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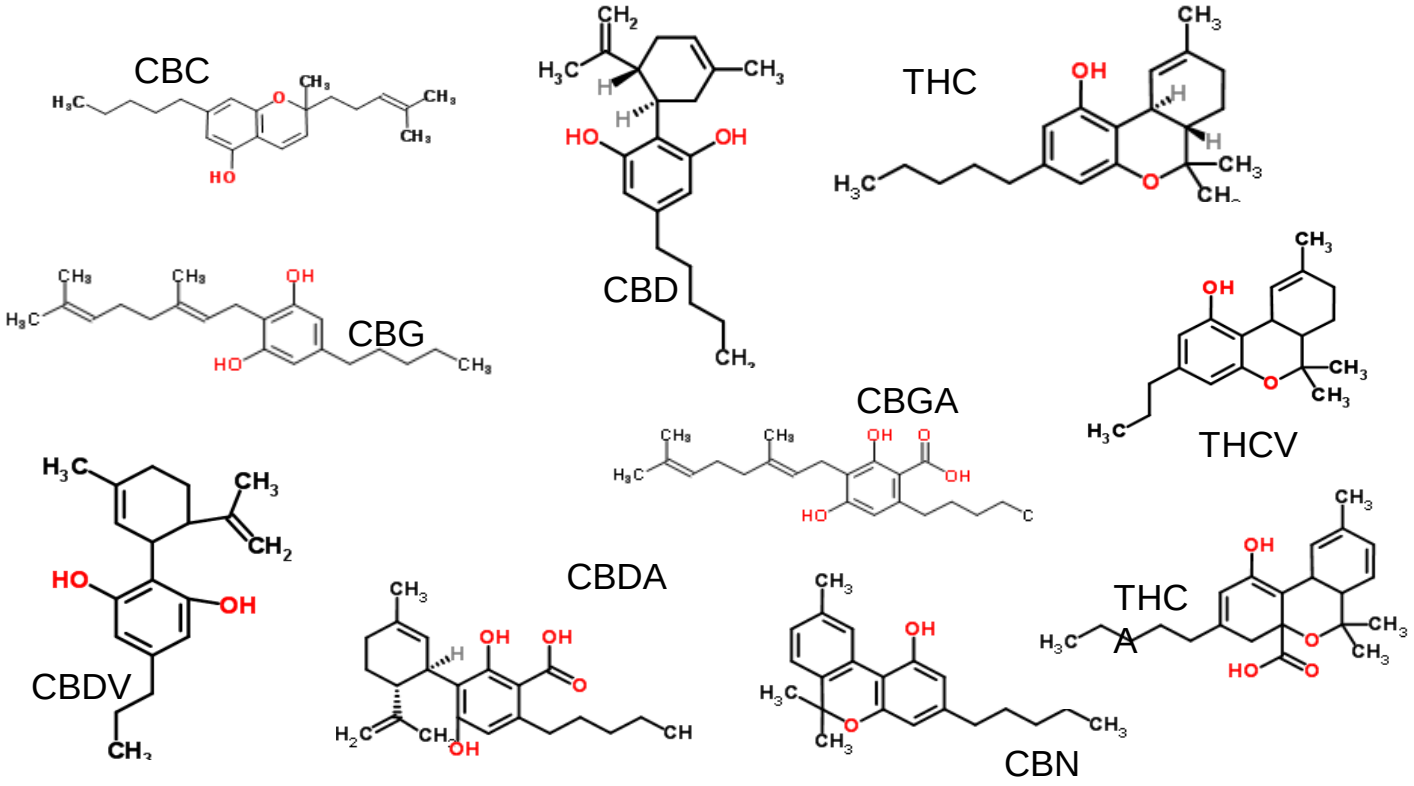
Agilent
Trusted Answers

CWC LABS

What is Hemp Oil?

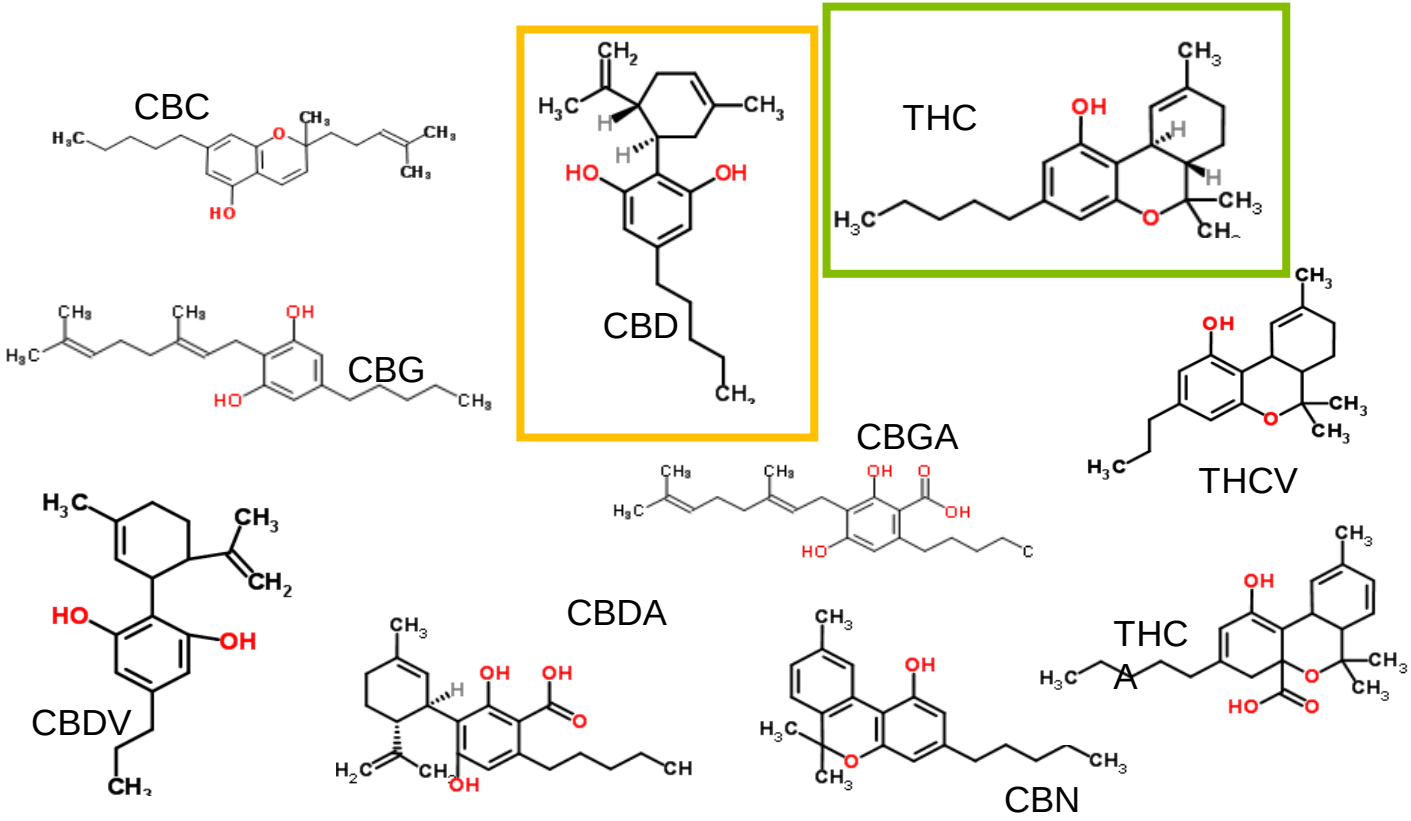
- CBD hemp oil is a natural botanical extract of the common hemp plant.
- CBD hemp oil is derived from the seeds and stem of the *Cannabis sativa*.
- CBD hemp oil is high in CBD and very low in THC (below 0.3% delta 9 THC).
- CBD hemp oil is not psychoactive, it does not activate the CB1 receptor.

Chemical Structures of Top 10 Cannabinoids



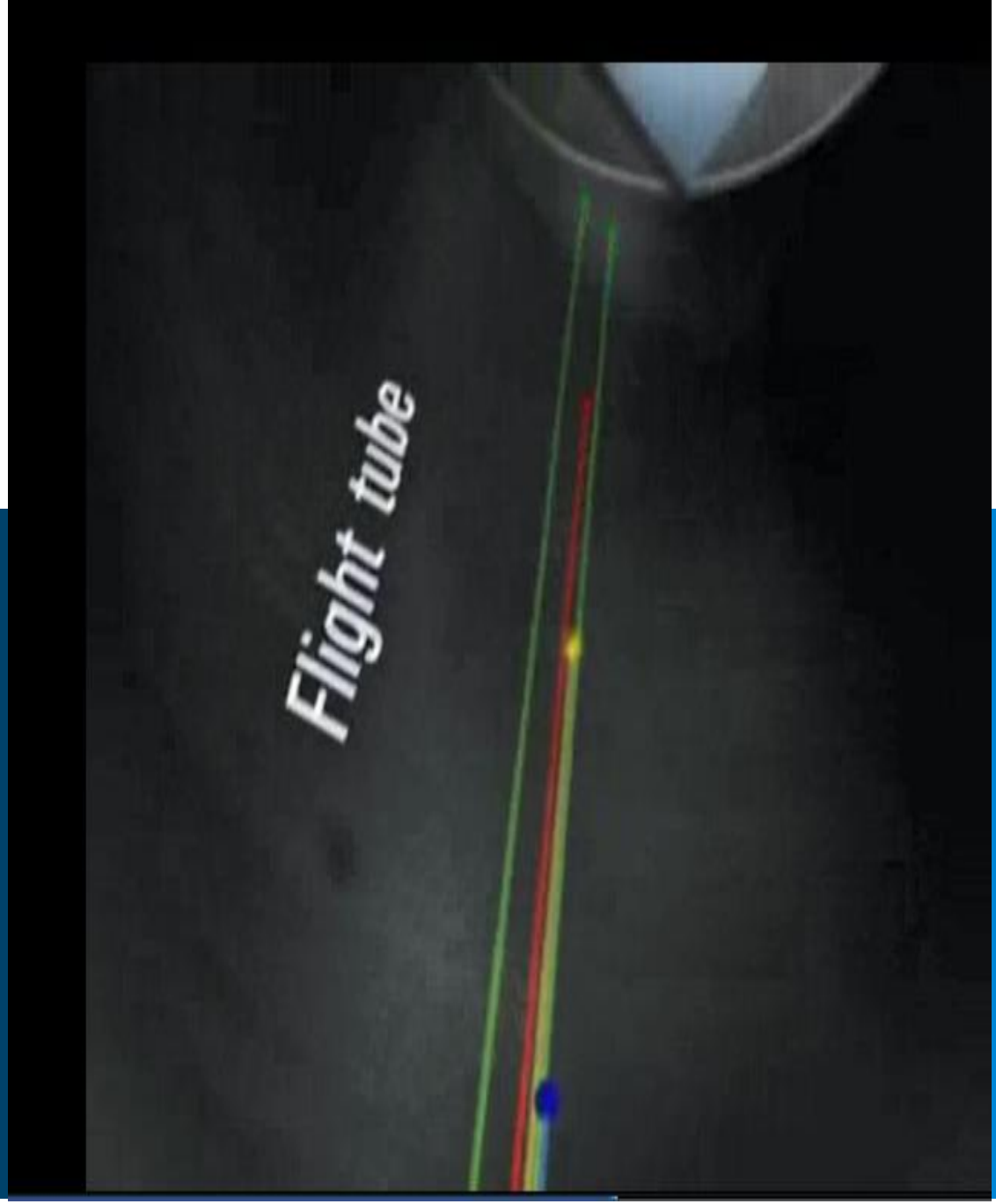
http://herb.co/2016/02/06/top-10-cannabinoids/

Chemical Structures of Top 10 Cannabinoids

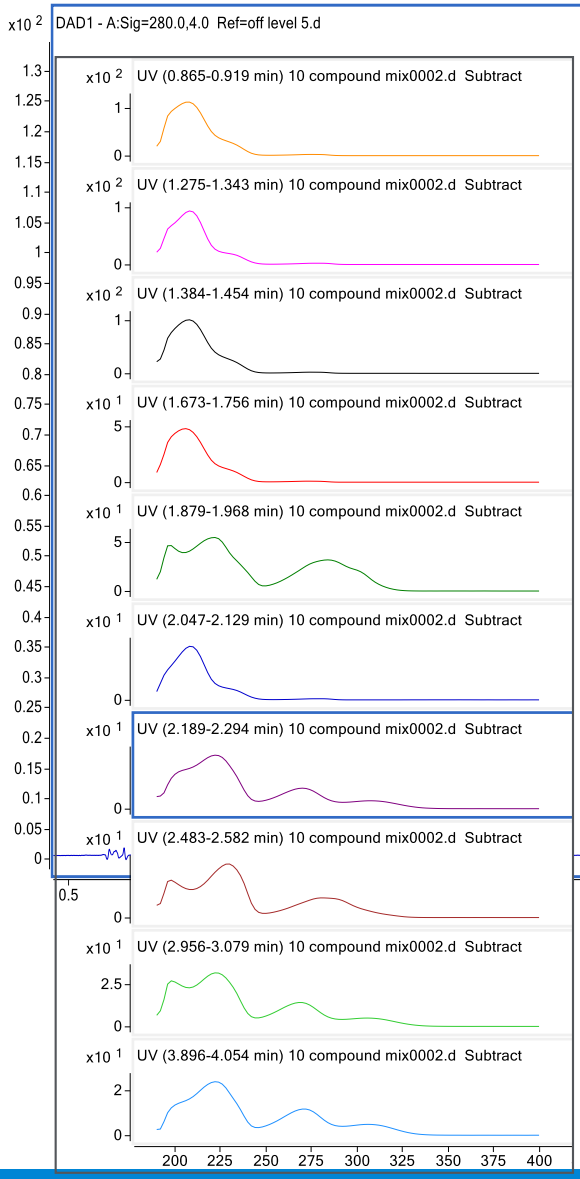


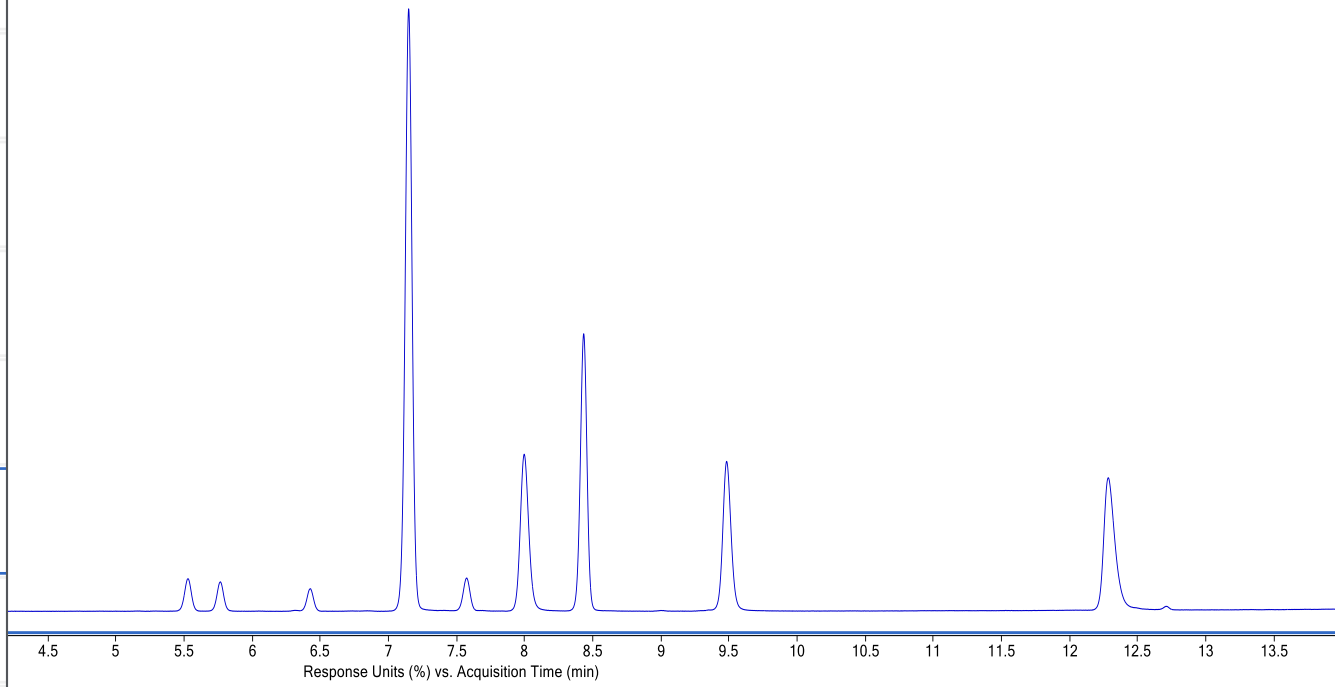
http://herb.co/2016/02/06/top-10-cannabinoids/

Why Accurate Mass?



UV Spectra of the Chromatographic Peaks

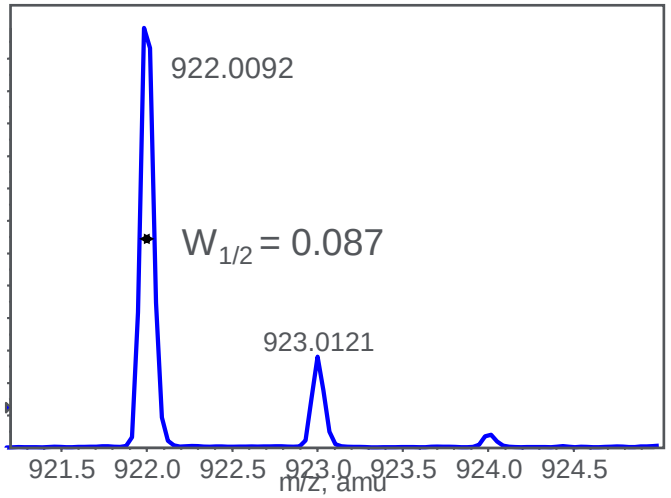




UV spectra only show class of compounds

Figures of Merit for Accurate-Mass Instrument Performance

Resolution = $(m/z)/w_{1/2}$
e.g.,
922.0092/0.087 = 10,597

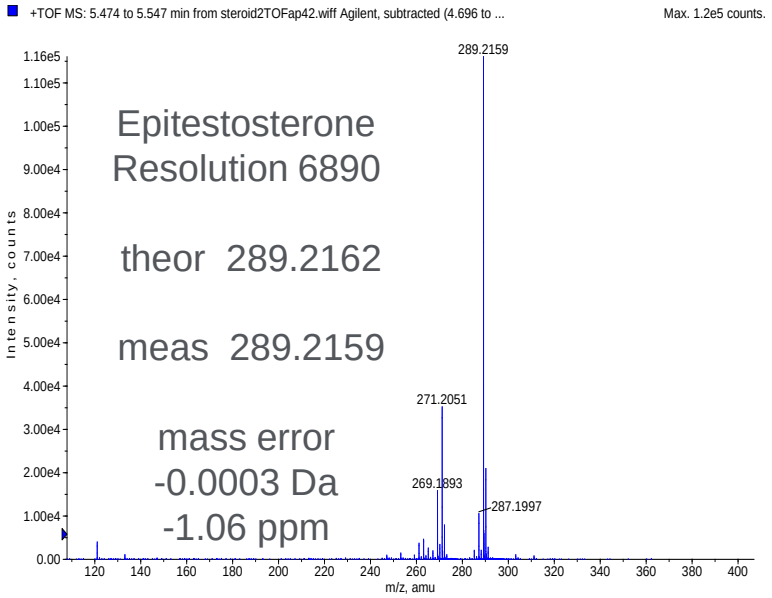


Mass accuracy (mass error)

$$\text{Mass accuracy} = \left(\frac{\text{measured - theory}}{\text{theory}} \right) \times 10^6$$

$(1000.001-1000.000)/1000) \times 10^6 = 1$ ppm

Therefore: 0.001 Da (1 mDa) error
@ MW 300 Da is approximately 3 ppm



How Much Accuracy in Needed for Identification? (new concept for LC/MS: mass accuracy in "ppm")

Reserpine ($C_{33}H_{40}N_2O_9$) has a protonated ion at m/z 609.28066

Single quadrupole MS reports mass to +/- 0.1 = 165 ppm

Number of possible formulas using only C, H, O & N, at various mass errors:

- 165 ppm 209 (single quadrupole resolution)
- 10 ppm 13 (older TOF instruments)
- 5 ppm 7
- 3 ppm 4
- 2 ppm 2

Accurate mass limits the number of possible formulae for a given m/z measurement.

TOF: Time-of-Flight

The kinetic energy of ions leaving the source.

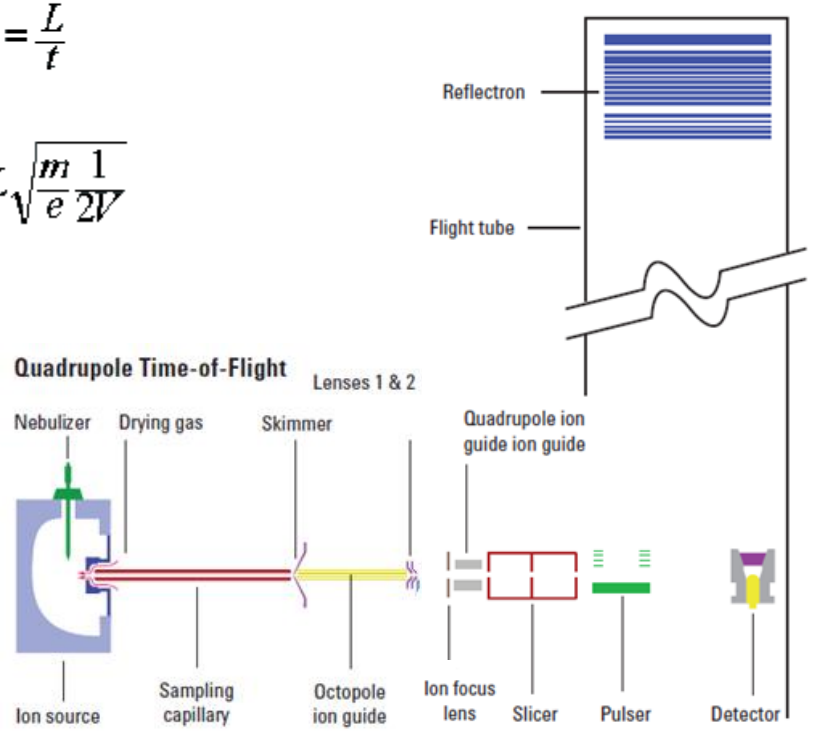
$$T = eV = \frac{mv^2}{2}$$

The flight time is proportional to the square root of the mass, which makes the mass proportional to t^2.

$$v = \frac{L}{t}$$

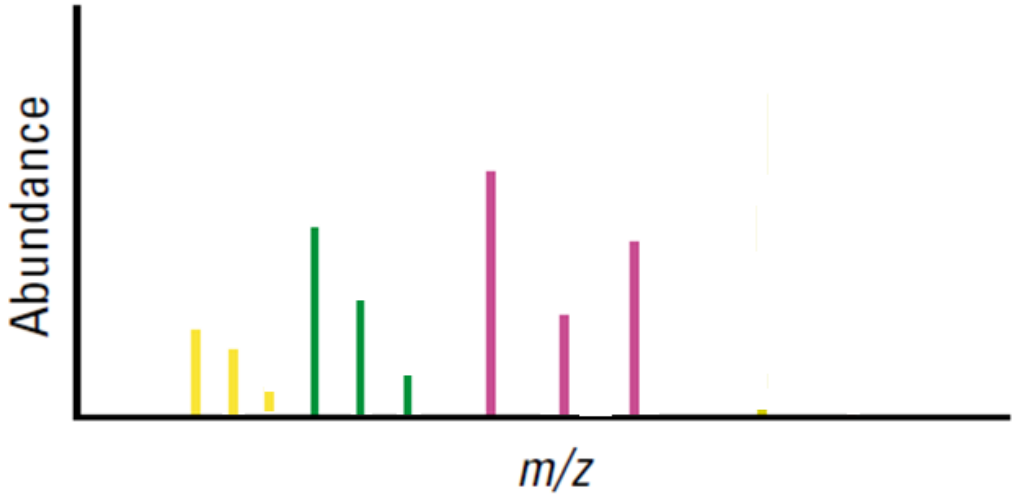
The ion velocity equals the flight path (L) divided by time.

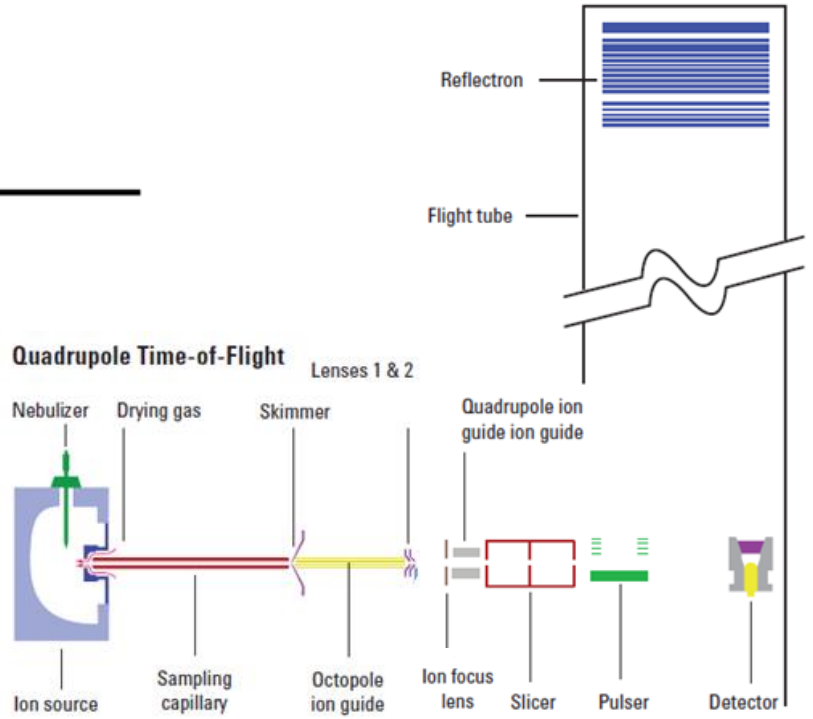
$$t = L\sqrt{\frac{m}{e}\frac{1}{2V}}$$



$$m/z = [2V/L^2]t^2$$

TOF: Time-of-Flight





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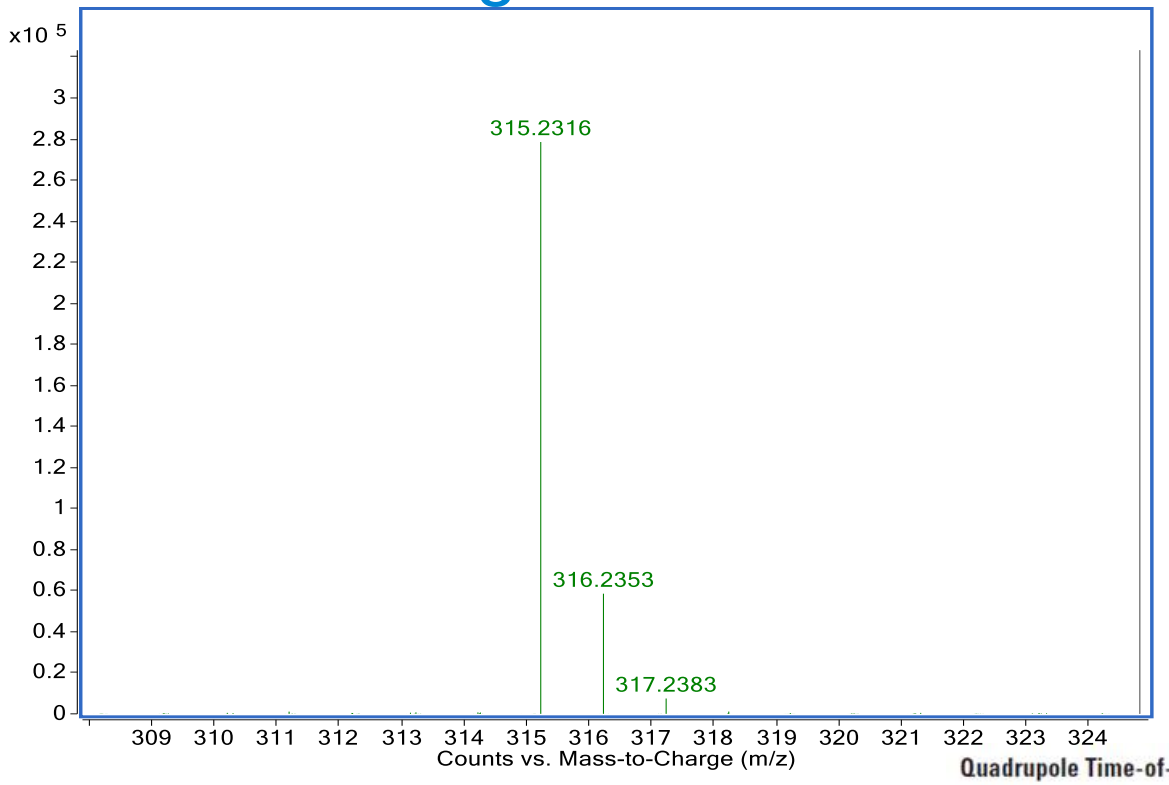

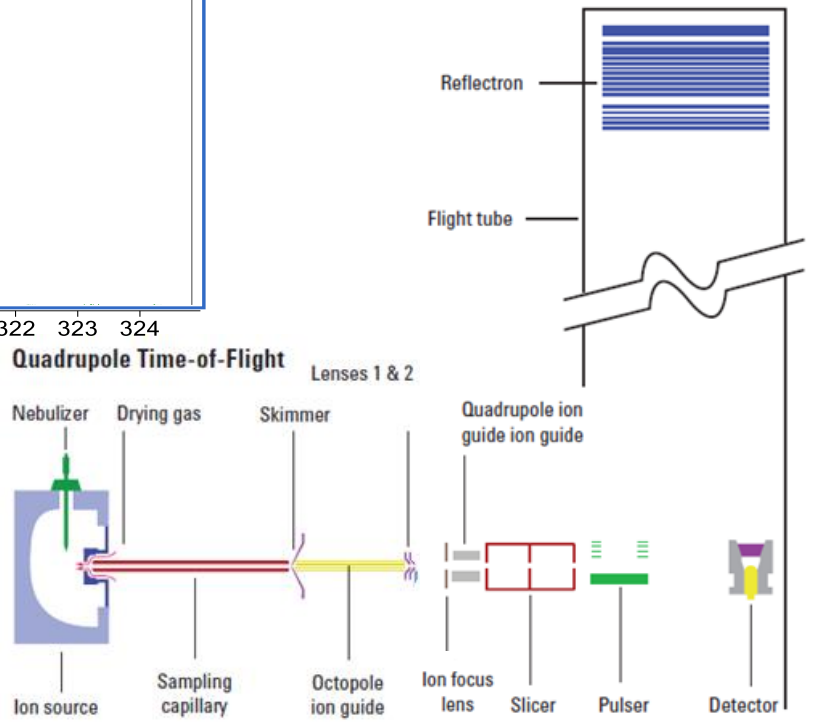

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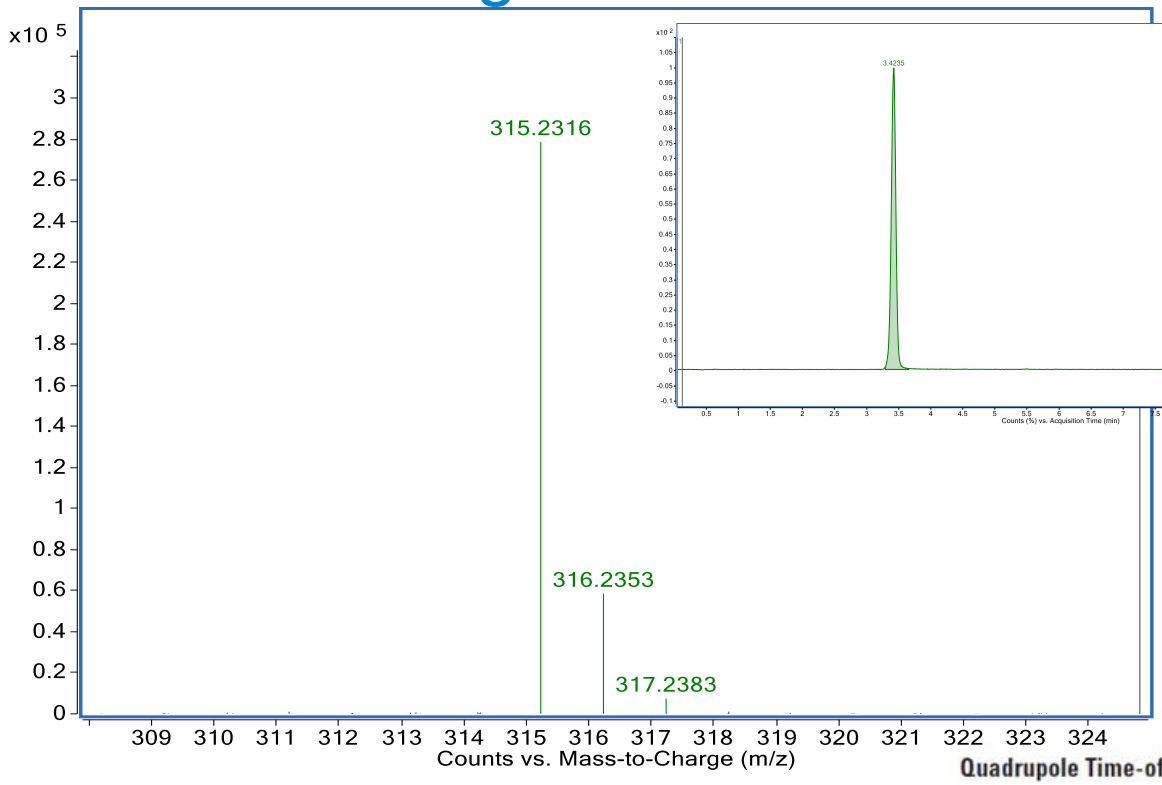
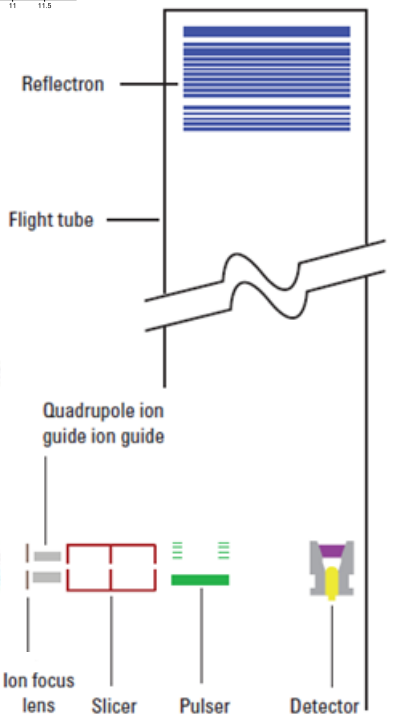
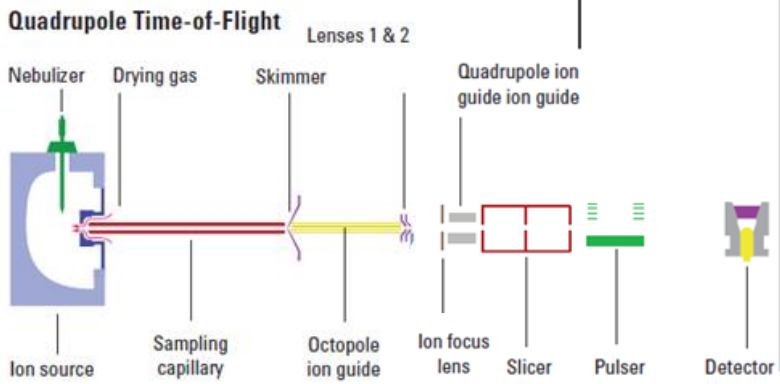
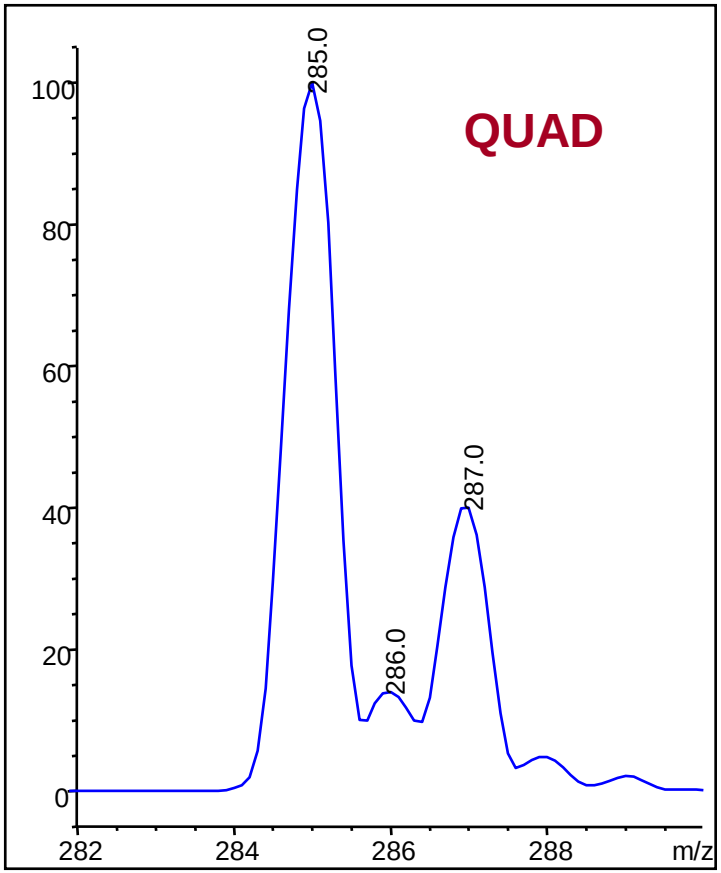




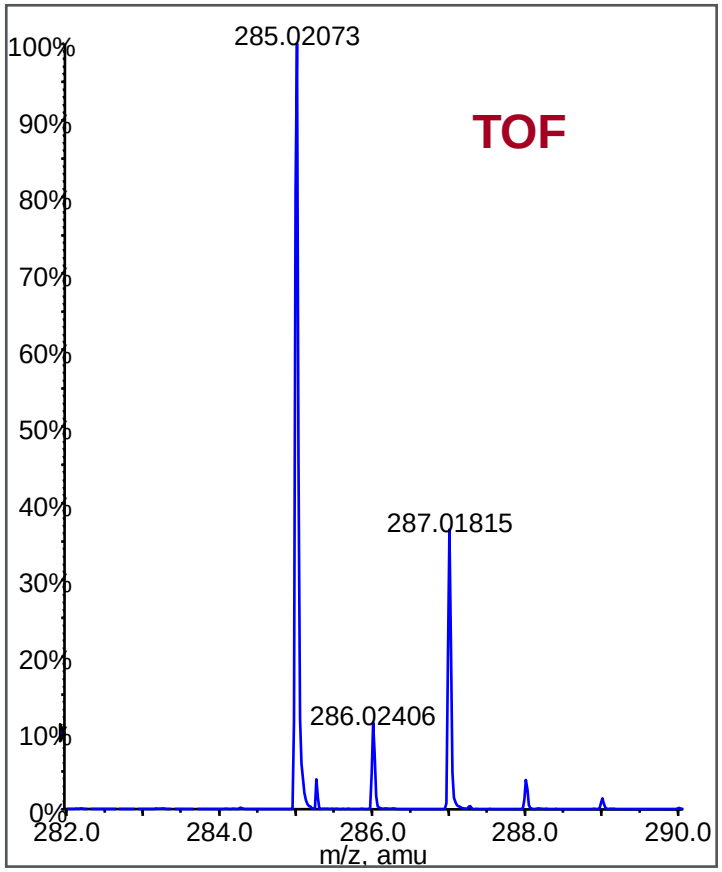


$$m/z = [2V/L^2]t^2$$

Resolution Comparison of Quadrupole and TOF

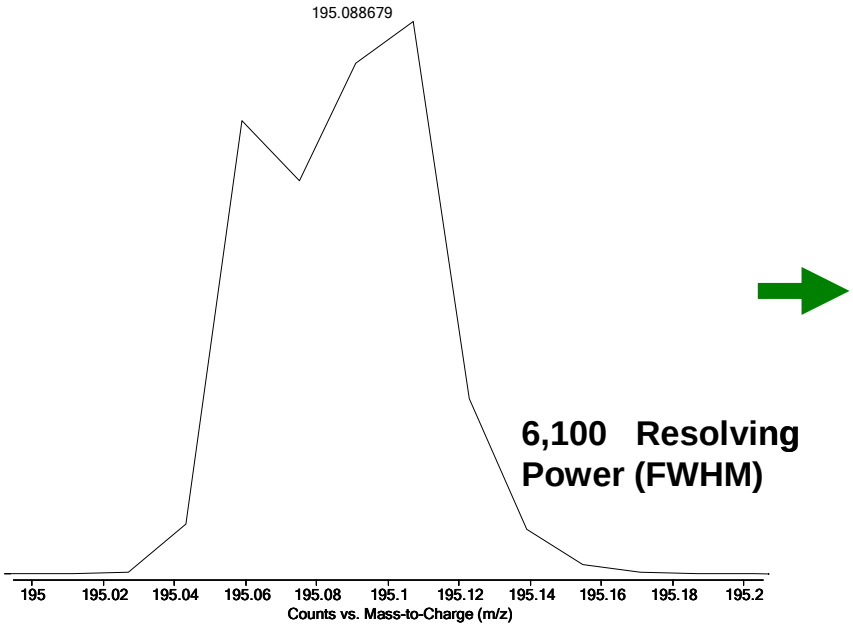


Mass axis stepped in 0.1 *m/z* increments
No centroid interpolation done



Mass axis stepped in 0.009 *m/z* increments
Advanced centroiding performed

Extraordinary Mass Resolution in Agilent's TOF and Q-TOF Solutions



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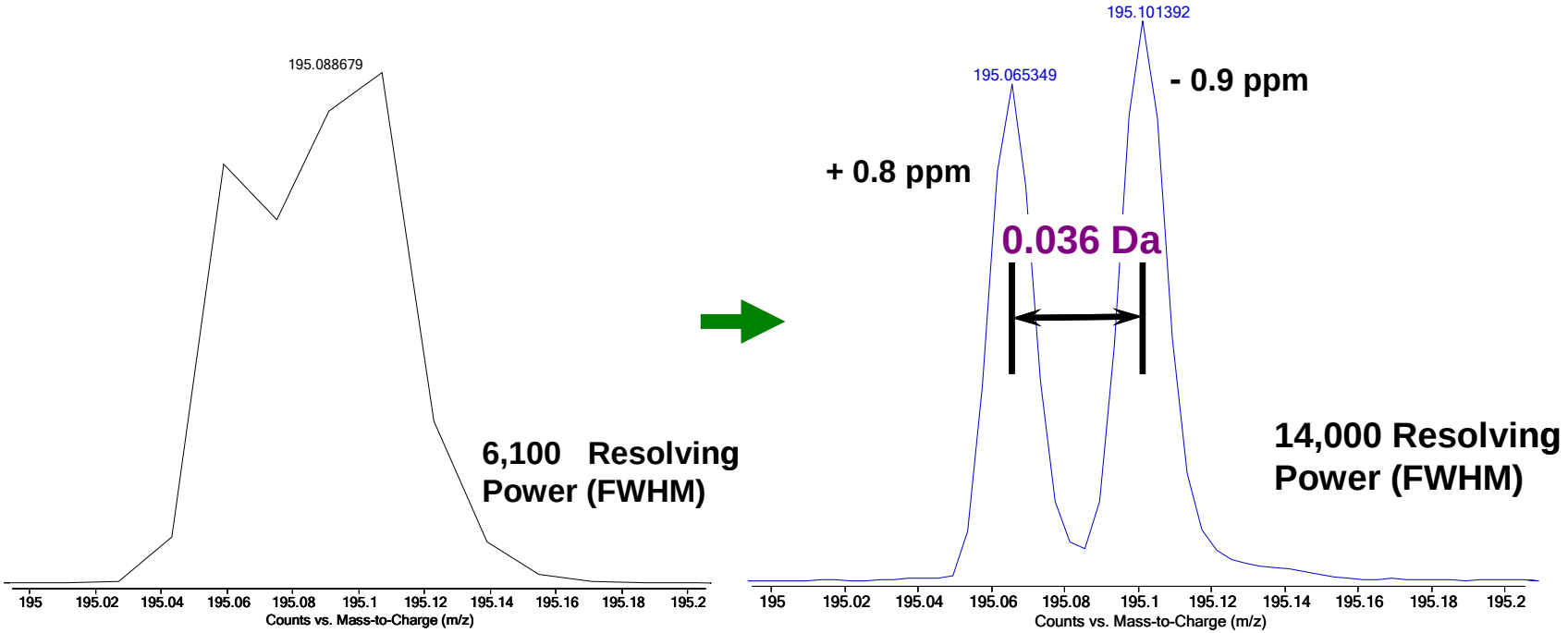

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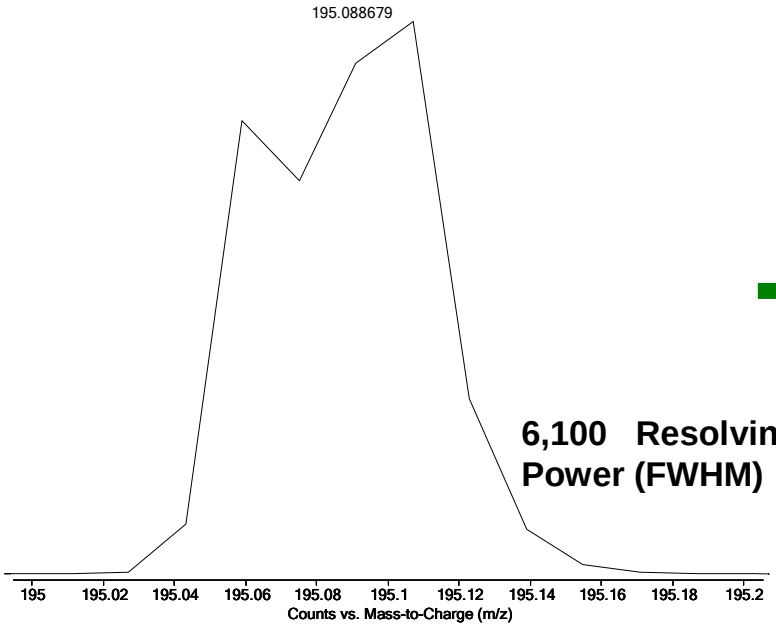
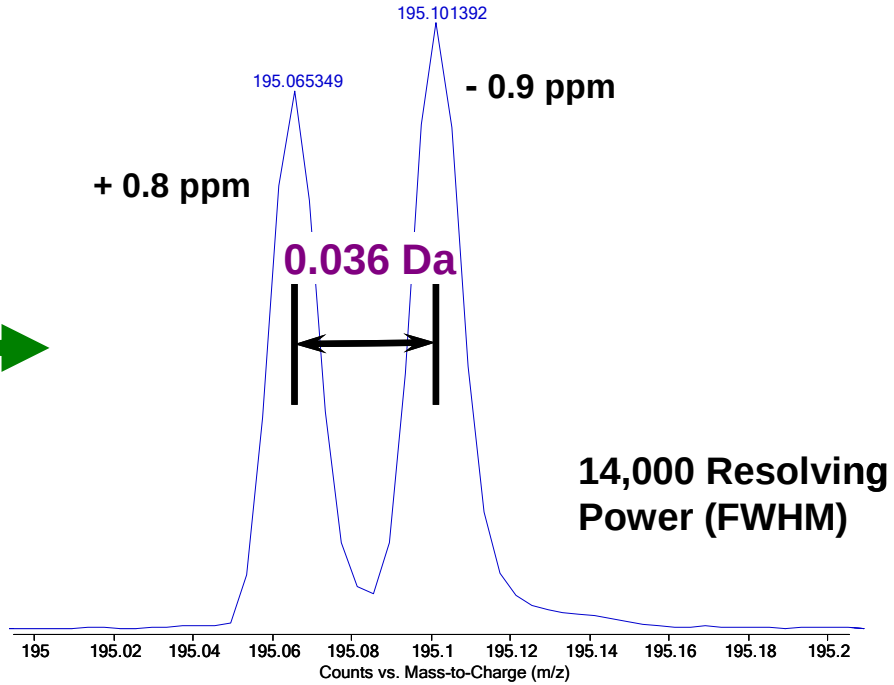
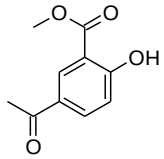
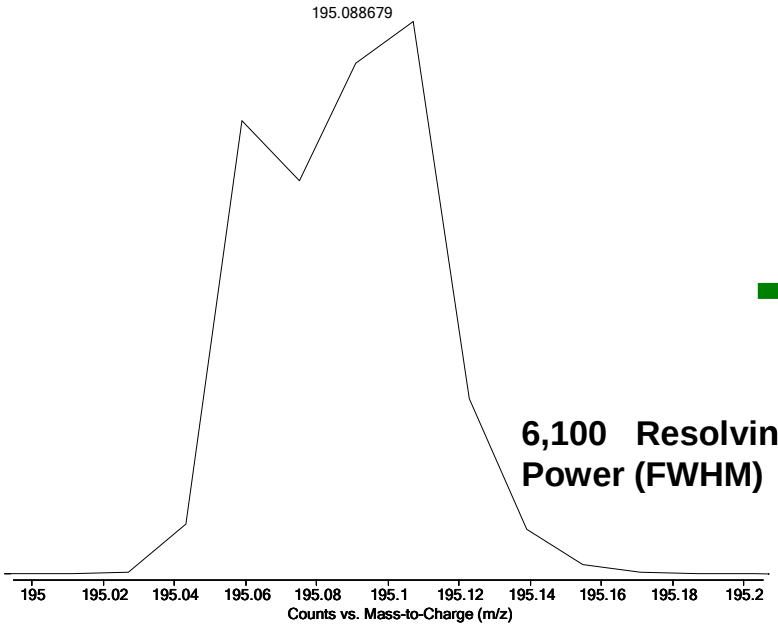


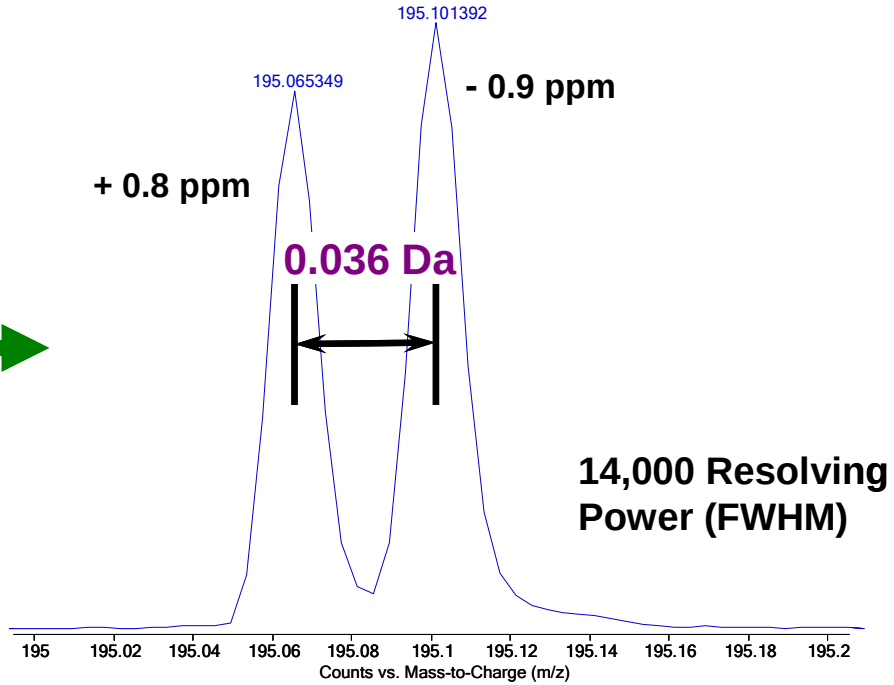


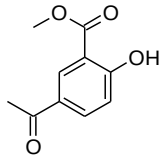


Methyl 5-acetylsalicylate
[M+H]+ = *m/z* 195.06519

Extraordinary Mass Resolution in Agilent's TOF and Q-TOF Solutions







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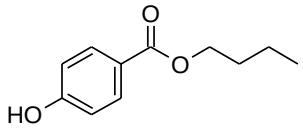
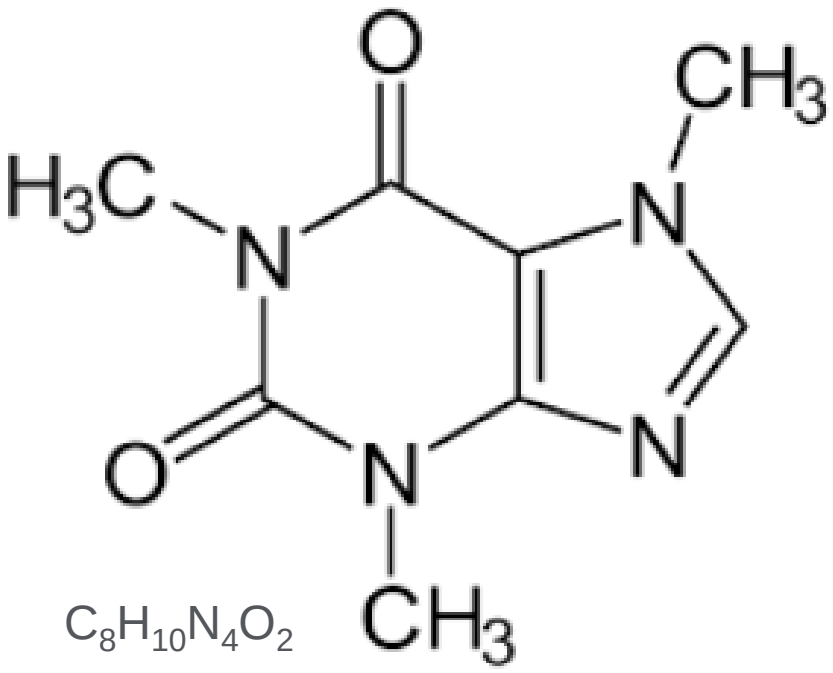


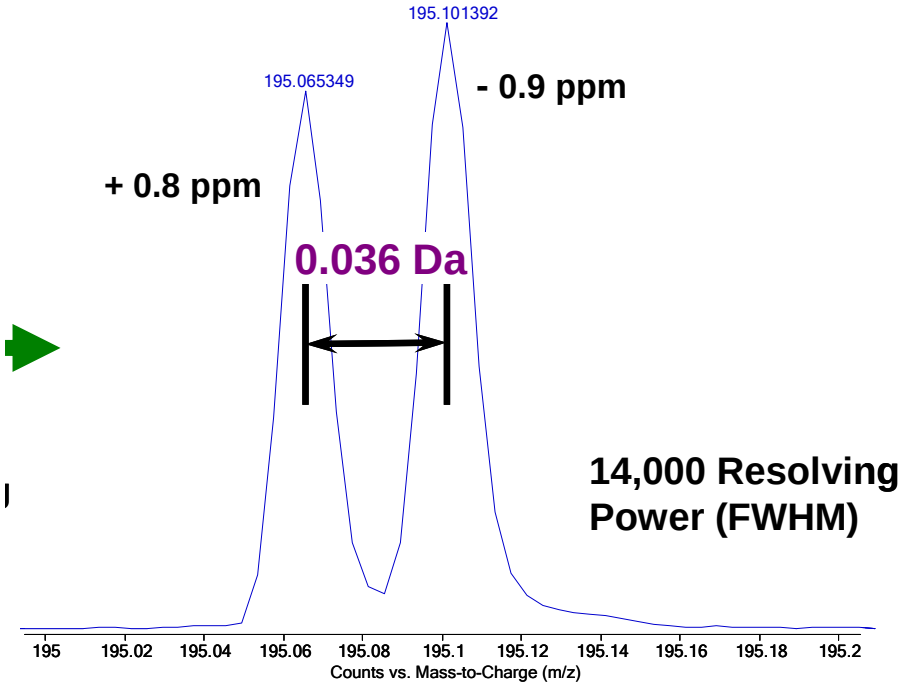
Butyl paraben
[M+H]+ = *m/z* 195.10157

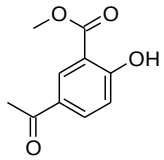
Extraordinary Mass Resolution in Agilent's TOF and Q-TOF Solutions



$C_8H_{10}N_4O_2$

195.0877





Methyl 5-acetylsalicylate
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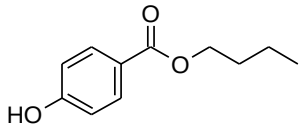
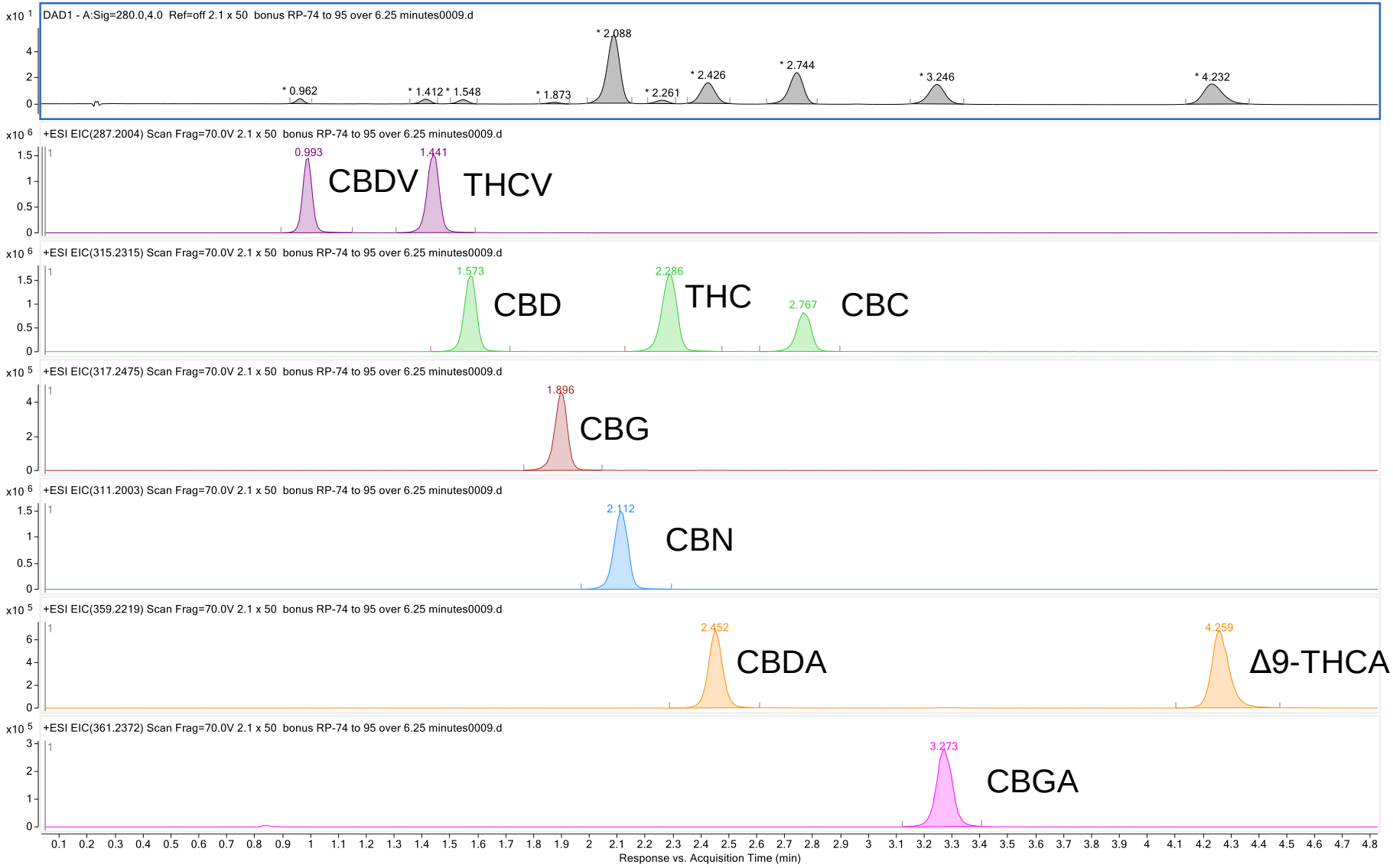


Butyl paraben
[M+H]+ = *m/z* 195.10157

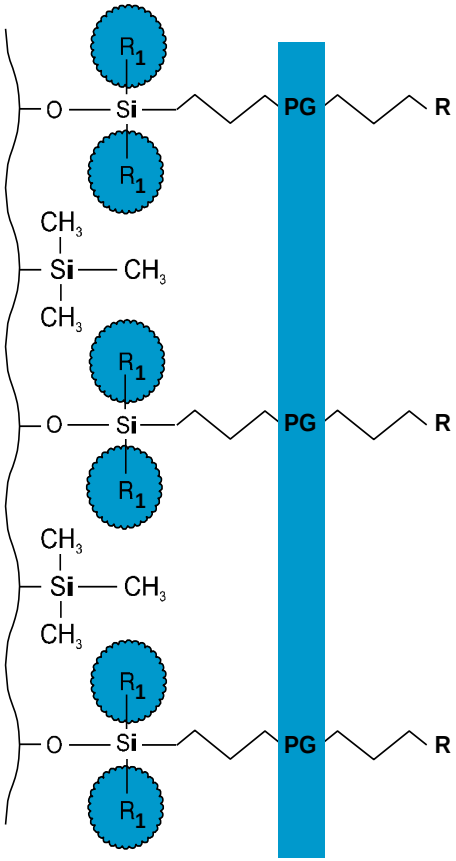
Our goal

To develop a method which allows quantitation of high levels of CBD and CBDA in the same analytical run as low levels of THC.

10 compound mix with ToF data on Bonus RP 2.1 x 50, 1.8u 5 minute run time



Zorbax Bonus-RP
Polar-linked alkyl phase



Superb peak shape for basic compounds

Long column life (pH 2-8)

Unique selectivity

Patented bonding technology

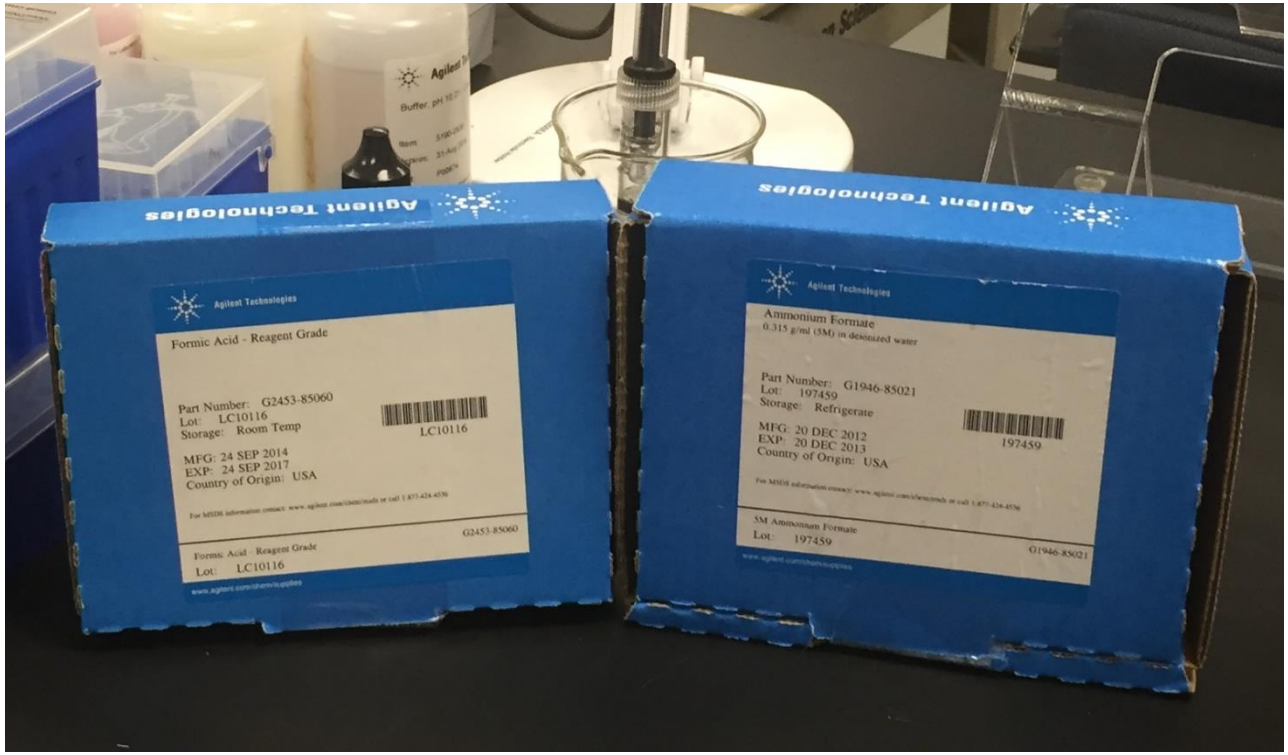
- polar-linked alkyl phase for fast mass transfer giving good peak shape
- bulky side groups give low pH stability
- triple endcapped for mid-range pH stability and good peak shape

HPLC Conditions for short method

Agilent 1290 Infinity II UHPLC series Quaternary Pump, Multisampler with wash , Multi Column Themostat, DAD

Column: Zorbax Bonus RP 2.1 x 50 mm, 1.8 µm or Poroshell 3.0 x50 2.7um

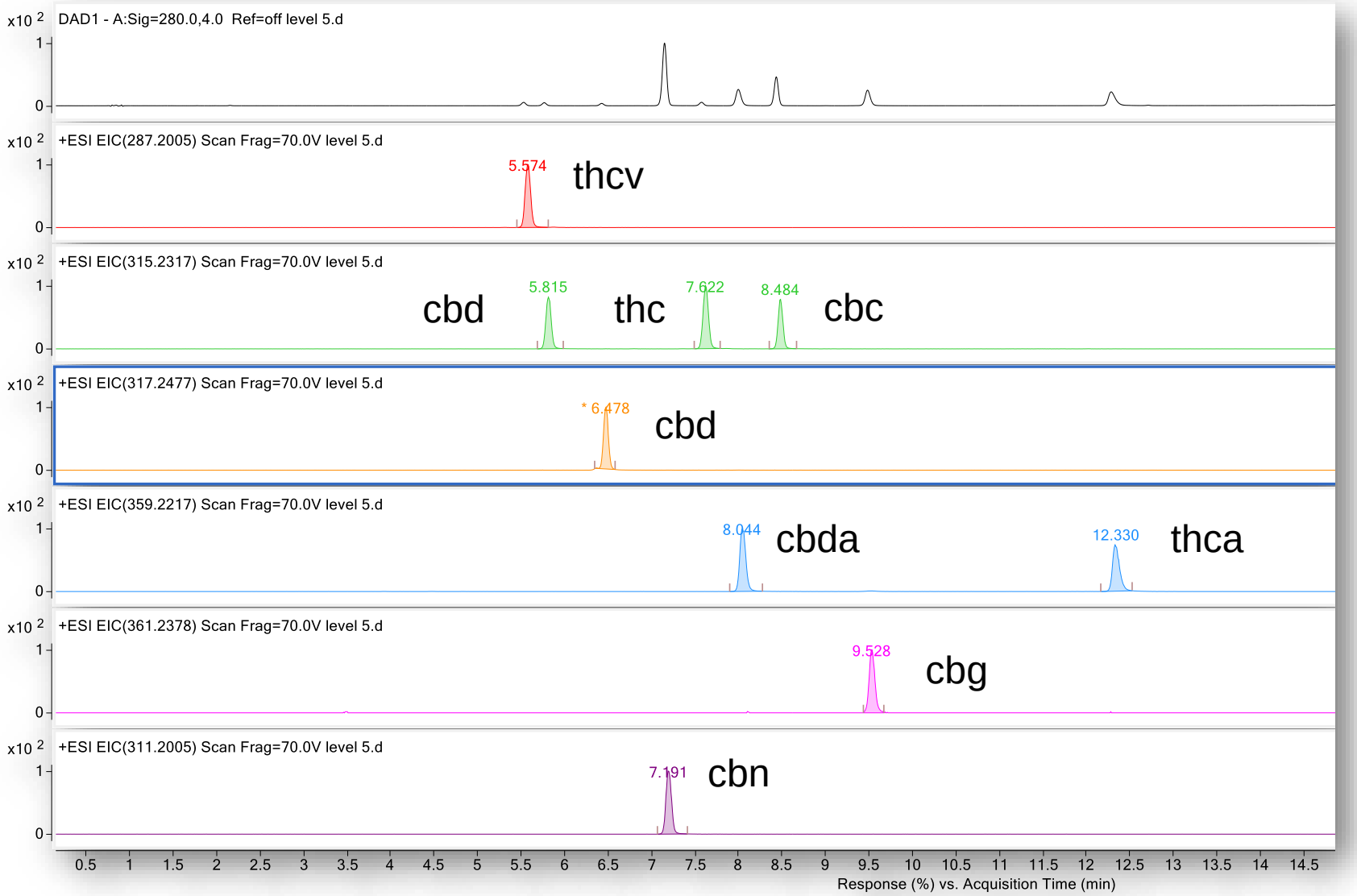
Column temperature:	50°C		
Injection volume:	0.05 µL		
Autosampler temp:	23 °C		
Needle wash:	3.5 s Flush Port (25:25:50) (H_2O:IPA:MeOH)		
DAD-UV	254 nm		
Mobile phase:	A = Water		
	B= Methanol		
	C= 0.1% CH_2O_2 + 2.2 ml 5M NH_4HCO_2 in H_2O		
Flow rate:	0.5 mL/min		
Gradient:	Time (min)	%B	%C
	0.0	72	5
	6.25	95	5
Stop time:	5.00 min.		
Post time:	1.0 min.		
Overall run time	6.0 minutes (incl. re-equilibration)		



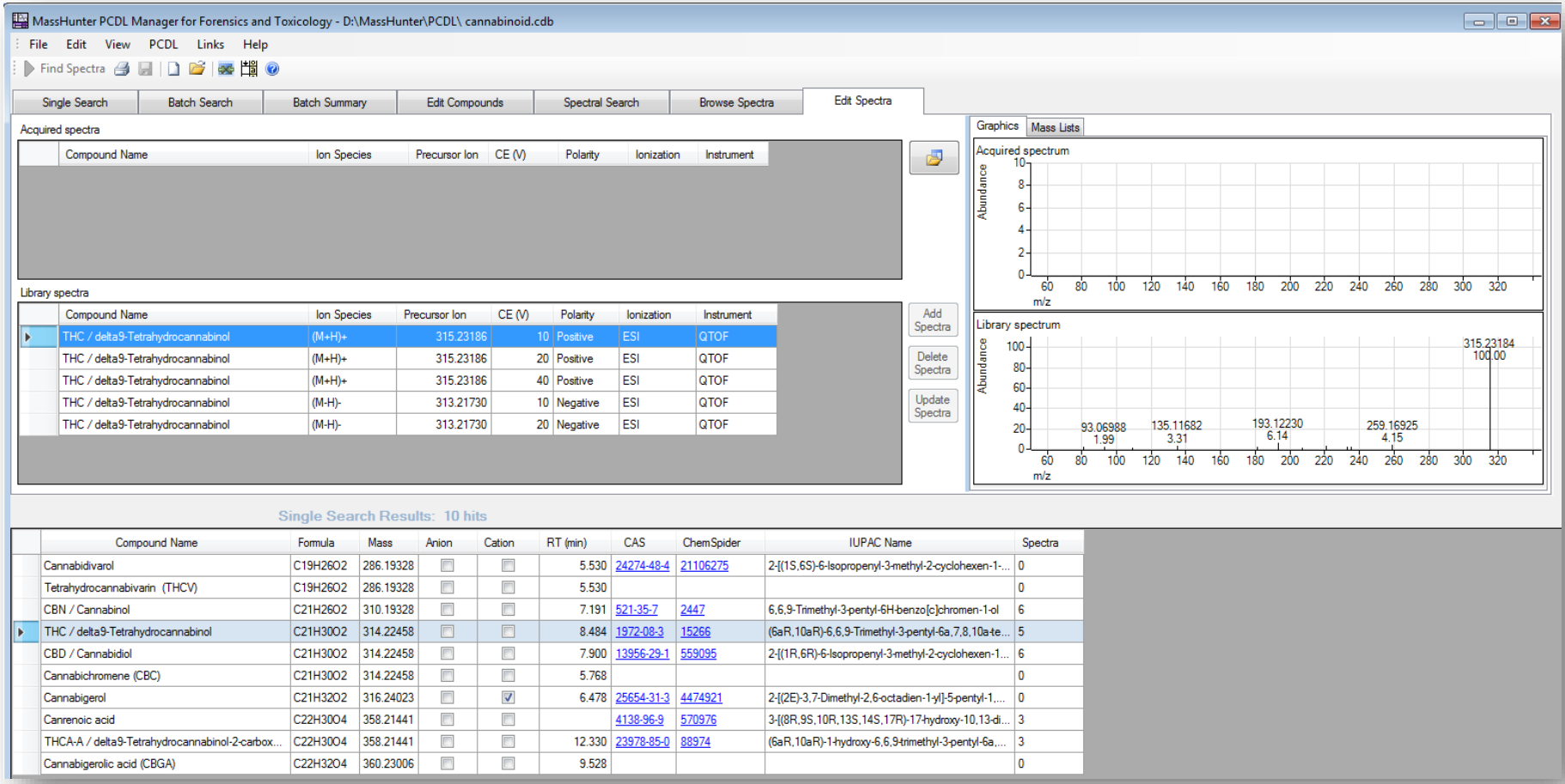
1. 1 vial of Ammonium Formate (G1946-85021)
2. 1 ML of Formic Acid (G2452-85060)

Into 1 Liter of LC MS grade H2O. We have only tested with bottled H20

Bonus RP 3.0 x 100 1.8 um 9 compound standard

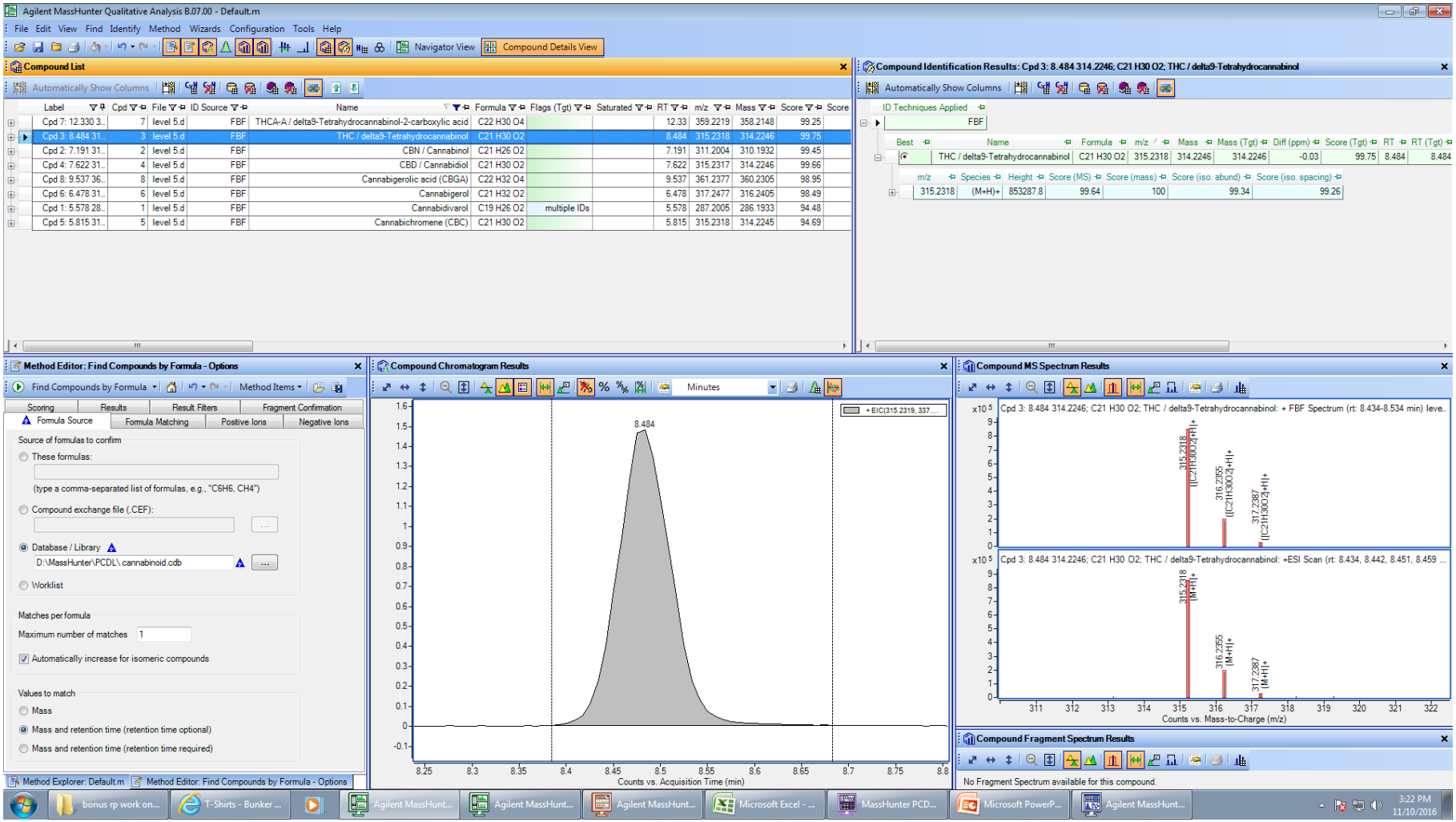


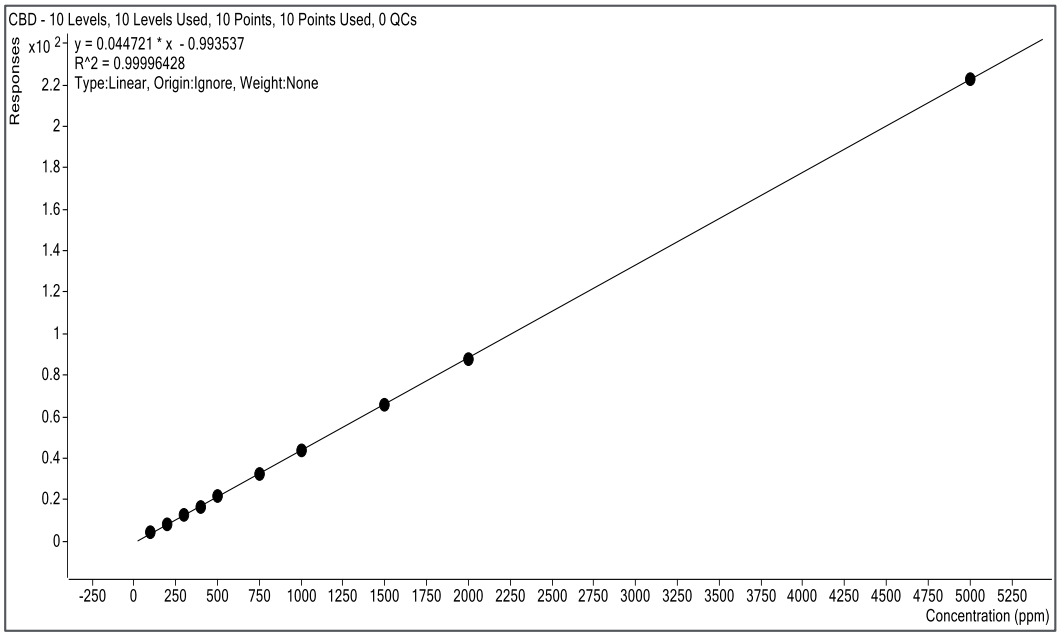
10 Cannabinoid Standard PCDL



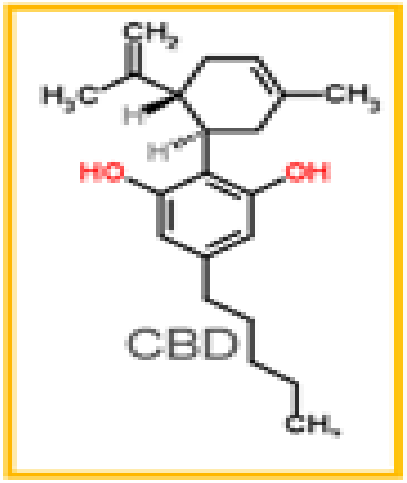
These are the times for the 15 minute method, note the PCDL can be adjusted for the column and UHPLC/HPLC used

Confirmation of Compounds



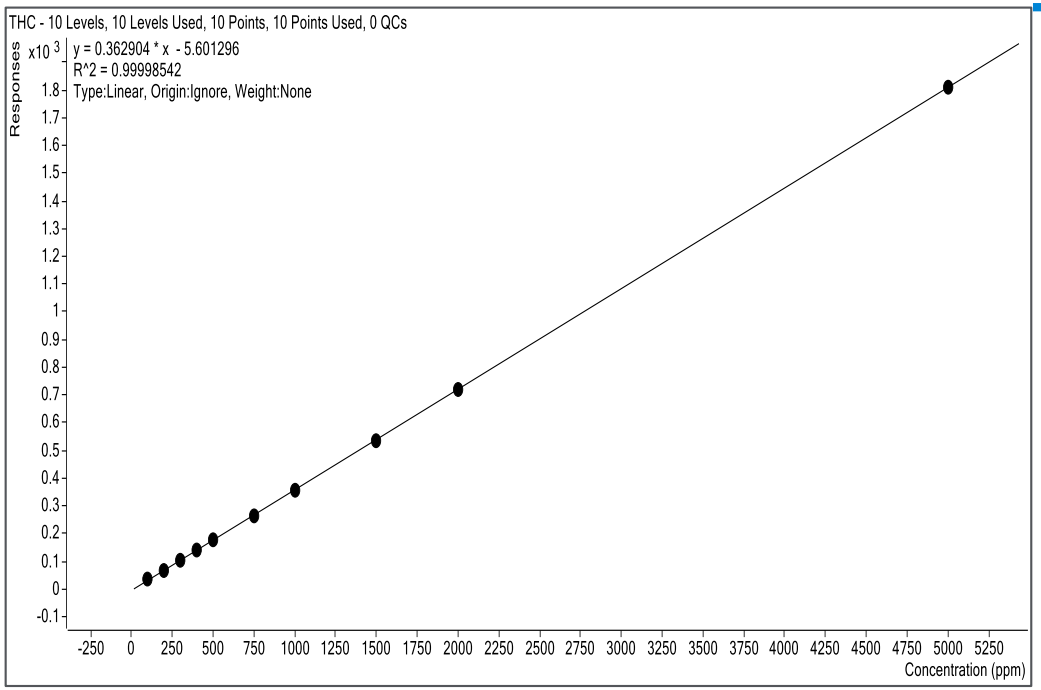


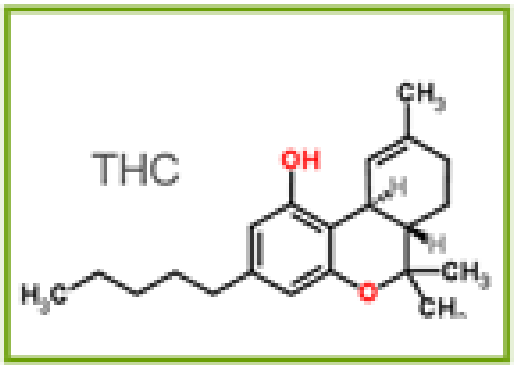
CBD at high level



Sample			CBD Method	CBD Results				
Data File	Type	Level	Exp. Conc.	RT	Resp.	Calc. Conc.	Final Conc.	Accuracy
level 1.d	Cal	1	100.0000	7.549	4	114.6761	114.6761	114.7
level 2.d	Cal	2	200.0000	7.566	8	203.0707	203.0707	101.5
level 3.d	Cal	3	300.0000	7.567	12	299.8328	299.8328	99.9
level 4.d	Cal	4	400.0000	7.568	17	393.2657	393.2657	98.3
level 5.d	Cal	5	500.0000	7.576	21	502.1863	502.1863	100.4
level 6.d	Cal	6	750.0000	7.585	32	745.9138	745.9138	99.5
level 7.d	Cal	7	1000.0000	7.578	44	1006.1116	1006.11...	100.6
level 8.d	Cal	8	1500.0000	7.581	66	1493.4677	1493.46...	99.6
level 9.d	Cal	9	2000.0000	7.587	88	1983.6854	1983.68...	99.2
level 10.d	Cal	10	5000.0000	7.577	223	5007.7899	5007.78...	100.2

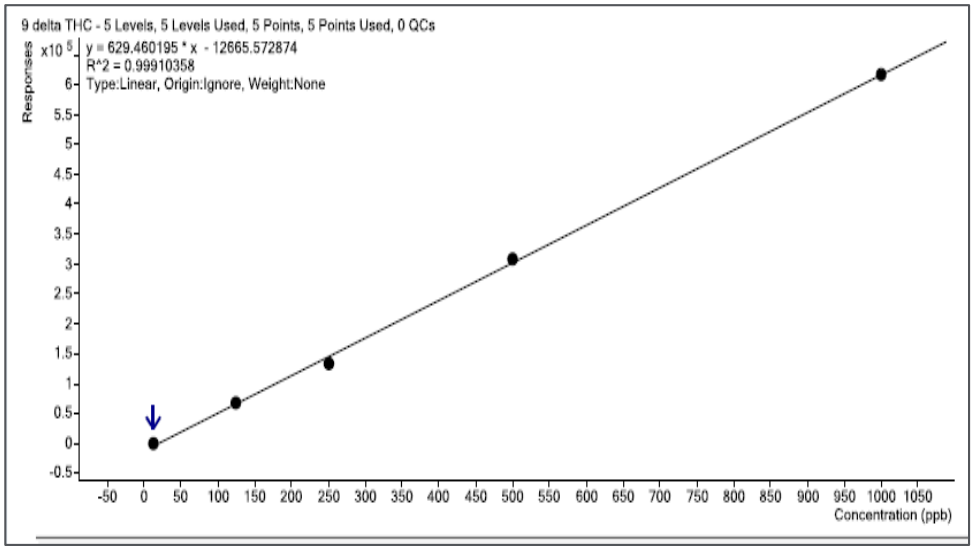
THC at high level

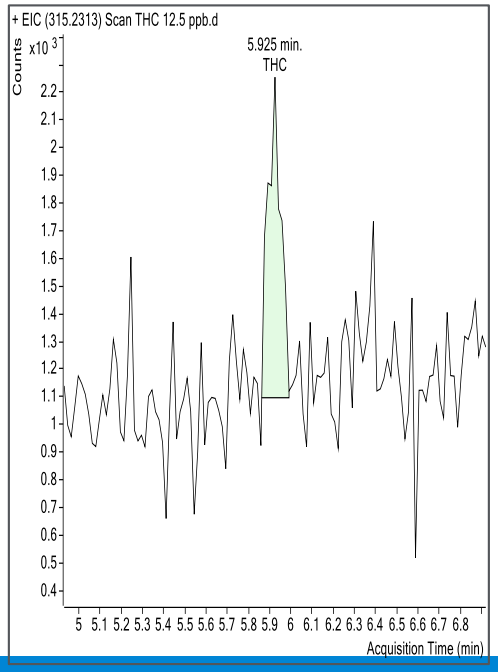




		Sample				THC Method	THC Results				
		Name	Data File	Type	Level	Exp. Conc.	RT	Resp.	Calc. Conc.	Final Conc.	Accuracy
		9 peak mix	level 1.d	Cal	1	100.0000	8.408	35	110.7183	110.7183	110.7
		9 peak mix	level 2.d	Cal	2	200.0000	8.422	68	203.0966	203.0966	101.5
		9 peak mix	level 3.d	Cal	3	300.0000	8.427	103	299.8599	299.8599	100.0
		9 peak mix	level 4.d	Cal	4	400.0000	8.427	138	396.4041	396.4041	99.1
		9 peak mix	level 5.d	Cal	5	500.0000	8.435	177	503.9937	503.9937	100.8
		9 peak mix	level 6.d	Cal	6	750.0000	8.446	266	747.4100	747.4100	99.7
		9 peak mix	level 7.d	Cal	7	1000.0000	8.437	356	996.0243	996.0243	99.6
		9 peak mix	level 8.d	Cal	8	1500.0000	8.438	536	1491.6483	1491.64...	99.4
		9 peak mix	level 9.d	Cal	9	2000.0000	8.445	719	1995.9952	1995.99...	99.8
		9 peak mix	level 10.d	Cal	10	5000.0000	8.436	1811	5004.8495	5004.84...	100.1
		9 peak mix	level 5 with all ions.d	Sample			8.429	176	501.2125	501.2125	
		Sample14	F1 sample.d	Sample			8.444	110	319.1457	319.1457	
		Sample15	F2 sample d.d	Sample			8.450	61	184.1997	184.1997	
		Sample16	blend.d	Sample			8.458	2	21.9074	21.9074	
		Sample17	hemp hri.d	Sample			8.449	374	1045.9793	1045.97...	

THC at low level



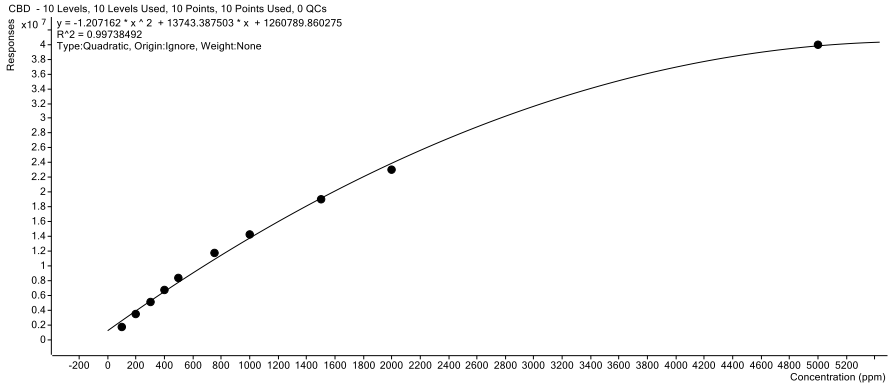


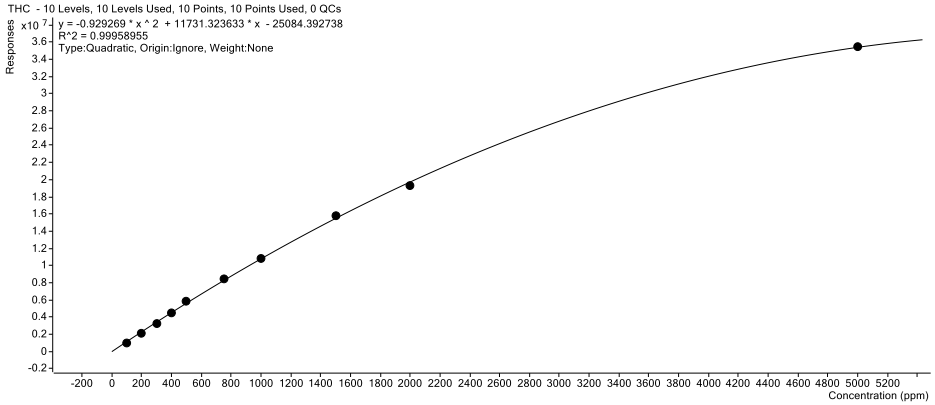
Sample						THC Method	THC Results			
	Name	Data File	Type	Level	Acq. Date-Time	Exp. Conc.	RT	Resp.	Calc. Conc.	Final Conc.
	thc	THC 12.5 ppb.d	Cal	1	8/9/2016 3:20 AM	12.5000	5.925	4703	17.9468	17.9468
	tox standard	THC 125 ppb.d	Cal	2	8/9/2016 3:40 AM	125.0000	5.910	68067	118.1281	118.1281
	tox standard	THC 1000 ppb...	Cal	5	8/9/2016 4:42 AM	1000.0000	5.922	626243	1000.6274	1000.62...
	tox standard	THC 500 ppb.d	Cal	4	8/9/2016 4:21 AM	500.0000	5.920	316156	510.3682	510.3682
	tox standard	THC 250 ppb.d	Cal	3	8/9/2016 4:01 AM	250.0000	5.923	138773	229.9177	229.9177

12.5 ppb is the limit of quantitation

Time of Flight Quant results for CBD oils

Sample		THCV Results		CBC Results		CBG Results		CBN Results		CBD Results		CBDA Results		THC Results		CBGA Results		Δ9-THCA Results	
Data File	Level	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.
level 1.d	1	5.553	45.8677	5.793	55.6911	6.448	68.1147	7.177	23.53...	7.600	40.8614	8.031	88.0906	8.462	90.4250	9.507	68.1370	12.342	82.6832
level 2.d	2	5.566	170.7265	5.807	169.0788	6.462	173.2007	7.191	160.9...	7.614	167.5536	8.037	179.4669	8.468	185.4560	9.520	169.9906	12.339	168.6954
level 3.d	3	5.570	297.8734	5.810	293.2463	6.465	283.8862	7.191	290.3...	7.618	291.1512	8.040	285.5188	8.471	290.0830	9.524	283.3952	12.326	268.4161
level 4.d	4	5.577	404.9564	5.817	413.8471	6.464	394.0739	7.185	424.3...	7.608	413.8514	8.039	404.8989	8.470	399.6527	9.523	410.5962	12.333	390.3144
level 5.d	5	5.578	549.5927	5.815	545.4278	6.478	540.0666	7.191	561.2...	7.622	546.4598	8.044	526.6426	8.484	518.9580	9.528	538.6802	12.330	531.5715
level 6.d	6	5.588	807.6517	5.828	801.2261	6.483	796.0720	7.208	823.9...	7.636	828.8500	8.058	780.3652	8.495	773.4770	9.542	789.1688	12.327	808.5492
level 7.d	7	5.580	1048.84...	5.812	1035.8498	6.475	1065.6733	7.197	1076....	7.628	1048.3231	8.042	1018.2177	8.490	1005.6598	9.534	1058.43...	12.320	1082.08...
level 8.d	8	5.592	1486.93...	5.824	1480.3461	6.487	1480.8181	7.202	1474....	7.630	1487.0882	8.046	1489.8548	8.485	1530.9807	9.521	1483.92...	12.298	1507.72...
level 9.d	9	5.582	1922.17...	5.823	1943.7187	6.486	1938.0747	7.208	1893....	7.638	1905.3750	8.051	1970.6716	8.495	1947.7246	9.537	1934.30...	12.297	1886.90...
level 10.d	10	5.572	5026.34...	5.813	5016.8193	6.459	5011.9245	7.189	5050....	7.612	5062.7758	8.034	5009.2372	8.474	5013.8457	9.502	5024.02...	12.229	
F1 sample.d		5.589	0.0000	5.813		6.484	11.5164	7.205	0.0000	7.903	368.0442	8.067	95.5966	8.499	326.0708	9.535	37.5829	12.461	28.5090
F2 sample...		5.596	0.0000	5.822		5.811	267.0110	7.221	0.0000	7.900	254.6984	8.066	10.6925	8.506	183.5776	9.533	0.0000	12.435	23.5803
blend.d		5.613	0.0000	5.814		5.812	295.8620	7.238	0.0000	7.909	153.1084	8.025	10.0775	7.909	294.5973	9.542	19.0771	12.468	21.1392
hemp hri.d		5.589	0.0000	5.804		6.492	1280.5276	7.213	0.0000	7.636	1526.7139	7.968		8.498	1163.1428	9.551	708.1808	12.353	226.4427

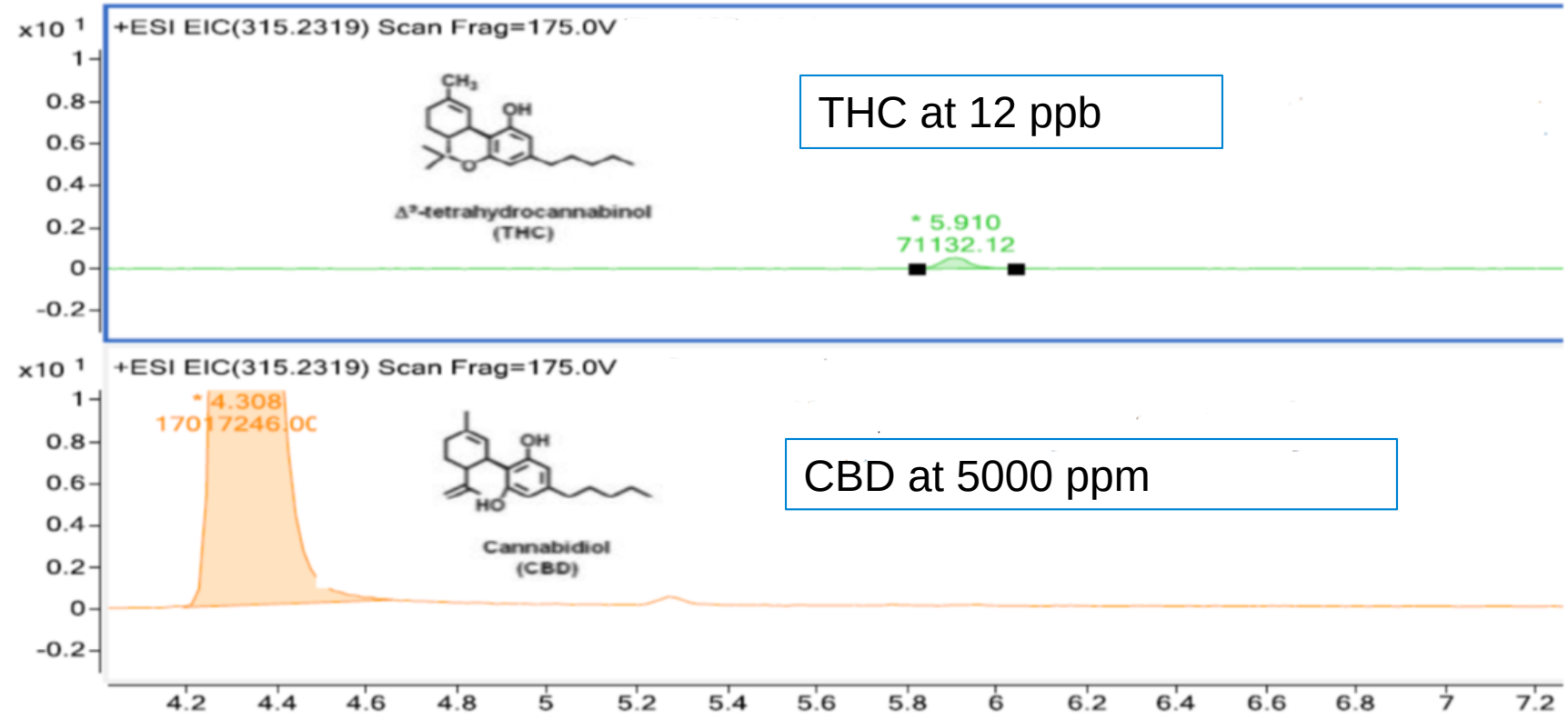




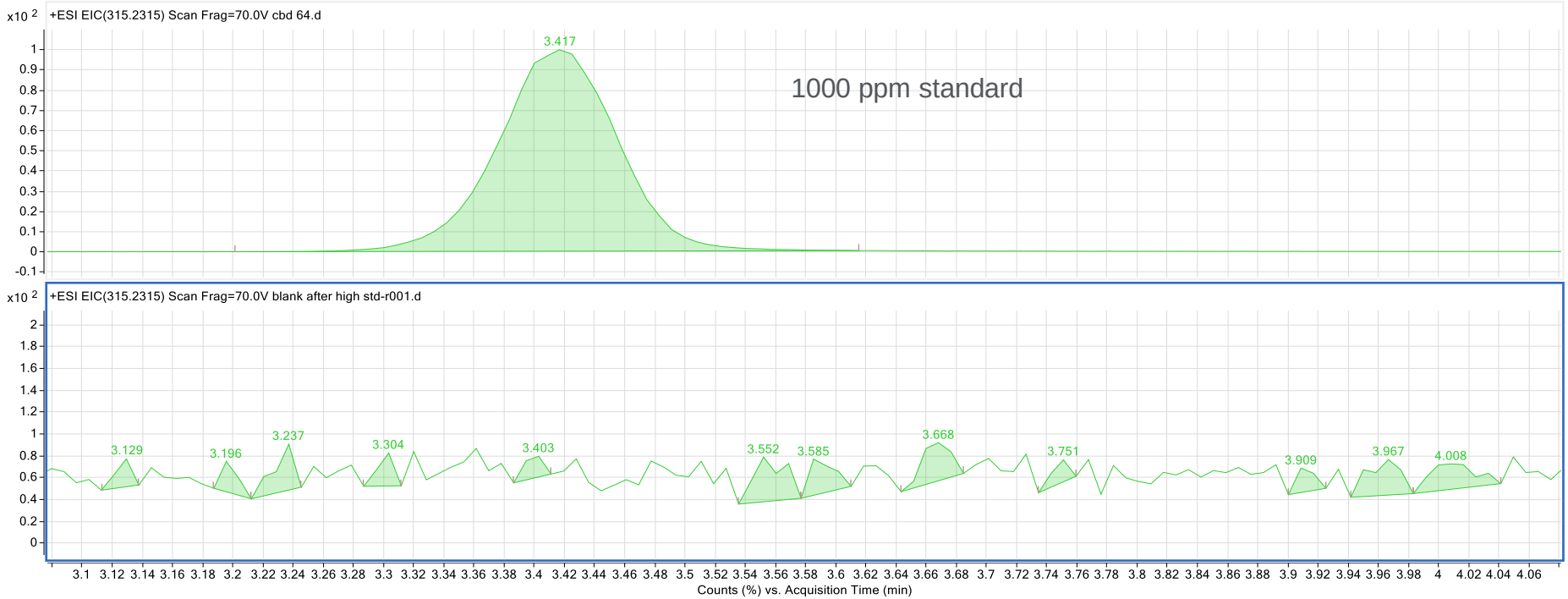
CBD and THC curves for standards. Results of a CBD and THC oil product

Time of Flight Quant results for CBD oils

Sample			THCV Results		CBC Results		CBG Results		CBN Results		CBD Results		CBDA Results		THC Results		CBGA Results		Δ9-THCA Results	
Data File		Level	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.	RT	Final Conc.
	level 1.d	1	5.553	45.8677	5.793	55.6911	6.448	68.1147	7.177	23.53...	7.600	40.8614	8.031	88.0906	8.462	90.4250	9.507	68.1370	12.342	82.6832
	level 2.d	2	5.566	170.7265	5.807	169.0788	6.462	173.2007	7.191	160.9...	7.614	167.5536	8.037	179.4669	8.468	185.4560	9.520	169.9906	12.339	168.6954
	level 3.d	3	5.570	297.8734	5.810	293.2463	6.465	283.8862	7.191	290.3...	7.618	291.1512	8.040	285.5188	8.471	290.0830	9.524	283.3952	12.326	268.4161
	level 4.d	4	5.577	404.9564	5.817	413.8471	6.464	394.0739	7.185	424.3...	7.608	413.8514	8.039	404.8989	8.470	399.6527	9.523	410.5962	12.333	390.3144
	level 5.d	5	5.578	549.5927	5.815	545.4278	6.478	540.0666	7.191	561.2...	7.622	546.4598	8.044	526.6426	8.484	518.9580	9.528	538.6802	12.330	531.5715
	level 6.d	6	5.588	807.6517	5.828	801.2261	6.483	796.0720	7.208	823.9...	7.636	828.8500	8.058	780.3652	8.495	773.4770	9.542	789.1688	12.327	808.5492



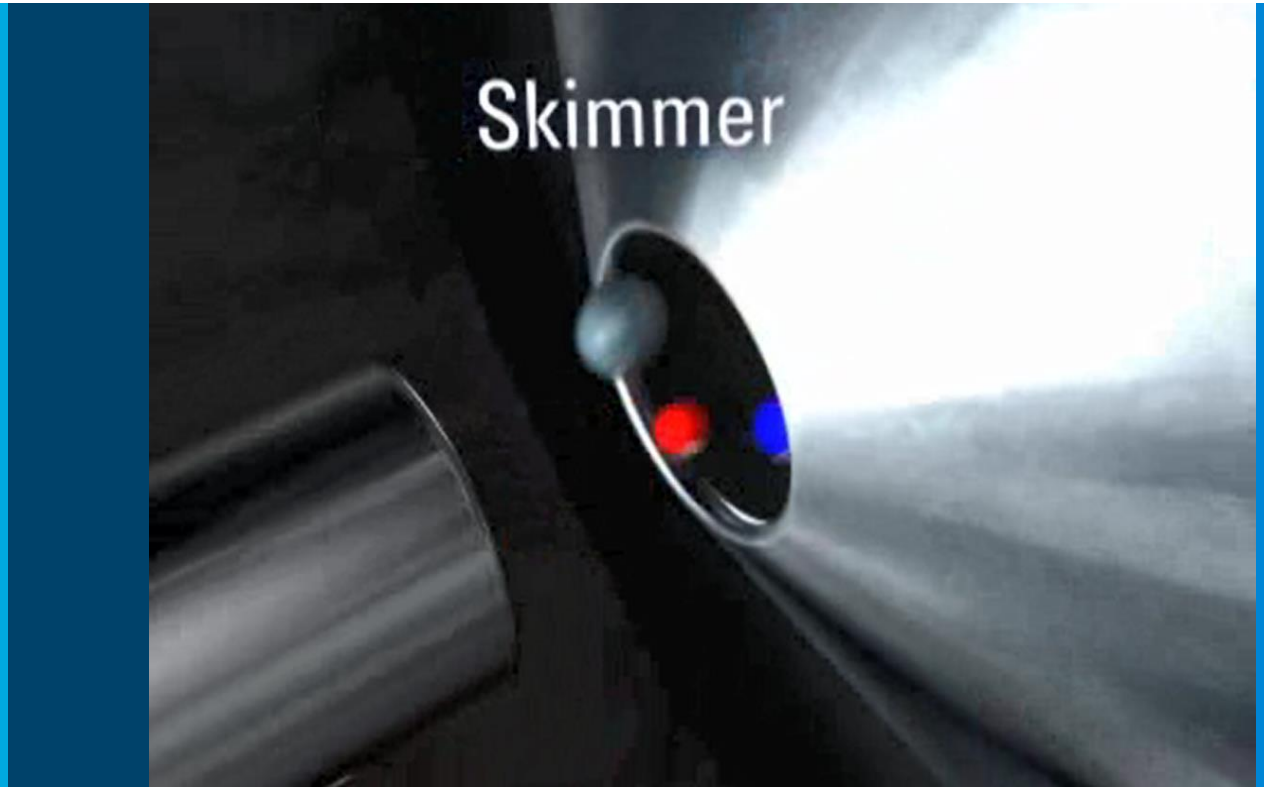
Carryover with the Agilent Multisampler



Validation of our method showing replicates

Name	Data File	Type	Level	Acq. Date-Time	Dil.	Pos.	RT	Final Conc.	Accuracy	Resp.
25	25 ppm replicates 01.d	Sample		9/5/2016 21:22	1	P3-A1	5.444	22.4003		3436709
25	25 ppm replicates 02.d	Sample		9/5/2016 21:42	1	P3-A2	5.443	21.5165		3295961
25	25 ppm replicates 03.d	Sample		9/5/2016 22:03	1	P3-A3	5.41	23.7939		3658652
25	25 ppm replicates 04.d	Sample		9/5/2016 22:23	1	P3-A4	5.406	23.9299		3680308
25	25 ppm replicates 05.d	Sample		9/5/2016 22:44	1	P3-A5	5.373	23.818		3662489
25	25 ppm replicates 06.d	Sample		9/5/2016 23:04	1	P3-B1	5.377	23.6223		3631311
25	25 ppm replicates 07.d	Sample		9/5/2016 23:25	1	P3-B2	5.395	23.3784		3592482
25	25 ppm replicates 08.d	Sample		9/5/2016 23:45	1	P3-B3	5.408	23.6481		3635420
25	25 ppm replicates 09.d	Sample		9/6/2016 0:06	1	P3-B4	5.406	23.5704		3623045
25	25 ppm replicates 10.d	Sample		9/6/2016 0:26	1	P3-B5	5.405	23.5852		3625404
25	25 ppm replicates 11.d	Sample		9/6/2016 0:47	1	P3-C1	5.397	23.0039		3532828
25	25 ppm replicates 12.d	Sample		9/6/2016 1:07	1	P3-C2	5.38	22.651		3476628
25	25 ppm replicates 13.d	Sample		9/6/2016 1:28	1	P3-C3	5.376	22.8665		3510951
25	25 ppm replicates 14.d	Sample		9/6/2016 1:48	1	P3-C4	5.409	23.0619		3542068
25	25 ppm replicates 15.d	Sample		9/6/2016 2:09	1	P3-C5	5.392	22.8092		3501832
25	25 ppm replicates 16.d	Sample		9/6/2016 2:29	1	P3-D1	5.362	22.9727		3527863
25	25 ppm replicates 17.d	Sample		9/6/2016 2:50	1	P3-D2	5.363	22.9097		3517831
25	25 ppm replicates 18.d	Sample		9/6/2016 3:10	1	P3-D3	5.363	22.9547		3524993
25	25 ppm replicates 19.d	Sample		9/6/2016 3:31	1	P3-D4	5.362	22.6298		3473258
25	25 ppm replicates 20.d	Sample		9/6/2016 3:51	1	P3-D5	5.375	23.1343		3553608
2 ppm	2 ppm.d	Cal	1	9/5/2016 17:56	1	P1-A1	5.47	2.2898	114.5	234015
5 ppm	5 ppm.d	Cal	2	9/5/2016 18:17	1	P1-A2	5.459	4.896	97.9	649066
15 ppm	15 ppm.d	Cal	3	9/5/2016 18:37	1	P1-A3	5.474	14.6092	97.4	2195935
25 ppm	25 ppm.d	Cal	4	9/5/2016 18:58	1	P1-A4	5.459	25.0264	100.1	3854923
40 ppm	40 ppm.d	Cal	5	9/5/2016 19:18	1	P1-A5	5.458	40.2786	100.7	6283917
60 ppm	60 ppm.d	Cal	6	9/5/2016 19:39	1	P1-A6	5.44	59.9	99.8	9408715

All Ions Adding Fragment Confirmation

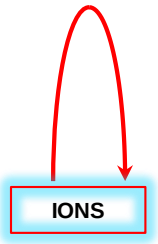


Molecular Mass

Measuring the mass-to-charge ratio of atomic and molecular ions

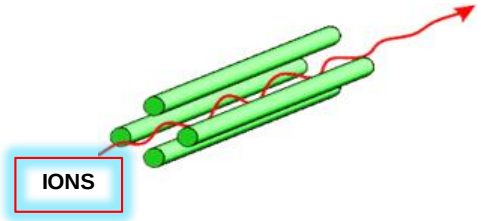
Time of Flight

Gives ions a pulse and measures their flight time



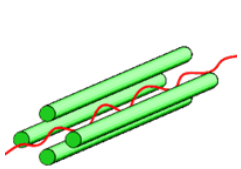
Quadrupole

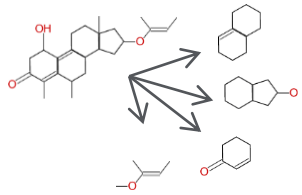
Passes only ions with the correct mass



Tandem Mass Spectroscopy (MS-MS)

Selects a range of masses → Fragments by collision → Analyzes the fragments



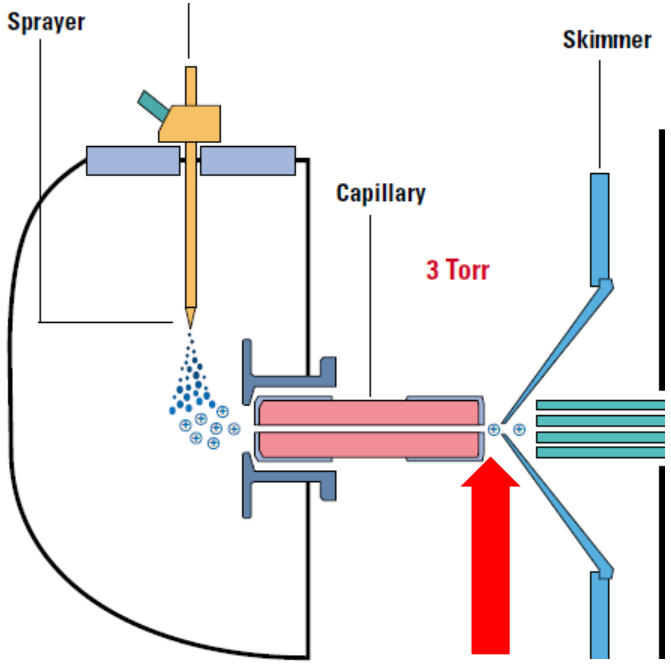


QTOF

QQQ

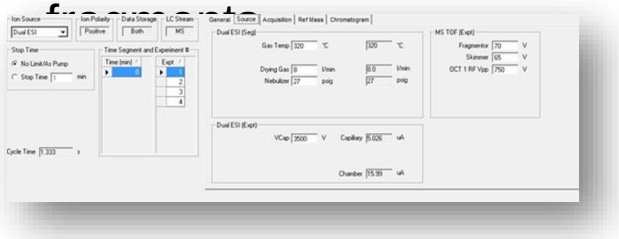
Fragment Ions with High Fragmentor Voltage

Occurs between the capillary and the skimmer



Fragmentor voltage drives “ions” into gas molecules

Higher voltage increases collision energetics producing more fragments

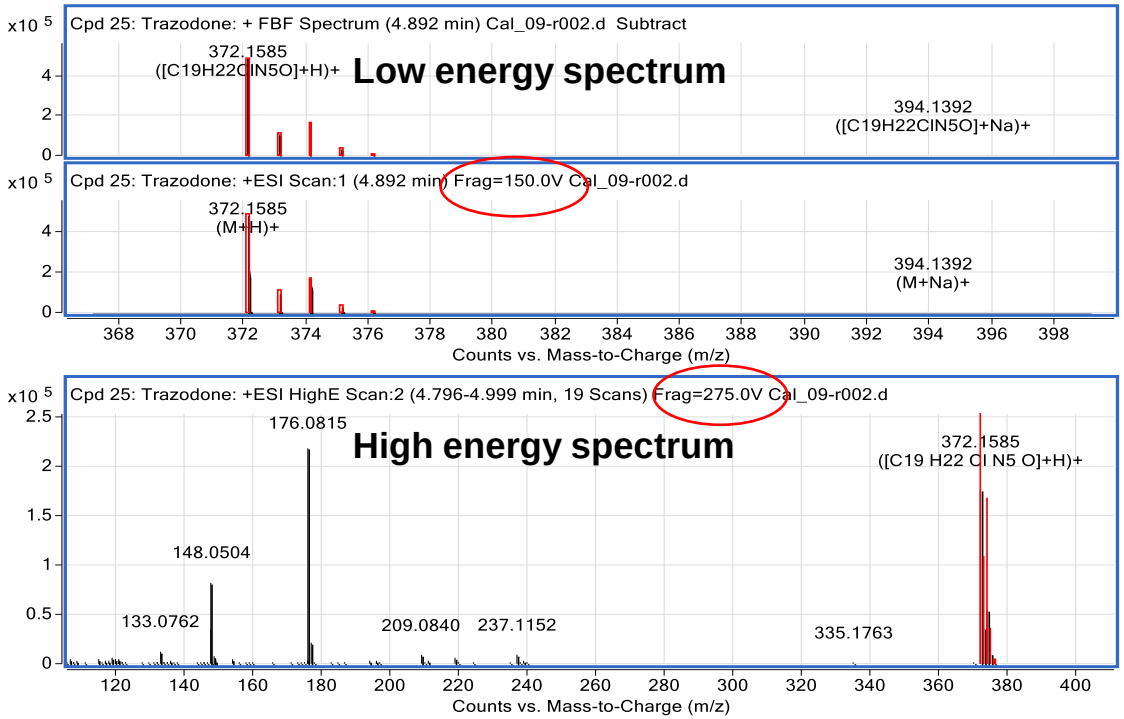


All Ions MS/MS-What is it?

Step 1: Fragmentation on TOF without precursor isolation

a) First Scan: Low fragmentation energy to analyze precursors

b) Second Scan: High fragmentation energy to analyze fragment ions

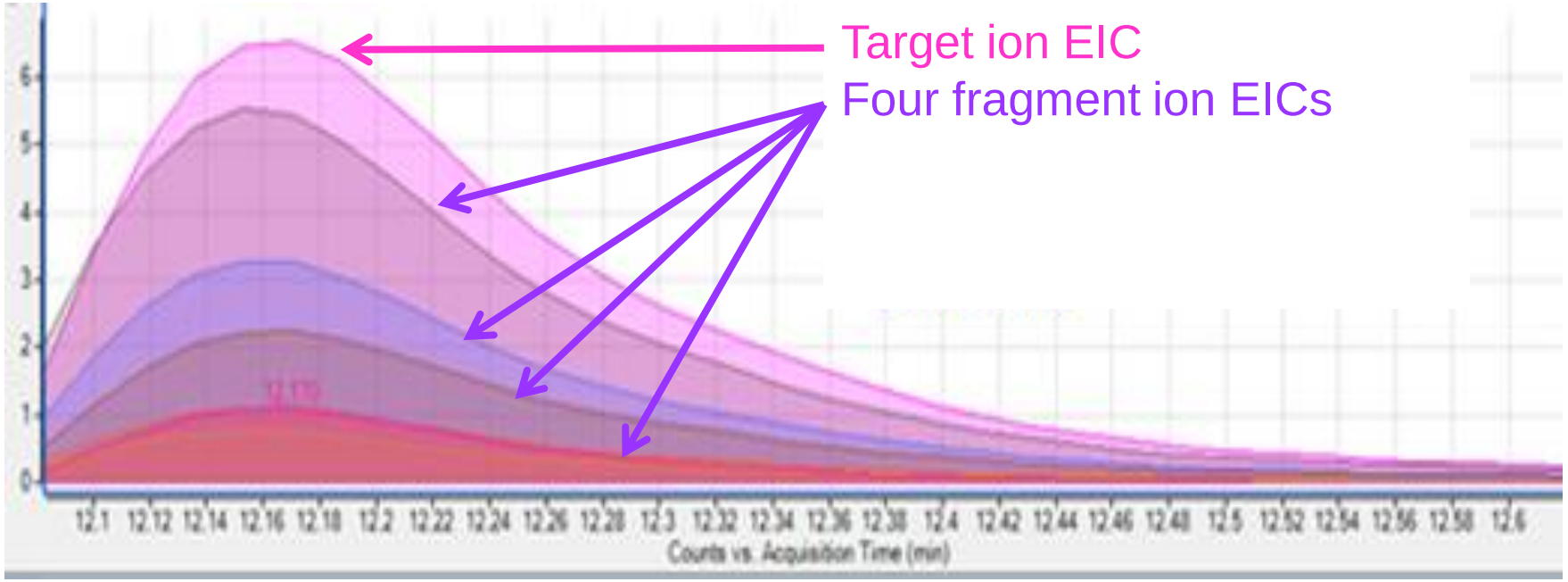


Shows Precursor Ions

Shows Fragment Ions

All Ions MS/MS –

Check if precursor and fragment ions overlap (co-elute)

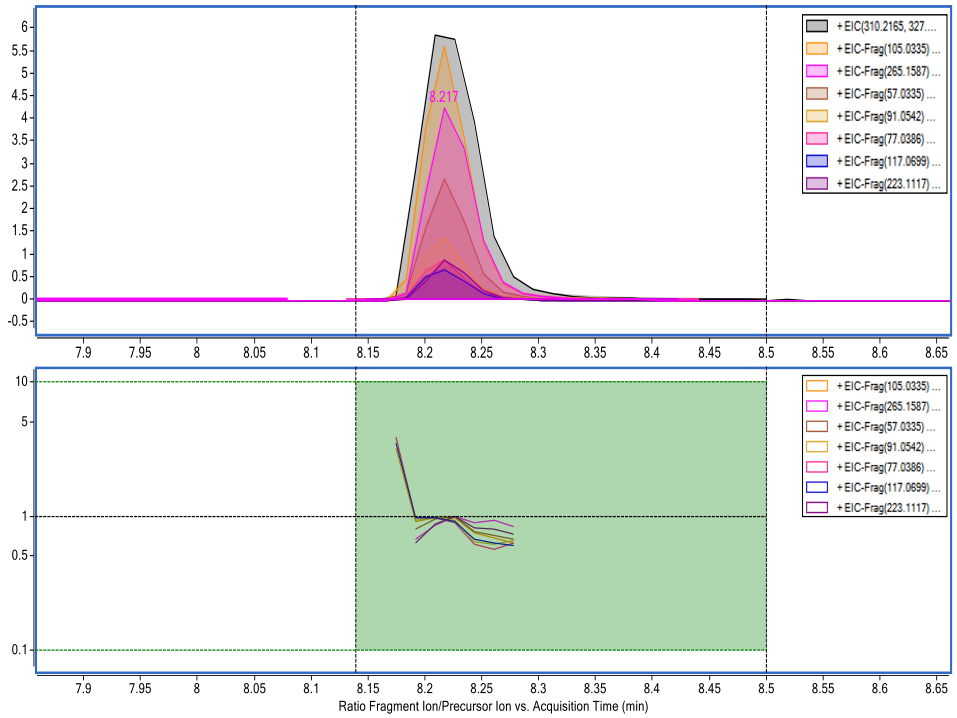


All Ions MS/MS-What is it?

Step 2: Software Extracts, Correlates, and Confirms

a) Find by Formula uses library to extract precursors from low energy MS channel

b) All Ions MS/MS uses library to extract fragments from high energy channel, gives coelution score

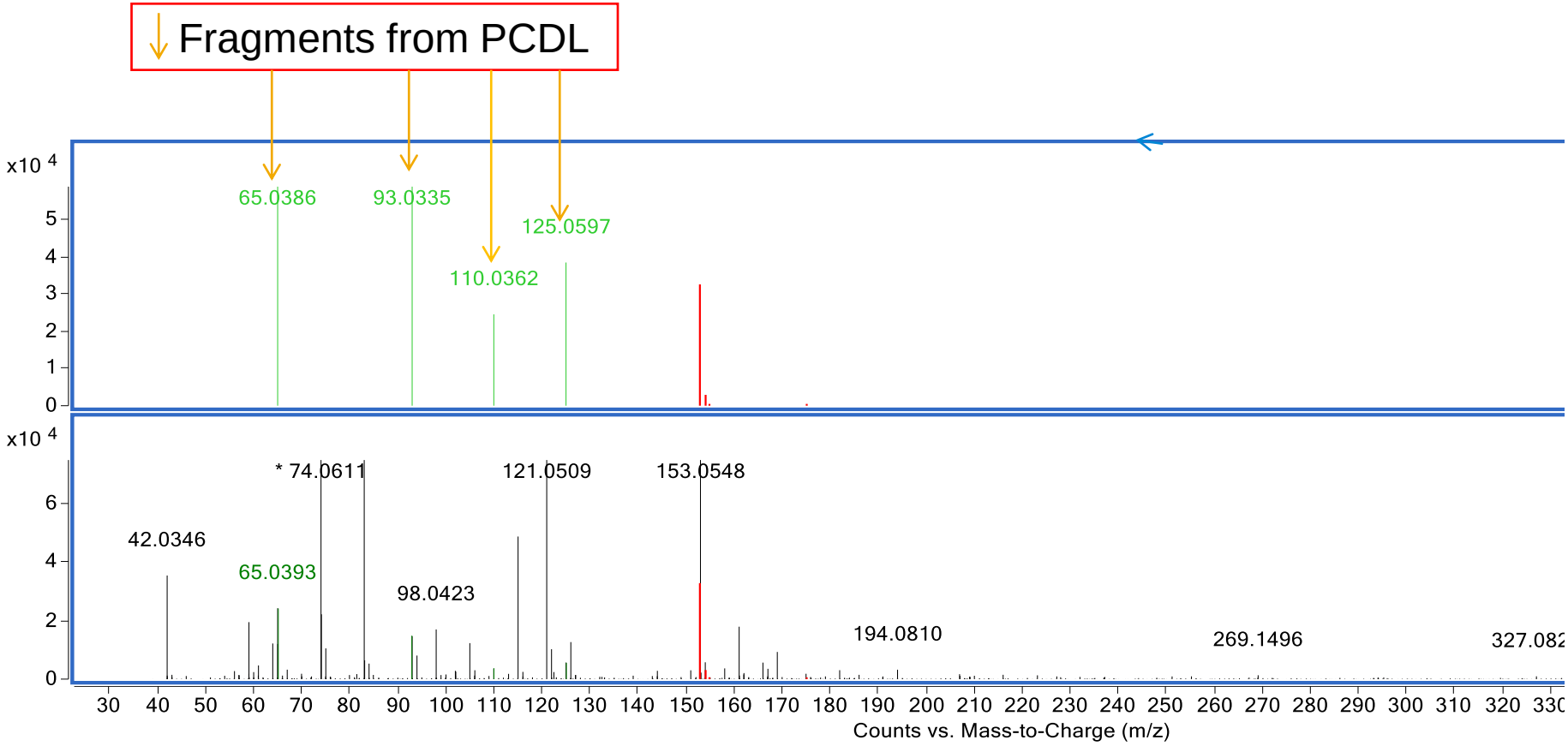


Software automatically matches precursors with fragment ions:
Coelution Plot with Coelution Score

Evaluation of All Ions MS/MS Automated Workflow

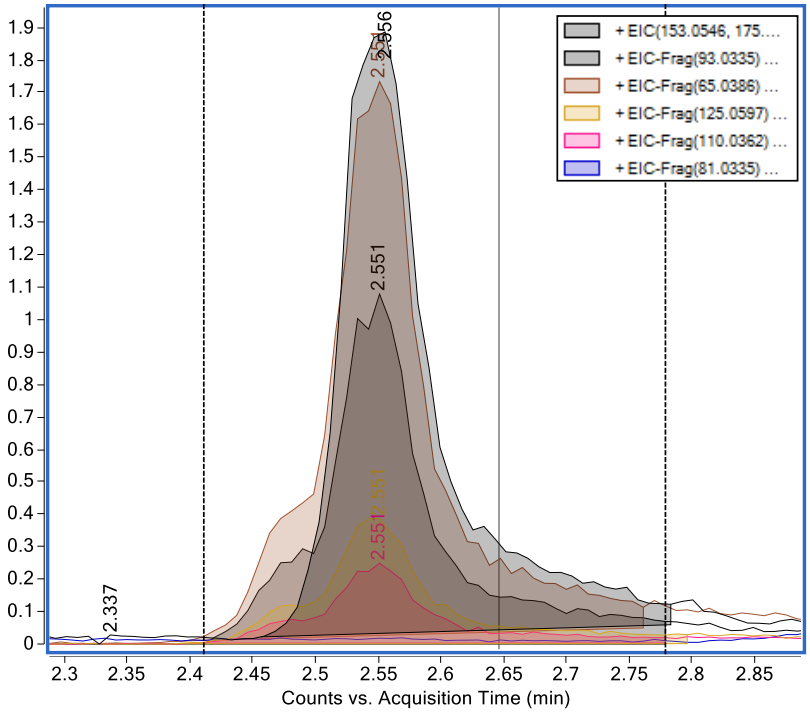
Untargeted targeted screen for congeners

Step 2: Extract Corresponding Fragment Ions

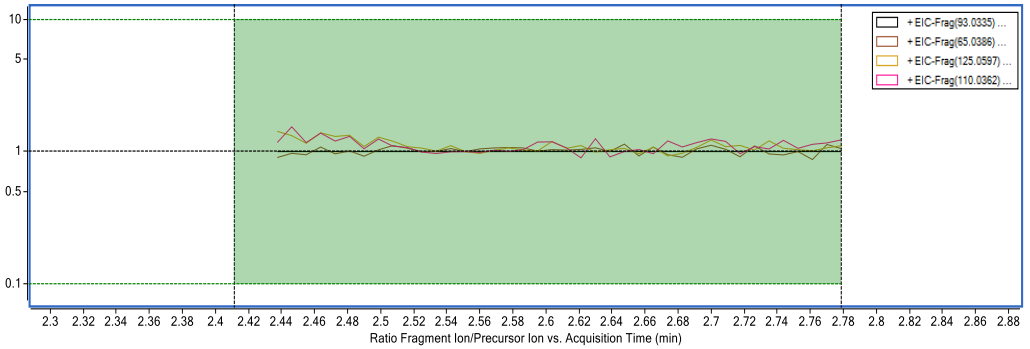


Evaluation of All Ions MS/MS Automated Workflow

Step 3: Precursor and Fragment Correlation/Coelution

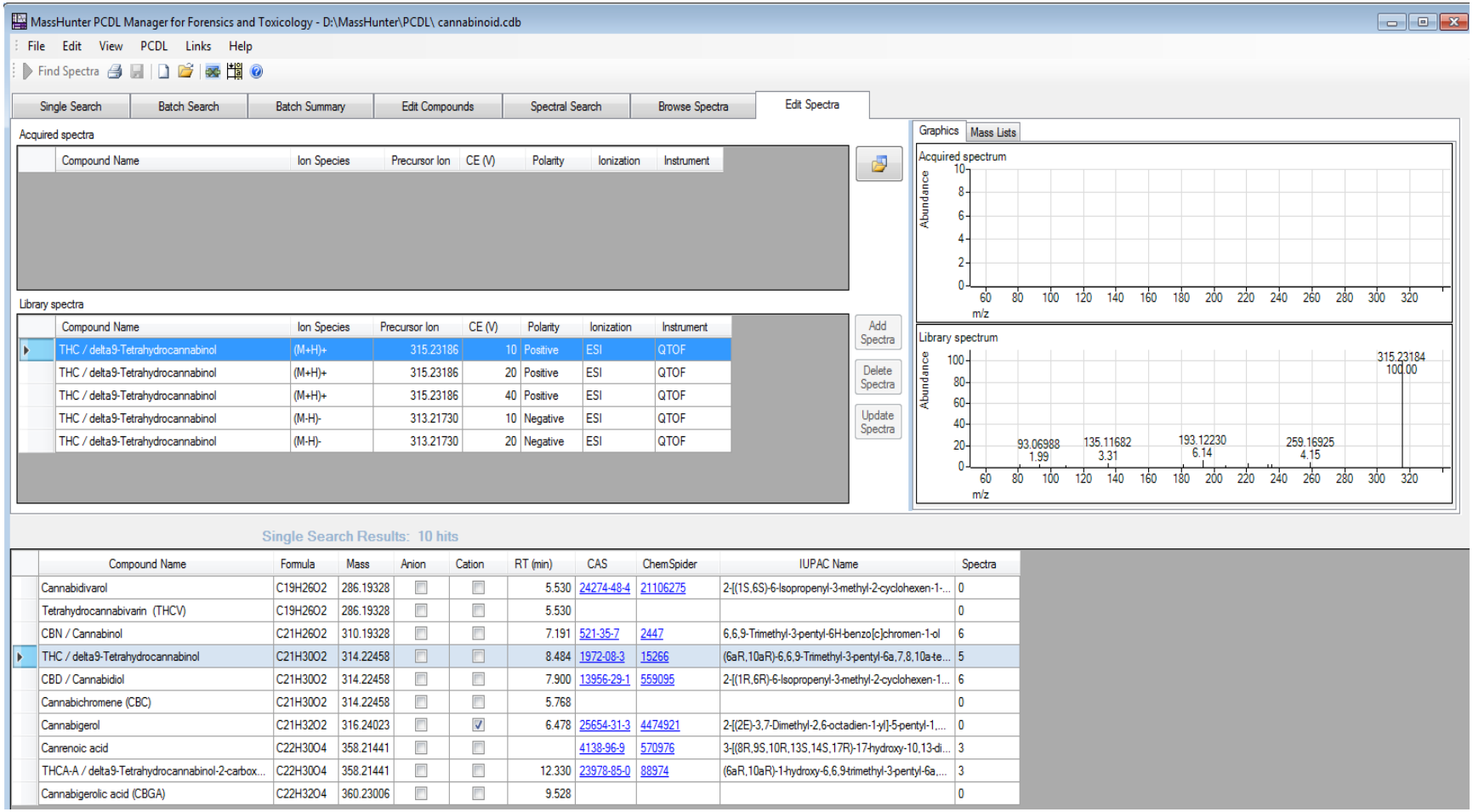


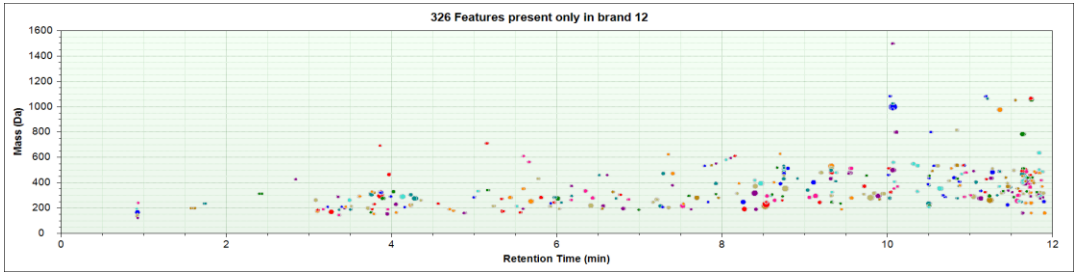
Overlaid Precursor and Fragment Ion Chromatograms

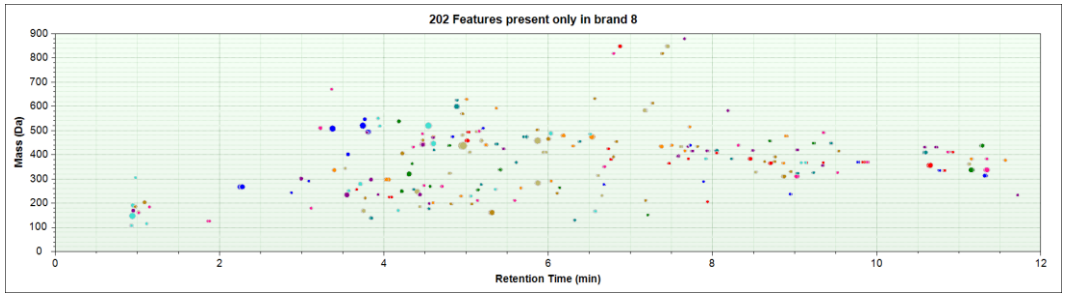


Coelution Plot

Create a library from the standards data with spectra for the cannabinoids





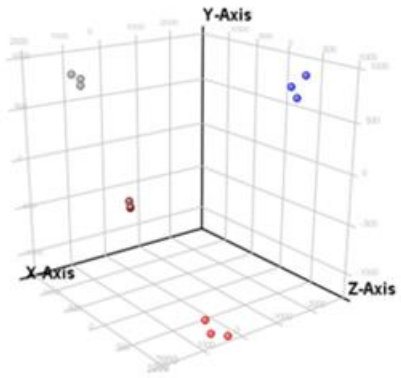


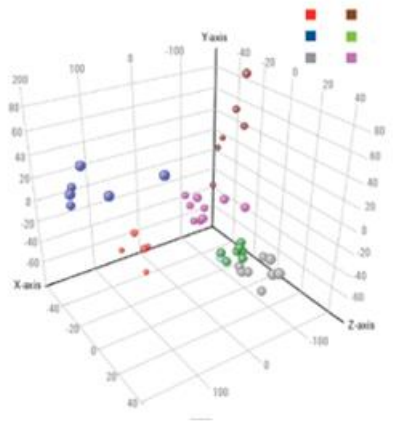
Mass Profiler

Compares 2 sets of data.

Mass Profiler Professional

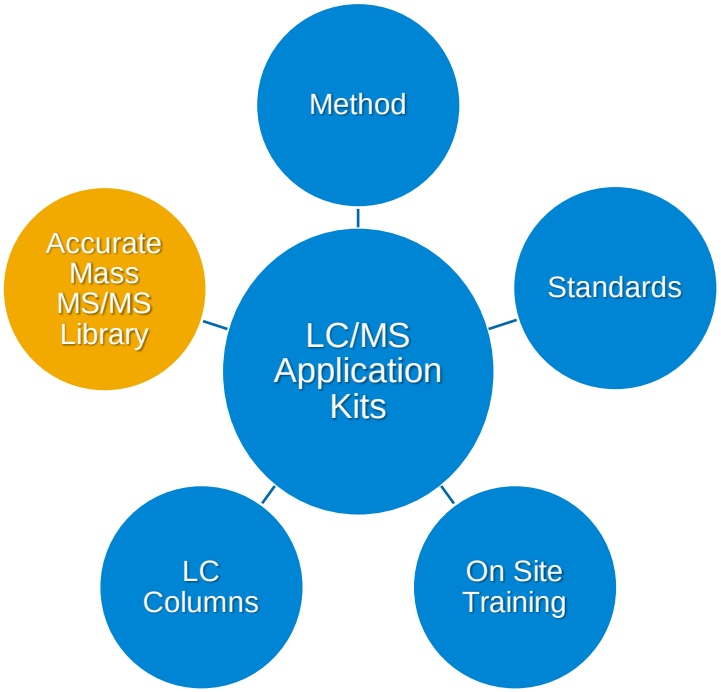
Allows you to compare across multiple sets and adds statistical variables





Pesticide Analysis

LC/MS TOF and Q-TOF Pesticide Application Kit



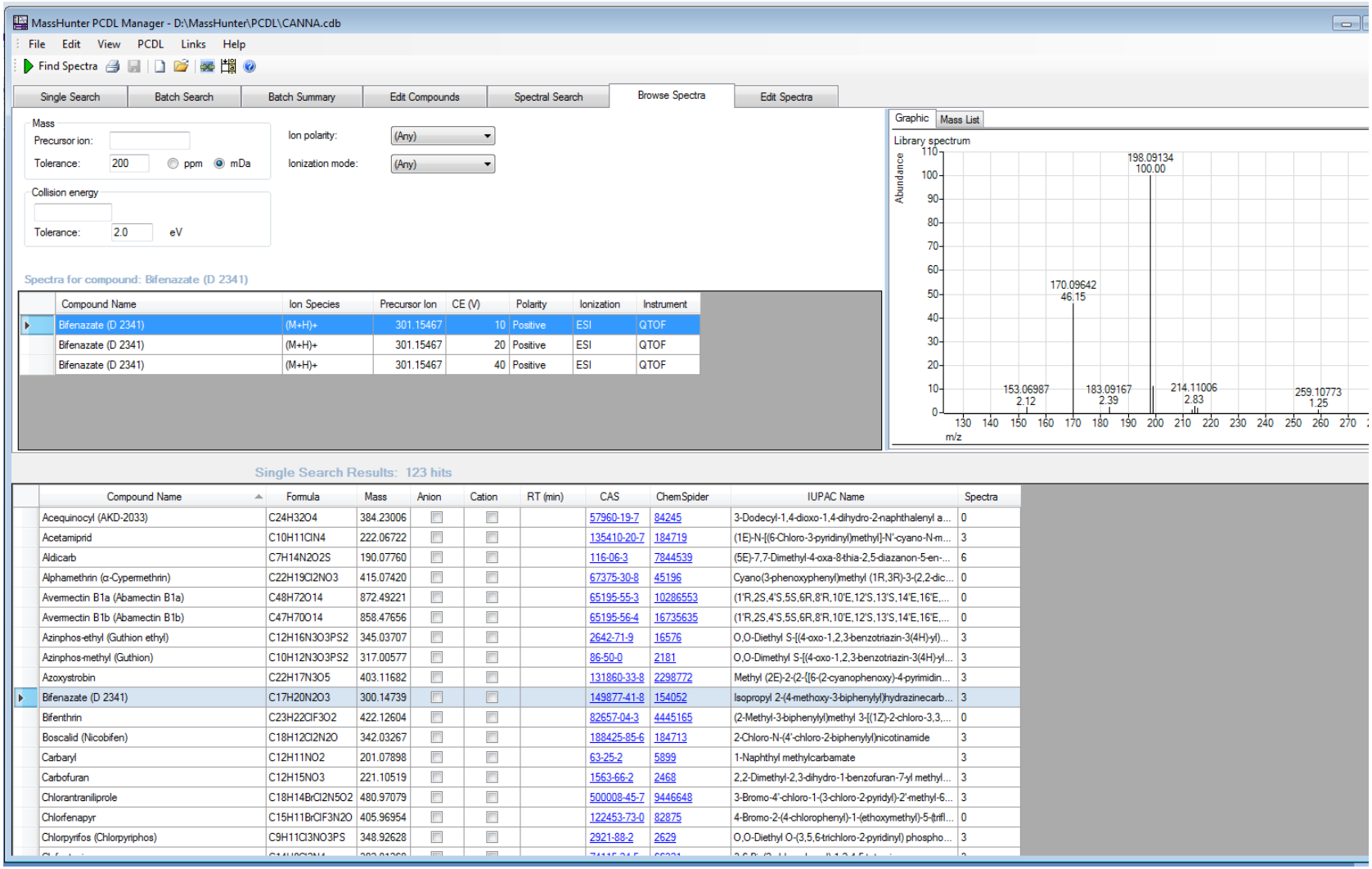
6200 Series LC/MS TOF and 6500 Series LC/MS Q-TOF

http://www.chem.agilent.com/Library/flyers/Public/5990-5642EN.pdf

Accurate Mass LC/MS Pesticide Kit

-Test Mix: 253 compounds
-Accurate Mass DB: 1600+ compounds
-Accurate Mass MS/MS Library: 500+ compounds
-3 Days of On Site Training with Application Expert
-LC Columns for RRLC and UHPLC Methods

PCDL subset of targeted pesticides



Based on the Oregon and Colorado pesticides list

CBD Candy Bar screen for pesticides with All Ions

Compound Identification Results: Cpd 12: 9.608 300.1469; C17 H20 N2 O3; Bifenazate (D 2341)

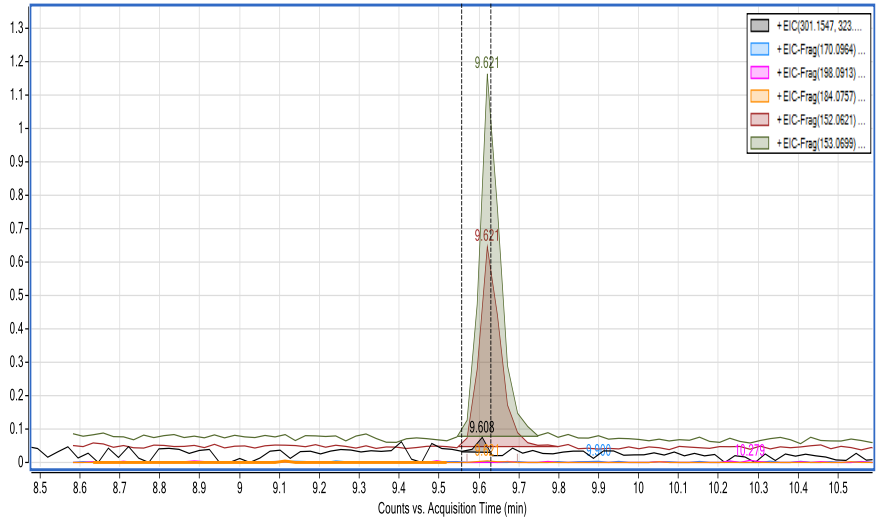
Automatically Show Columns

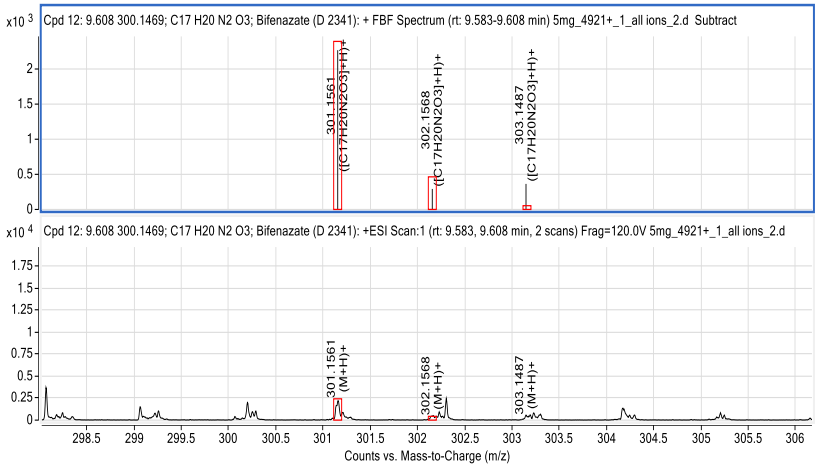
ID Techniques Applied: FBF-FragConfirm

Best	Name	Formula	m/z	Mass	Mass (Tgt)	Diff (ppm)	Score (Tgt)	RT	RT (Tgt)	RT Diff	Score (RT)	Species	Fla	Notes
◉	Bifenazate (D 2341)	C17 H20 N2 O3	301.1561	300.1469	300.1474	1.56	57.71	9.608				(M+H)+		Forensic and Toxicology drug; Pesticide

m/z	Species	Height	Score (MS)	Score (mass)	Score (iso. abund)	Score (iso. spacing)
301.1561	(M+H)+	2398.6	57.71	98.39	7.59	36.5

m/z	CE	FV	Coelution Score	Flags(Fls)	Height	SNR	RT	RT Diff	Compound Name
170.0964				Noise region not found	341.6		9.9		Bifenazate (D 2341)
198.0913				Noise region not found	625.6		10.279		Bifenazate (D 2341)
184.0757				Low S/N ratio	469.1	2.1	9.621		Bifenazate (D 2341)
152.0621	210		97.7	Qualified	59841	44	9.621	0.013	Bifenazate (D 2341)
153.0699	210		98.1	Qualified	108515.9	38.8	9.621	0.013	Bifenazate (D 2341)

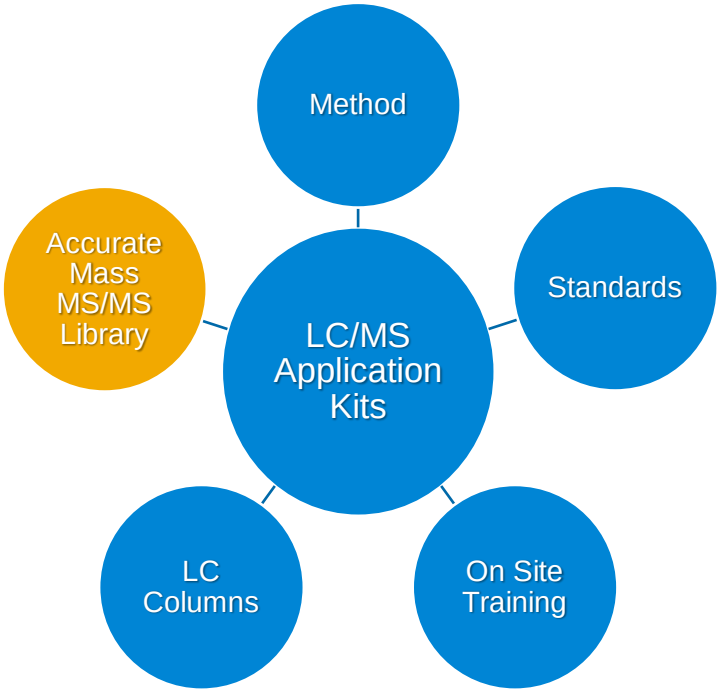




Extracted with QuEChERS and cleanup with Dispersive EMR(Enhanced Matrix Removal)

Untargeted Forensic Toxicology Analysis

LC/MS TOF and Q-TOF Forensic Tox Application Kit



6200 Series LC/MS TOF and 6500 Series LC/MS Q-TOF

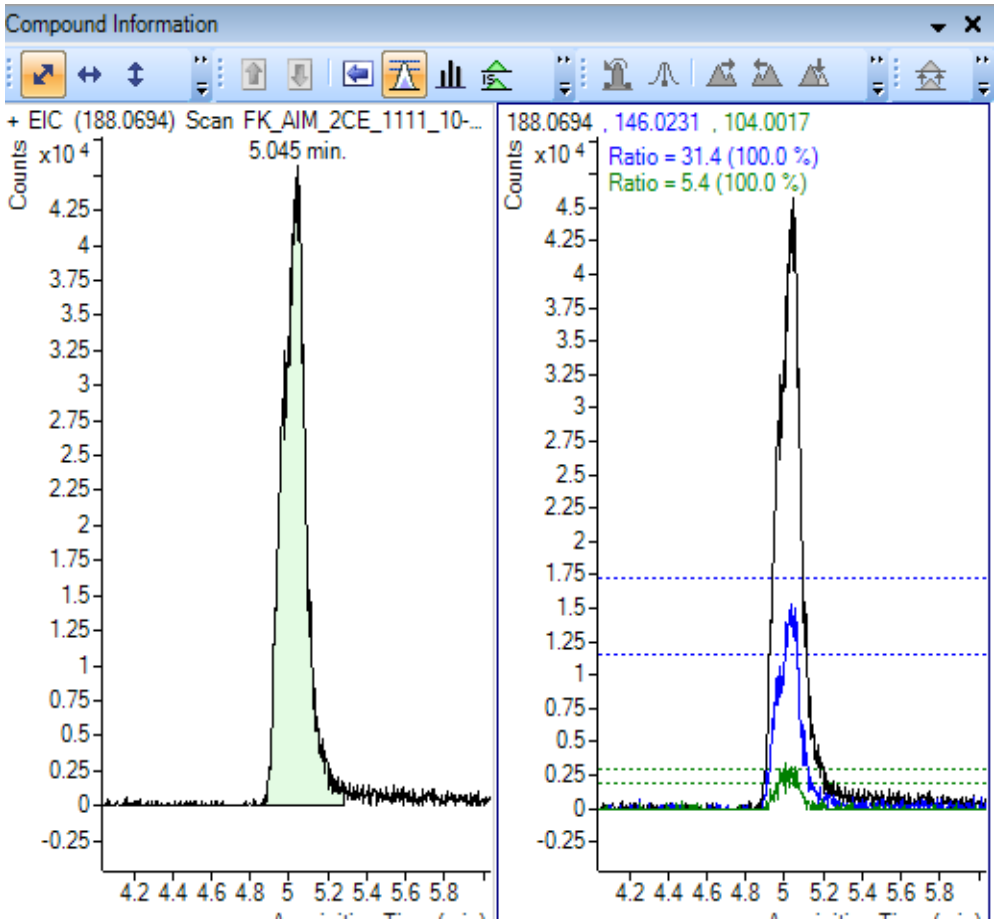
Accurate Mass LC/MS Forensic Toxicology Kit

- -Test Mix: 139 compounds
- -Accurate Mass DB: 9,000+ compounds
- -Accurate Mass MS/MS Library: 3,000+ compounds
- -3 Days of On Site Training with Application Expert
- -LC Columns for RRLC and UHPLC Methods

- ✓ Cannabinoids
- ✓ Hallucinogens
- ✓ Stimulants
- ✓ Benzodiazepines
- ✓ Hypnotics
- ✓ Neuroleptics
- ✓ Barbituates
- ✓ Antidepressants
- ✓ Antiepileptics
- ✓ Opioids

All Ions MS/MS Checks Qualifier Ion Ratios

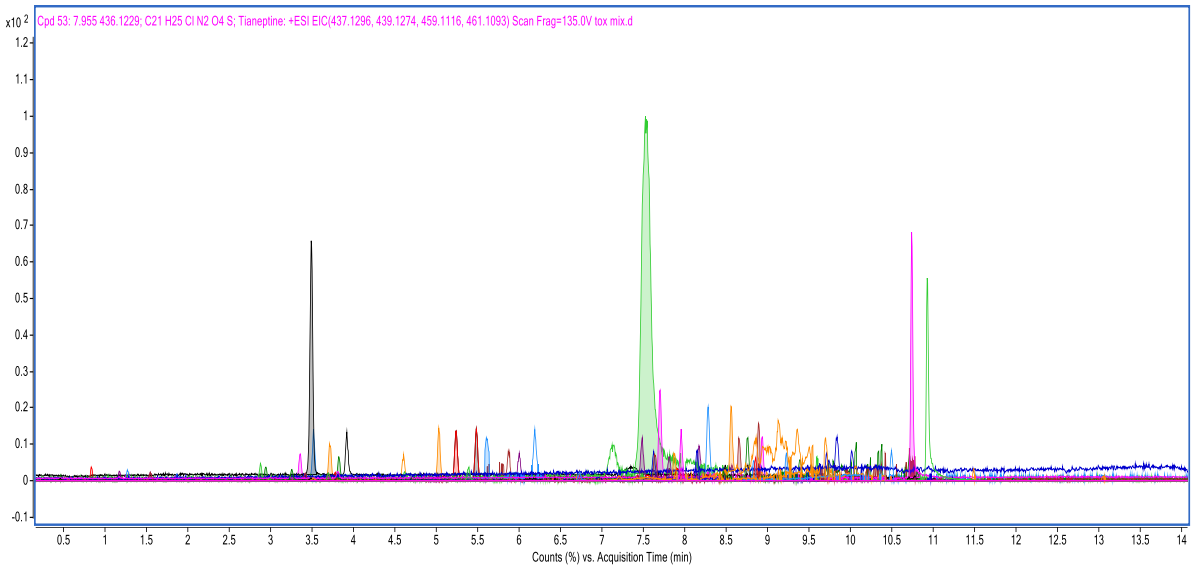
Provides additional confirmation according to point system in addition to library matching

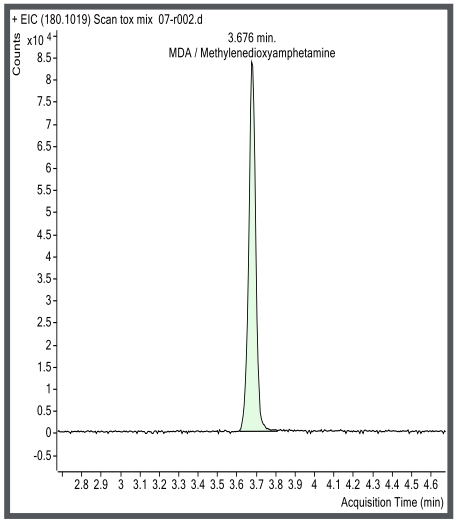


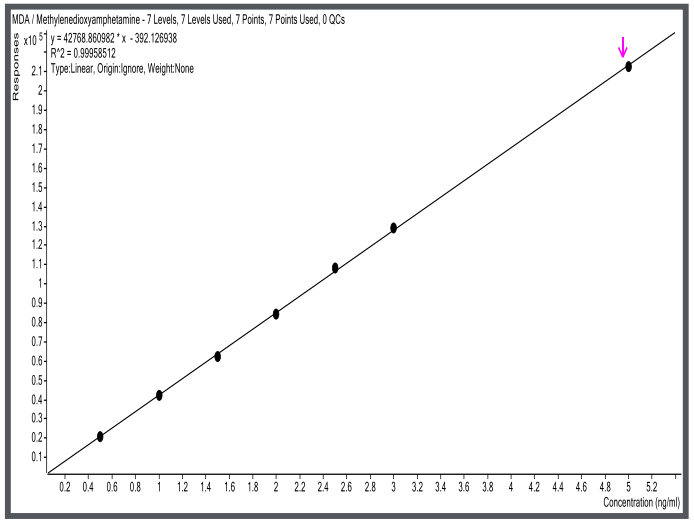
Correct Ratio

Correct Ratio

Screening for Drugs of Abuse in Hemp Oil Matrix







A standard of 96 drugs of abuse was spiked into natural hemp oil without CBD. The sample was then run on the TOF using the All Ions technique.

All of the 96 compounds had calibration curves created with correlation coefficients of 0.995 to 0.999, figure 11 is an example of a curve. The randomly spiked sample was quantitated against this calibration curve. The methodology used has the same mobile phases as the potency assay only a different column.

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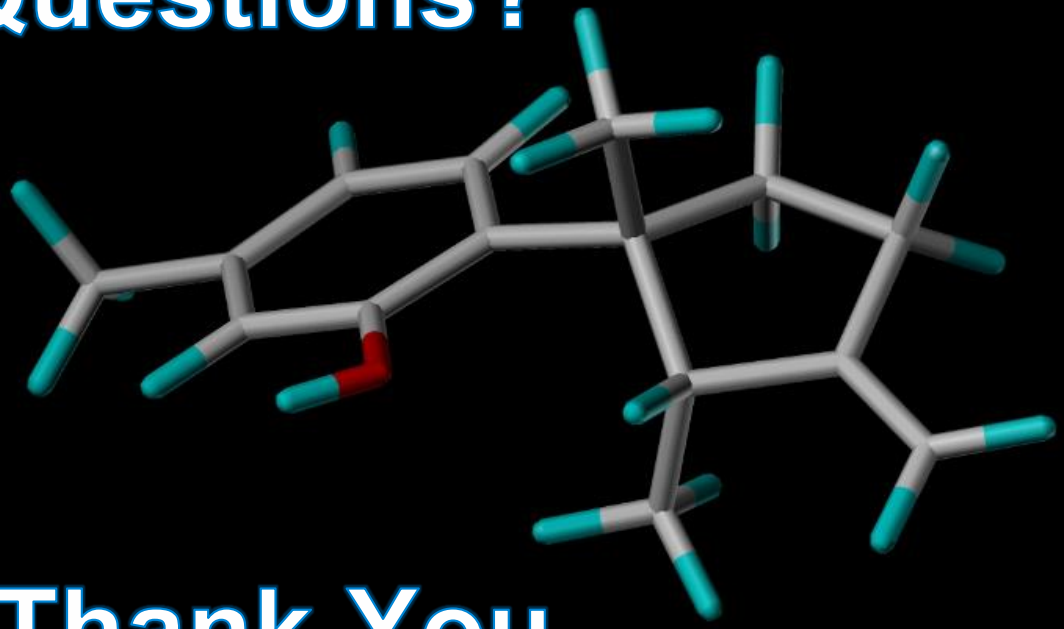
Any Questions?



Thank You

Work by CWC labs, Anthony Macherone, John Palmer, Joni Stevens & Sue D'Antonio

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