Use of Verex® Filter Vials for Cannabis Pesticides Analysis

Zara Jalali, Jenks Presley, Sean Orlowicz, and Bryan Tackett, PhD
Phenomenex Inc., 411 Madrid Ave., Torrance, CA 90501 USA

Overview

Cannabis samples to be analyzed for pesticides can be prepared in a multitude of ways, all of which can impact chromatographic results. Ineffective sample preparation can lead to reduction in column life, reduction in chromatographic separation, and reproducibility. For example, choosing the wrong filtration device could release extractable compounds into the sample that could bind analytes of interest and influence analyte recovery.

Pesticides analysis from cannabis samples by High-Performance Liquid Chromatography-Mass Spectrometry (LC-MS) requires some sample cleanup due to the typically "dirty" matrix. In this application note, cannabis samples were filtered using Verex Filter Vials, with either Regenerated Cellulose (RC) or Nylon (NY) membranes.

Samples were run by LC-MS to determine if there was any performance change. When compared to pesticide samples without a filtration device, profiles remained the same, indicating no adsorption to the membrane nor vial. Area Ratios were also calculated as a measure of performance. The comparison of the samples using either filter vial to samples not using a filter vial showed no significant difference in Area Ratios with differences less than 20 %. This suggests that the use of the Verex Filter Vials did not affect overall performance. The use of Verex Filter Vials would be useful when working with cannabis samples due to their ease of use and improved method robustness.

Sample Preparation

Samples were loaded into either 0.2 µm RC Verex Filter Vials (AR0-F103-12) or 0.2 µm NY Verex Filter Vials (AR0-F107-12) followed by injection onto a Luna Omega 3 µm Polar C18 column.

LC Conditions

Column: Luna™ Omega 3 µm Polar C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4760-E0
Mobile Phase: A: 5 mM Ammonium Formate and 0.1 % Formic Acid in Water
B: 5 mM Ammonium Formate and 0.1 % Formic Acid in Acetonitrile

Gradient:

Time (min)	%B
0	0
3	50
7	70
10	85
12	88
16	100
18	100
18.1	0

Flow Rate: 0.8 mL/min
Injection Volume: 5 µL
Temperature: 40 °C
Instrument: Agilent® 1260 (Binary)
Detection: MS/MS
Detector: SCIEX® 5500 Triple Quad™

Table 1. Pesticide Analyte MS/MS Transitions and Retention Times

Analyte	Precursor Mass (m/z)	Fragment Mass (m/z)	Retention Time (min)
Acephate 1	184.1	143.0	4.8
Acephate 2	184.1	49.0	4.8
Acequinocyl 1	402.2	343.2	18.0
Acequinocyl 2	402.2	189.1	18.0
Acetamiprid 1	223.2	126.1	6.8
Acetamiprid 2	223.2	56.0	6.8
Aldicarb 1	208.1	116.0	7.8
Aldicarb 2	208.1	88.9	8.2
Avermectin B1a 1	890.5	567.4	16.2
Avermectin B1a 2	890.5	305.2	16.2
Azoxystrobin 1	404.1	372.1	10.6
Azoxystrobin 2	404.1	344.0	10.6
Azoxystrobin 3	404.1	172.1	10.6
Bifenazate 1	301.1	198.1	11.1
Bifenazate 2	301.1	170.2	11.1
Bifenthrin 1	440.2	181.1	16.2
Bifenthrin 2	440.2	166.1	16.2
Boscalid 1	343.0	307.0	10.7
Boscalid 2	343.0	140.0	10.7
Captan 1	317.0	264.0	10.1
Captan 2	319.0	266.0	10.1
Captan 3	317.0	236.0	10.1
Carbofuran 1	222.1	123.0	8.6
Carbofuran 2	222.1	165.2	8.6
Chlorantraniliprole 1	483.9	452.9	10.1
Chlorantraniliprole 2	483.9	285.9	10.1
Chlorpyrifos 1	350.0	96.9	14.0
Chlorpyrifos 2	350.0	198.0	14.0
Clofentezine 1	303.0	138.0	12.5
Clofentezine 2	303.0	102.0	12.5
Coumaphos 1	363.0	226.0	12.5
Coumaphos 3	363.0	335.0	12.5
Cyfluthrin 1	451.1	191.0	14.4
Cyfluthrin 2	451.1	434.0	14.4
Cypermethrin 1	433.2	191.0	14.7
Cypermethrin 2	433.2	416.0	14.8
Daminozide 1	161.2	143.1	3.9
Daminozide 2	161.2	44.0	3.9
Diazinon 1	305.1	153.0	12.4
Diazinon 2	305.1	96.9	12.4
Dichlorvos 1	222.6	109.0	8.4
Dichlorvos 2	222.6	127.0	8.4
Dimethoate 1	230.0	199.1	6.8
Dimethoate 2	230.0	125.0	6.8
Dimethomorph I 1	388.0	301.0	10.7
Dimethomorph I 2	388.0	165.0	10.7
Dimethomorph II 1	388.1	301.0	11.0
Dimethomorph II 2	388.1	165.0	11.0
Ethoprophos 1	243.0	131.0	11.8
Ethoprophos 2	243.0	97.0	11.8
Etofenprox 1	394.0	177.3	16.2
Etofenprox 2	394.0	135.1	16.2
Etoxazole 1	360.2	141.0	14.6
Etoxazole 2	360.2	177.2	14.6
Fenhexamid 1	302.0	97.0	11.3
Fenhexamid 2	302.0	141.8	11.3
Fenoxycarb 1	302.2	87.9	11.7
Fenoxycarb 2	302.2	116.0	11.7
Fenpyroximate 1	422.2	366.1	15.2
Fenpyroximate 2	422.2	135.1	15.2
Flonicamid 1	230.0	203.2	5.8
Flonicamid 2	230.0	97.8	5.8
Fludioxonil 1	266.0	229.0	10.7
Fludioxonil 2	266.0	158.0	10.7
Hexythiazox 1	353.1	168.1	14.0
Hexythiazox 2	353.1	228.0	14.0
Imazalil 1	297.2	41.1	9.3
Imazalil 2	297.2	159.1	9.3
Imidacloprid 1	256.1	209.0	6.3
Imidacloprid 2	256.1	175.0	6.3
Kresoxim-methyl 1	314.1	115.9	12.0
Kresoxim-methyl 2	314.1	131.0	12.0
Malathion A 1	331.1	127.1	11.0
Malathion A 2	331.1	285.0	11.0
Metalaxyl 1	280.2	220.0	10.1
Metalaxyl 2	280.2	248.1	10.1
Methiocarb 1	226.1	169.2	10.7
Methiocarb 2	226.2	107.0	10.7
Methomyl 1	163.1	88.1	5.8
Methomyl 2	163.0	105.7	5.8
Mevinphos I 1	225.0	66.7	6.7
Mevinphos I 2	225.0	192.5	6.7
Mevinphos II 1	225.1	66.7	7.4
Mevinphos II 2	225.1	192.5	7.4
Myclobutanil 1	289.1	70.1	11.0
Myclobutanil 2	289.1	125.2	11.0
Naled 1	382.8	127.1	9.9
Naled 2	380.8	127.1	9.9
Oxamyl 1	237.1	72.1	5.5
Oxamyl 2	237.1	90.1	5.5
Paclobutrazol 1	294.1	70.1	10.9
Paclobutrazol 2	294.1	125.0	10.9
Permethrin, trans- 1	408.1	355.1	15.5
Permethrin, trans- 2	408.1	183.1	15.5
Permethrins cis 1	408.2	183.1	15.9
Permethrins cis 2	408.2	355.1	15.9
Phosmet 1	318.0	160.0	10.3
Phosmet 2	318.0	133.1	10.3
Piperonyl butoxide 1	356.2	177.1	14.0
Piperonyl butoxide 2	356.2	119.2	14.0
Prallethrin 1	301.3	133.1	12.9
Prallethrin 2	301.3	105.1	12.9
Propiconazole 1	342.1	159.0	12.4
Propiconazole 2	342.1	69.1	12.4
Propoxure 1	210.1	111.1	8.5
Propoxure 2	210.1	168.1	8.5
Pyrethrins Pyrethrin I 1	329.2	161.0	14.7
Pyrethrins Pyrethrin I 2	329.2	133.0	14.7
Pyridaben 1	365.1	309.0	15.5
Pyridaben 2	365.1	147.0	15.5
Spinetoram.1	748.5	142.2	13.2
Spinetoram.2	748.5	98.1	13.2
Spinosyn A 1	732.4	142.2	12.6
Spinosyn A 2	732.4	98.2	12.6
Spinosyn D 1	746.4	142.2	13.1
Spinosyn D 2	746.4	99.0	13.1
Spiromesifen 1	371.3	273.3	14.7
Spiromesifen 2	371.3	255.2	14.7
Spirotetramat 1	374.2	302.2	11.6
Spirotetramat 2	374.2	216.1	11.6
Spiroxamine 1	298.3	100.2	10.7
Spiroxamine 2	298.3	144.2	10.7
Tebuconazole 1	308.1	70.1	12.1
Tebuconazole 2	308.1	125.0	12.1
Thiacloprid 1	253.2	126.0	7.3
Thiacloprid 2	253.2	186.0	7.3
Thiamethoxam 1	292.0	211.0	5.8
Thiamethoxam 2	292.0	181.0	5.8
Trifloxystrobin 1	409.1	186.1	12.8
Trifloxystrobin 2	409.1	116.1	12.8
d13Pyridaben	378.1	322.2	15.4
d4 Boscalid	347.3	311.0	10.7
d4Thiamethoxam	296.0	215.0	5.8
d6 Trifloxystrobin	415.3	185.7	12.8
d6Dichlorvos	227.0	115.0	8.4
d9 Piperonyl Butoxide	365.5	177.0	13.9
Fipronil 1	435.0	330.0	11.5
Fipronil 2	435.0	250.0	11.5

Figure 1. Chromatograms of Pesticides from Cannabis Samples.

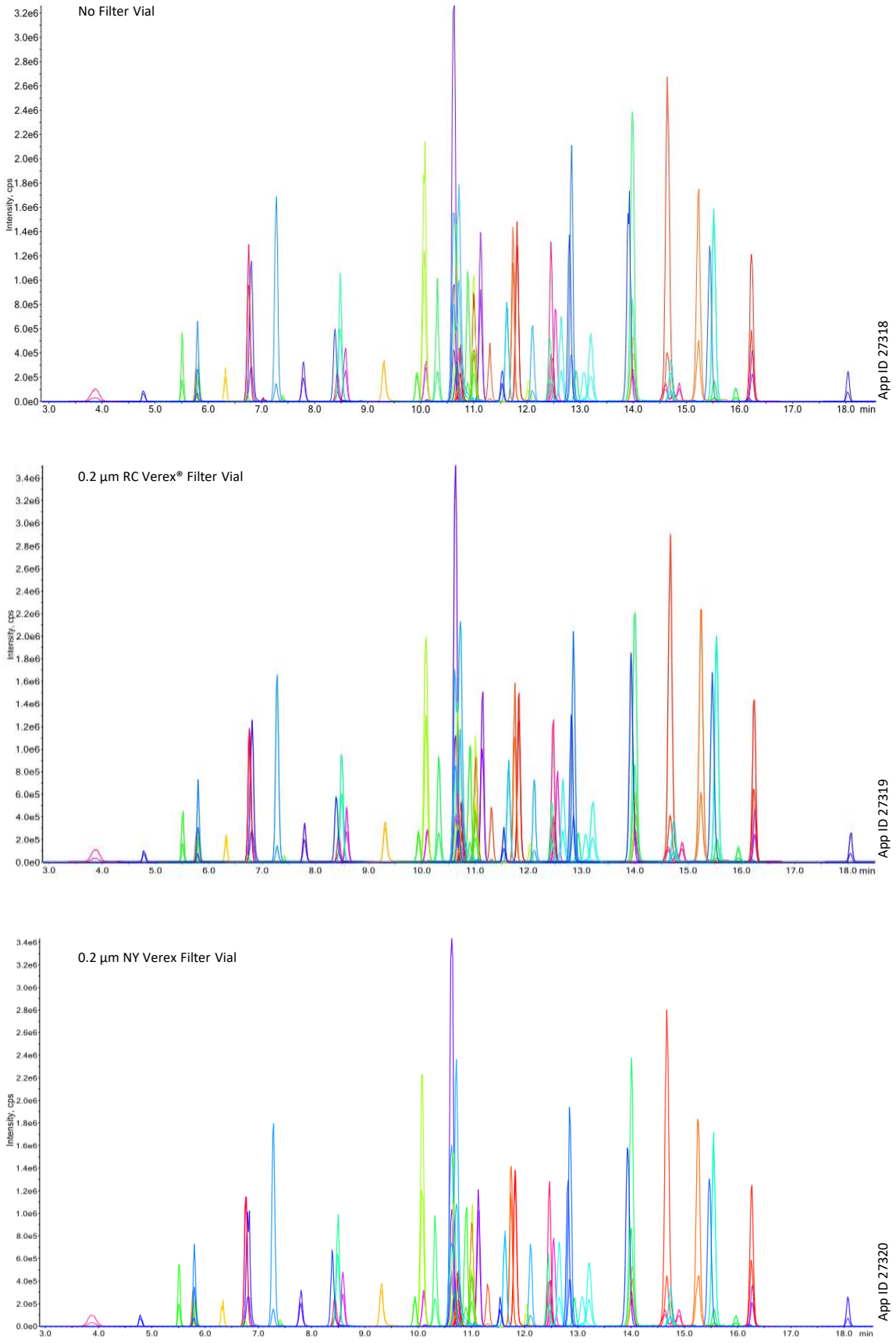


Figure 2. Overlay of Chromatograms of Example Pesticides with No Filter Used (Pink), RC Filter Vial Used (Blue), or NY Filter Vial Used (Red).

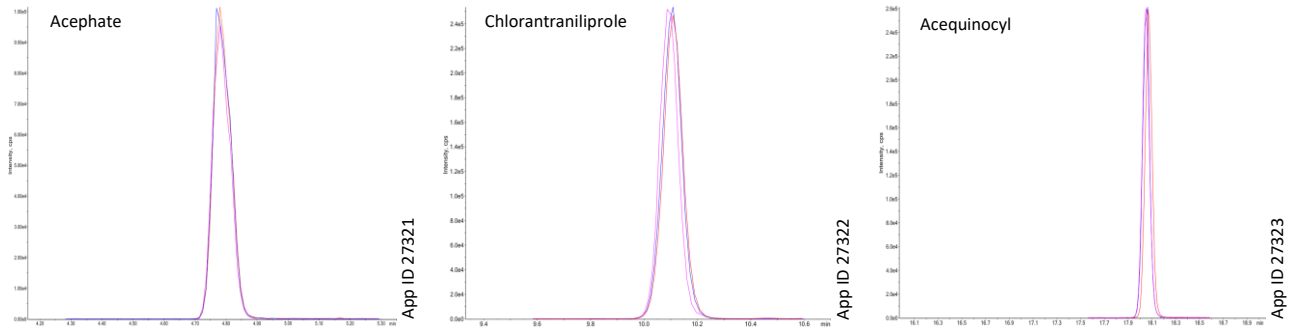


Figure 3. Comparison of Retention Time (%).

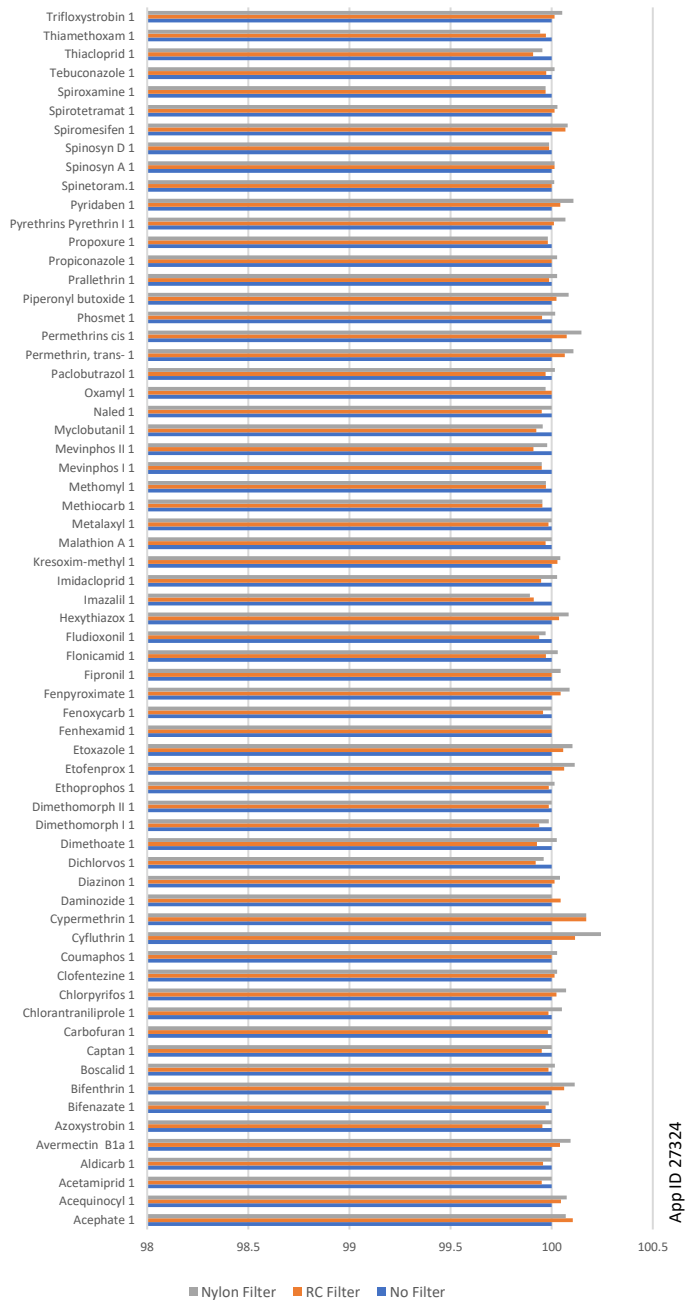
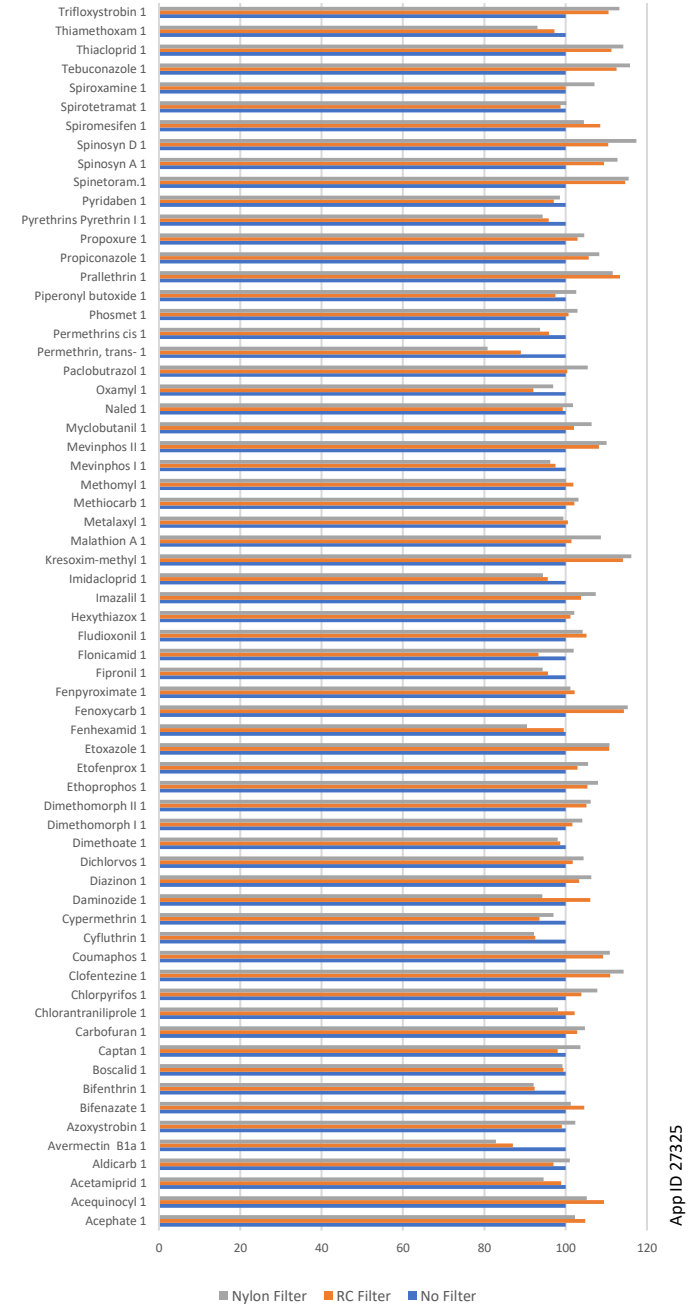


Figure 4. Comparison of Area Ratios (%).



Need a different column size or sample preparation format?

No problem! We have a majority of our available dimensions up on www.phenomenex.com, but if you can't find what you need right away, our super helpful Technical Specialists can guide you to the solution via our online chat portal www.phenomenex.com/Chat.

Australia
t: +61 (0)2-9428-6444
auinfo@phenomenex.com

Austria
t: +43 (0)1-319-1301
anfrage@phenomenex.com

Belgium
t: +32 (0)2 503 4015 (French)
t: +32 (0)2 511 8666 (Dutch)
beinfo@phenomenex.com

Canada
t: +1 (800) 543-3681
info@phenomenex.com

China
t: +86 400-606-8099
cninfo@phenomenex.com

Czech Republic
t: +420 272 017 077
cz-info@phenomenex.com

Denmark
t: +45 4824 8048
nordicinfo@phenomenex.com

Finland
t: +358 (0)9 4789 0063
nordicinfo@phenomenex.com

France
t: +33 (0)1 30 09 21 10
franceinfo@phenomenex.com

Germany
t: +49 (0)6021-58830-0
anfrage@phenomenex.com

Hong Kong
t: +852 6012 8162
hkinfo@phenomenex.com

India
t: +91 (0)40-3012 2400
indiainfo@phenomenex.com

Indonesia
t: +62 21 5019 9707
indoinfo@phenomenex.com

Ireland
t: +353 (0)1 247 5405
eireinfo@phenomenex.com

Italy
t: +39 051 6327511
italiainfo@phenomenex.com

Japan
t: +81 (0) 120-149-262
jpinfo@phenomenex.com

Luxembourg
t: +31 (0)30-2418700
nlinfo@phenomenex.com

Mexico
t: 01-800-844-5226
tecnicomx@phenomenex.com

The Netherlands
t: +31 (0)30-2418700
nlinfo@phenomenex.com

New Zealand
t: +64 (0)9-4780951
nzinfo@phenomenex.com

Norway
t: +47 810 02 005
nordicinfo@phenomenex.com

Poland
t: +48 22 104 21 72
pl-info@phenomenex.com

Portugal
t: +351 221 450 488
ptinfo@phenomenex.com

Singapore
t: +65 6559 4364
sginfo@phenomenex.com

Slovakia
t: +420 272 017 077
sk-info@phenomenex.com

Spain
t: +34 91-413-8613
espinfo@phenomenex.com

Sweden
t: +46 (0)8 611 6950
nordicinfo@phenomenex.com

Switzerland
t: +41 (0)61 692 20 20
swissinfo@phenomenex.com

Taiwan
t: +886 (0) 0801-49-1246
twinfo@phenomenex.com

Thailand
t: +66 (0) 2 566 0287
thaiinfo@phenomenex.com

United Kingdom
t: +44 (0)1625-501367
ukinfo@phenomenex.com

USA
t: +1 (310) 212-0555
www.phenomenex.com/chat

All other countries/regions
Corporate Office USA
t: +1 (310) 212-0555
www.phenomenex.com/chat

www.phenomenex.com

Phenomenex products are available worldwide. For the distributor in your country/region, contact Phenomenex USA, International Department at international@phenomenex.com

Have questions or want more details on implementing this method? We would love to help!
*Visit **www.phenomenex.com/Chat** to get in touch with one of our Technical Specialists*