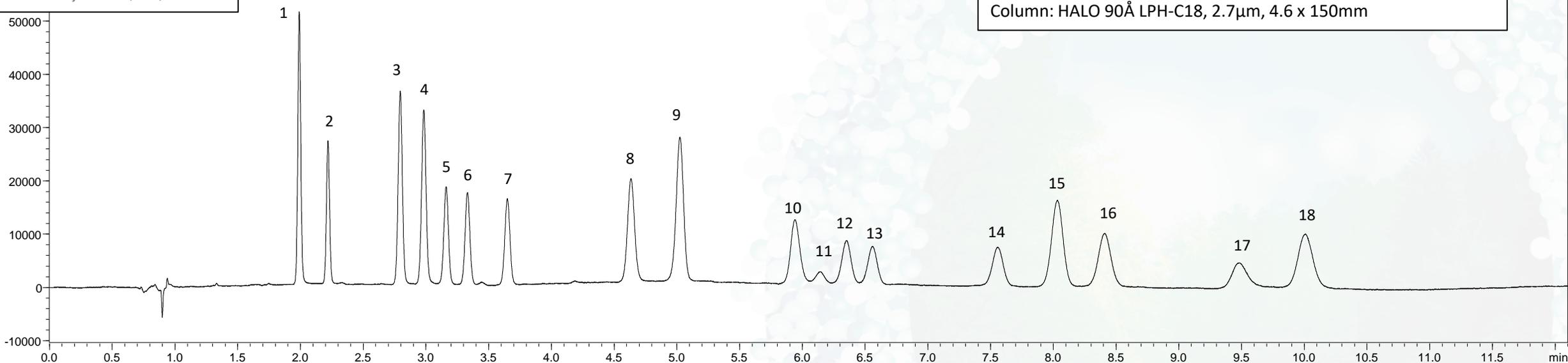
PEAK IDENTITIES:

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3. Cannabidiolic acid (CBDA)
4. Cannabigerolic acid (CBGA)
5. Cannabigerol (CBG)
6. Cannabidiol (CBD)
7. Tetrahydrocannabivarin (THCV)
8. Tetrahydrocannabivarinic acid (THCVA)
9. Cannabinol (CBN)
10. Cannabinolic acid (CBNA)
11. Exo-tetrahydrocannabinol (EXO-THC)
12. delta 9- Tetrahydrocannabinol (D9-THC)
13. delta 8- Tetrahydrocannabinol (D8-THC)
14. Cannabicycol (CBL)
15. Cannabichromene (CBC)
16. Tetrahydrocannabinolic acid A (THCA-A)
17. Cannabichromenic acid (CBCA)
18. Cannabicyclolic acid (CBLA)



Testing Conditions:

Mobile Phase: A: 5mM Ammonium Formate, 0.1% Formic Acid
B: Acetonitrile, 0.05% Formic Acid
Isocratic Separation: 75% B
Instrument: Shimadzu Nexera X2
Wavelength: PDA, 228 nm
Injection: 0.2 µl
Temperature: 30°C
Flow Rate: 1.5 mL/min.
Back Pressure: 345 bar
Sample Solvent: 75/25 ACN/ Water, 0.1% FA
Column: HALO 90Å LPH-C18, 2.7µm, 4.6 x 150mm



PEAK IDENTITIES

1. Cannabidivarinic acid (CBDVA, (+) 331 m/z)
2. Cannabidivarin (CBDV, (+) 287 m/z)
3. Cannabidiolic acid (CBDA, (-) 357 m/z)
4. Cannabigerolic acid (CBGA, (-) 359 m/z)
5. Cannabigerol (CBG, (+) 317 m/z)
6. Cannabidiol (CBD, (+) 315 m/z)
7. Tetrahydrocannabivarin (THCV, (+) 287 m/z)
8. Tetrahydrocannabivarinic acid (THCVA, (+) 331 m/z)
9. Cannabinol (CBN, (+) 311 m/z)
10. Cannabinolic acid (CBNA, (-) 353 m/z)
11. Exo-tetrahydrocannabinol (EXO-THC, (+) 315 m/z)
12. delta 9- Tetrahydrocannabinol (D9-THC, (+) 315 m/z)
13. delta 8- Tetrahydrocannabinol (D8-THC, (+) 315 m/z)
14. Cannabicycol (CBL, (+) 315 m/z)
15. Cannabichromene (CBC, (+) 315 m/z)
16. Tetrahydrocannabinolic acid A (THCA-A, (-) 357 m/z)
17. Cannabichromenic acid (CBCA, (-) 357 m/z)
18. Cannabicyclolic acid (CBLA, (-) 357 m/z)

Testing Conditions:

Mobile Phase: A: 5mM Ammonium Formate, 0.1% Formic Acid
 B: Acetonitrile, 0.05% Formic Acid

Isocratic Separation: 75% B

Instrument: Shimadzu LC-MS 8040/ Nexera X2

Wavelength: PDA, 228 nm

Injection: 0.2 µl

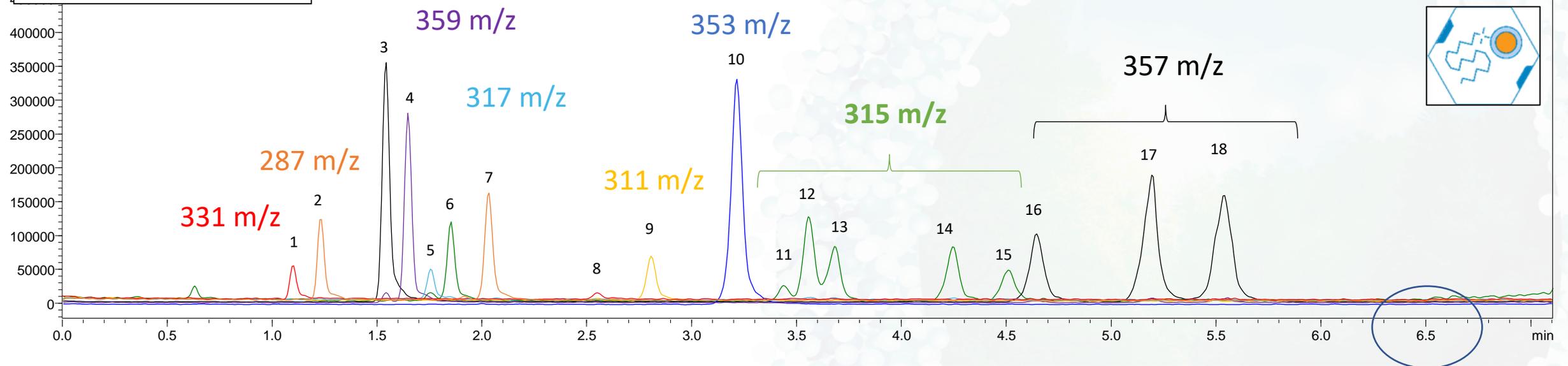
Temperature: 30°C

Flow Rate: 0.4 mL/min.

Back Pressure: 275 bar

Sample Solvent: 75/25 ACN/ Water, 0.1% FA

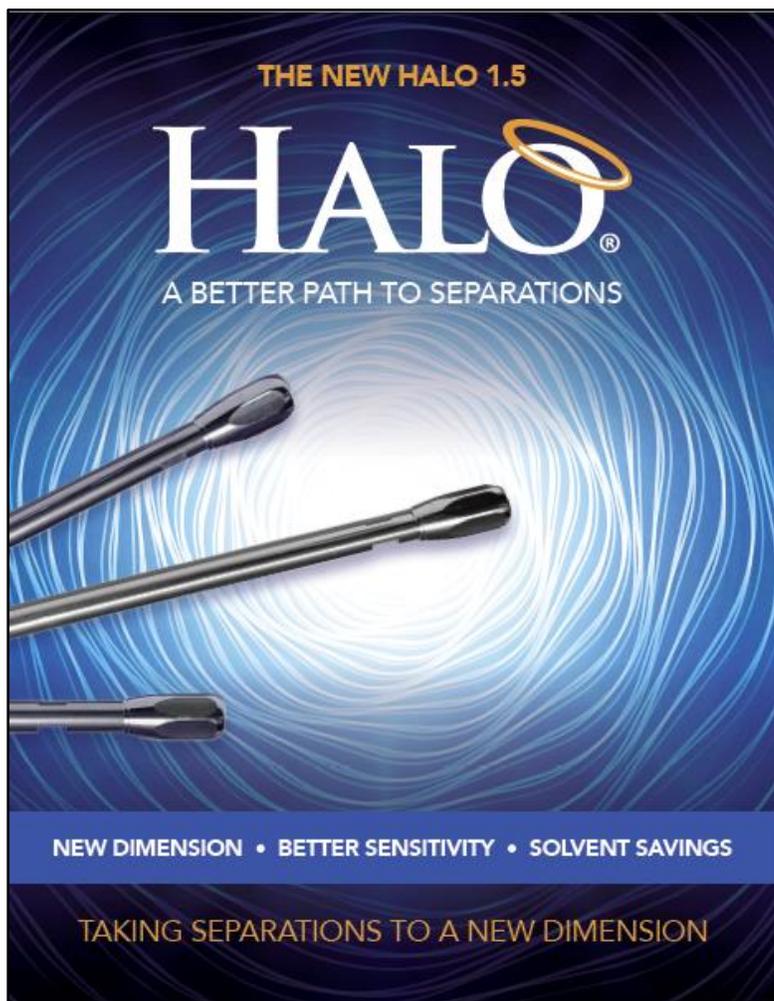
Column: HALO 90Å LPH-C18, 2µm, 2.1 x 100mm



A NEW DIMENSION IN SEPARATIONS

HALO®

MORE PERFORMANCE FROM UHPLC AND LCMS SYSTEMS



More **sensitivity** from conventional UHPLC systems



Higher **ionization efficiencies** from LCMS systems



Reduced **solvent consumption** compared to 2.1 mm id columns (and greater)

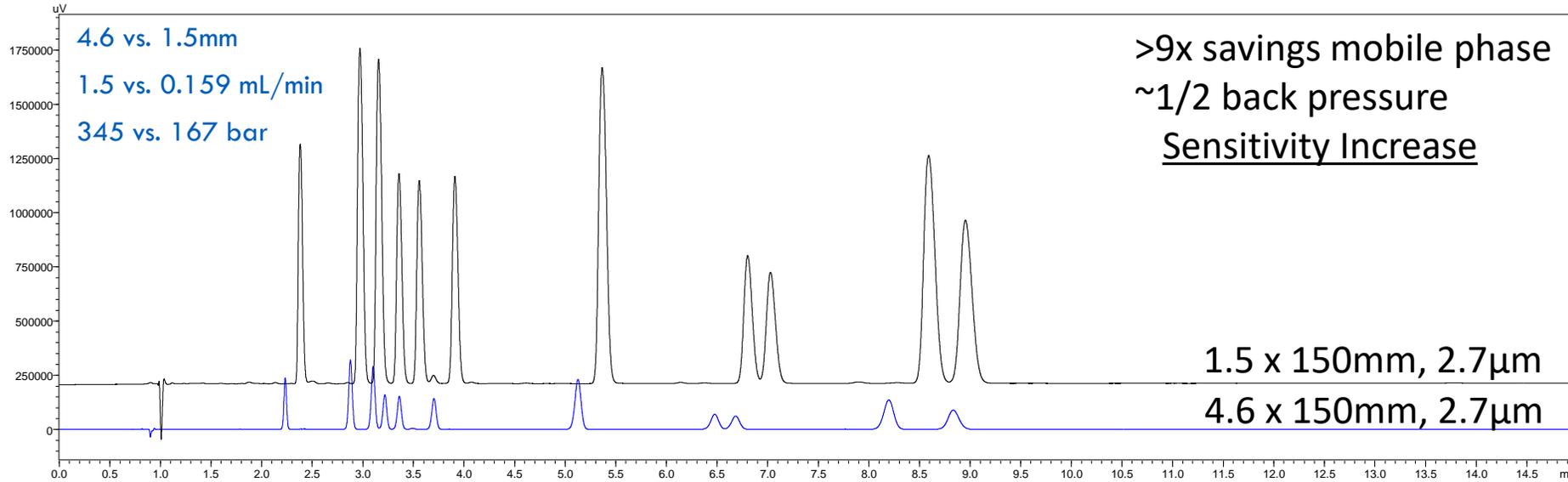


Easy to **implement** microflow solution

HALO[®] 1.5 mm ID: R&D/ MS Apps.



HALO[®]

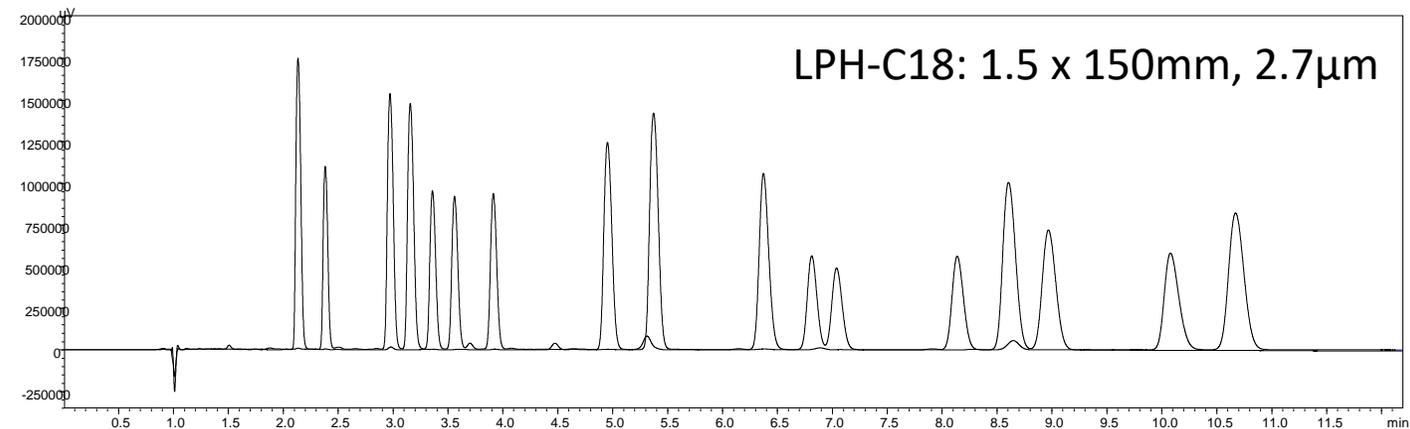
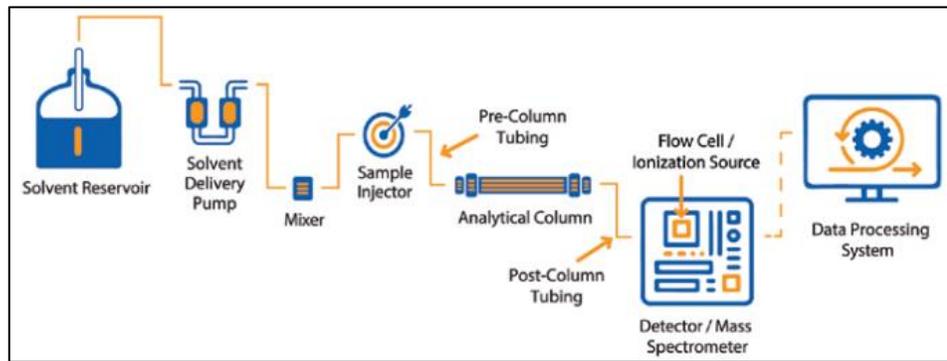


MarvelXACT™ VS. CONVENTIONAL CONED FITTINGS



Conventional coned fittings require a ferrule in conjunction with a fitting for proper sealing. They depend on tools, to improve sealing performance, which significantly increases probability of extra internal volume and poor chromatography results. The mechanical tightening increases wear leading to higher replacement costs.

MarvelXACT™ fittings do not depend on ferrules. They seal with hand tightening at the bottom of the port, which significantly reduces required torque and enables many more connects and disconnects reducing wear and increasing product life. An enhanced proprietary tip design also ensures zero dead volume (ZDV) and better chromatography results.



Website, LinkedIn, YouTube, Facebook



HALO® HPLC Columns for Chromatography Separation | LC Columns (halocolumns.com)

The screenshot shows the HALO website homepage. At the top, there is a navigation bar with the HALO logo, a search bar, and links for Shop, Cart, My Account, and a phone number (302) 992-8060. Below the navigation bar, there are two search boxes: 'Part Number Search' and 'Global Site Search'. A main banner features the text 'NEW DIMENSION IN CHROMATOGRAPHY - HALO® 1.5' and 'A BETTER PATH TO SEPARATIONS WITH FUSED-CORE® HPLC COLUMNS'. The banner also includes a description of the technology and two buttons: 'SHOP NOW' and 'DOWNLOAD PDF'. The background of the banner shows a glowing blue particle structure.

The screenshot shows the HALO Facebook page. The profile name is 'Advanced Materials Technology' with the tagline 'Biotechnology Company'. There is a 'Shop on Website' button and the URL 'halocolumns.com'. The page has tabs for 'Home', 'Posts', and 'Reviews'. The 'About' section includes the website URL 'http://www.halocolumns.com/', the phone number '(302) 992-8060', and the category 'Biotechnology Company'. A large Facebook logo is visible on the right side of the page.

The screenshot shows the HALO LinkedIn page. The header features the HALO logo and the LinkedIn logo. The company name is 'Advanced Materials Technology' with the tagline 'INNOVATION YOU CAN TRUST - PERFORMANCE YOU CAN RELY ON'. It also mentions 'Research Services - Wilmington, DE - 597 followers'. There is a section for 'Stephanie & 21 other connections work here · 43 employees' with buttons for 'Following', 'Learn more', and 'More'. The navigation bar at the bottom includes 'Home', 'My Company', 'About', 'Posts', 'Jobs', 'People', and 'Videos'.

The screenshot shows the HALO YouTube channel. The channel name is 'Advanced Materials Technology' with '11 subscribers'. There is a 'SUBSCRIBE' button and the YouTube logo. The navigation bar includes 'HOME', 'VIDEOS', 'PLAYLISTS', 'CHANNELS', and 'ABOUT'. The 'Uploads' section shows a list of videos with thumbnails and titles: 'LC Separations and Workflow Improvements for...', 'Back to Basics for Bio Chromatography: Reversed...', 'Reversed Phase Liquid Chromatography...', 'Extra Column Volume in HPLC | HALO®', 'Capillary Column Installation Instructions | HALO®', and 'HALO® ENVIROCLASS: New Solutions for PFAS and PAH...'. Each video has a duration and view count.

Technical Resources

HALO® HPLC Columns for Chromatography Separation | LC Columns (halocolumns.com)



BIOPHARMACEUTICALS

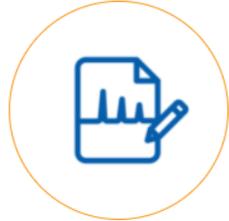
Increased Sensitivity and Solvent Savings of Trazosinamide Tryptic Digest using a 1.5 mm ID Column

Black = 1.5 mm ID
Red = 2.1 mm ID

TEST CONDITIONS:
Column: HALO 160 Å ES-C18, 2.7 µm, 1.5 x 150 mm
Part Number: 52120-702
Column: HALO 160 Å ES-C18, 2.7 µm, 2.1 x 150 mm
Mobile Phase: A: Water/0.1% DFA
B: Acetonitrile/0.1% DFA
Gradient: Time [min] Z
50 50
60 0
Flow Rate: 0.2 mL/min for 1.5 mm ID
0.4 mL/min for 2.1 mm ID
Back Pressure: 310 bar (1.5 mm)
444 bar (2.1 mm)
Temperature: 60 °C
Injection Volume: 2 µL of 1.25 mg/mL trazosinamide tryptic digest
Sample Solvent: 1.5 M guanidine HCl/0.5% formic acid
LC System: Shimadzu Nexera X2
MS System: ThermoFisher Q Exactive

MS CONDITIONS:
Spray Voltage: 3kV; 3.8
Capillary temperature: 320 °C
Sheath gas: 35
Aux gas: 10
RF lens: 50

A separation of Trazosinamide tryptic digest is performed on a HALO 160 Å ES-C18 column using a ThermoFisher Q Exactive. By switching from a 2.1 mm ID to a 1.5 mm ID column there is an increase in overall sensitivity along with a significant reduction in solvent consumption highlighted with a long analysis time, such as with a peptide map. Extra column volume was reduced by optimizing the tubing from the column outlet to the MS source. The use of a 1.5 mm ID column delivers an increase in sensitivity and reduces solvent usage without having to invest into a specialized micro flow HPLC system.



Application Notes



Conference Papers



Product Literature



Technical Documents



Videos

Webinar: Reversed Phase Liquid Chromatography: Fundamentals and Strategies for Faster Method Development

Reversed Phase Liquid Chromatography: Fundamentals and Strategies for Faster Method Development

HALO

Reversed Phase Liquid Chromatography: Fundamentals and Strategies for Faster Method Development

Stephanie Schuster, Ph.D.
Senior Technical Support Scientist
Advanced Materials Technology, Inc.
Wilmington, Delaware, USA

Watch on YouTube

HALO
METHOD CONVERSION GUIDEBOOK

HALO
GUIDEBOOK ON REVERSED PHASE CHEMISTRIES & UTILIZING SELECTIVITY FOR HPLC SEPARATIONS!

HALO
LPH - C18
ENHANCED STABILITY FOR LOW PH APPLICATIONS

HALO

TECHNICAL REPORT: AMT-TR022001

TITLE: HIGH RESOLUTION LCMS SEPARATIONS OF EDIBLE OILS

MARKET SEGMENT: FOOD / BEVERAGE

AUTHORS:
Andrew Herron, Ph.D., Application Scientist

ABSTRACT
Edible oils, extracted from both plant and animal sources, have evolved into a multi-billion dollar industry and are being used in more applications every year. In 2018 over 382.05 million metric tons of edible oils were consumed and valued worldwide. Products such as biodiesel, pharmaceutical formulation applications, soaps, shampoos, and household cleaners are among a few. In recent years, the food industry has sought to incorporate more oils with higher nutritional value, but with often ambiguous results. The hydrophilic nature of oils often makes analysis problematic by C18 stationary phases due to limited selectivity. In this technical report we generate the TAG profile of four common edible oils, including sun, sesame, canola, and grape seed oil by LC/MS, to demonstrate how the HALO C18 column with its unique stationary phase offers superior selectivity and higher shape selectivity. This enables better separation of the hydrophilic long-chain molecules, such as TAGs.

INTRODUCTION
Often thought of as an essential part of a healthy diet, the nutritional value of edible oils has been a topic of debate, primarily due to their application. The major component of edible oils is triglycerides (TAGs), which consist of approximately 99% of the oil. The remaining 1-10% is a mixture of free acids, monoacylglycerols, diacylglycerols (DAGs), phospholipids, sterols, and various hydrocarbons, including vitamins and antioxidants (Quaranta 2006).

The analysis of edible oils by LC/MS is difficult due to the high concentration of hydrophilic molecules, such as long chain fatty acids (LCFA) and steric, as well as DAGs and TAGs. In the food industry, the analysis of TAGs in the oil is a critical step to determine nutritional value, for example amount of unsaturation in the oil, as well as suitability for non-food-based applications. C18 columns, the most

(Rinaldi et al., 1998; Abul 2005; Sander and Vlas 1992). The structure and conformation of the C18 phase compared to C18, provides better phase thickness to enhance the interaction between the stationary phase, and long chain molecules, such as TAGs and DAGs (Sander and Vlas, 1992). In this application note we report the TAG profile of 4 common edible oils, and compare with previously published data, to demonstrate the utility of the HALO C18 for the analysis of long chain hydrophilic molecules, such as those found in edible oils.

KEY WORDS:
Edible oils, Triacylglycerols, Diacylglycerols, HALO C18, Hydrophilic, LC/MS, TAG, DAG.

Molecular Probes to Characterize HPLC Column Performance

Richard A. Henry¹, Stephanie Schuster¹, Connor Mohler¹ and William Johnson¹
¹Advanced Materials Technology, State College, PA 16802; Advanced Materials Technology Inc., Wilmington, DE

Presented at Pittcon 2019 Poster 1340-Z

Use of Chemical Probes in HPLC
Chemical probes are used to evaluate the performance of HPLC columns. They are small molecules that are used to test the selectivity and stability of the column. The probes are used to evaluate the column's ability to separate different types of molecules, such as hydrophobic, hydrophilic, and ionic. The probes are used to evaluate the column's ability to separate different types of molecules, such as hydrophobic, hydrophilic, and ionic.

Hydrophobic Subtraction Model
The hydrophobic subtraction model is used to evaluate the selectivity of HPLC columns. It is based on the idea that hydrophobic molecules are retained on the column by hydrophobic interactions, while hydrophilic molecules are not. The model is used to evaluate the column's ability to separate different types of molecules, such as hydrophobic, hydrophilic, and ionic.

Impact of Phase Polarity on OH Probes
The impact of phase polarity on OH probes is evaluated. OH probes are used to evaluate the selectivity of HPLC columns. The impact of phase polarity on OH probes is evaluated. OH probes are used to evaluate the selectivity of HPLC columns.

Impact of Hydrophobicity Plus Strong Hydrogen Bonding
The impact of hydrophobicity plus strong hydrogen bonding is evaluated. Hydrophobicity plus strong hydrogen bonding is used to evaluate the selectivity of HPLC columns.

RP-Amide Shows Different Selectivity to Match for OH Probe
RP-Amide shows different selectivity to match for OH probe. RP-Amide shows different selectivity to match for OH probe.

Enhanced Selectivity Values for OH Probe Mix in MOOH Mobile Phases
Enhanced selectivity values for OH probe mix in MOOH mobile phases. Enhanced selectivity values for OH probe mix in MOOH mobile phases.

Amide Compounds (with PE electron)
Amide compounds (with PE electron). Amide compounds (with PE electron).

Questions?

Sales, Technical and Marketing Materials:

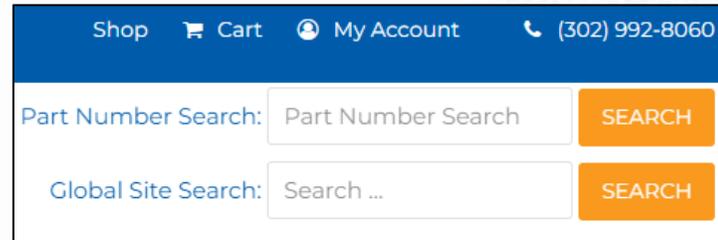
- www.halocolumns.com

Technical Support:

- support@advanced-materials-tech.com

Sales Questions/Sales Orders:

- sales@advanced-materials-tech.com



The screenshot shows the top navigation bar of the HALO website. It includes links for 'Shop', 'Cart', 'My Account', and a phone number '(302) 992-8060'. Below the navigation bar are two search fields: 'Part Number Search' with a 'SEARCH' button, and 'Global Site Search' with a 'SEARCH' button.



Special thanks to LGC for supplying standards!



Conner McHale
Technical Support Specialist
Advanced Materials Technology

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Phone: 1-302-992-8060 *1124





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