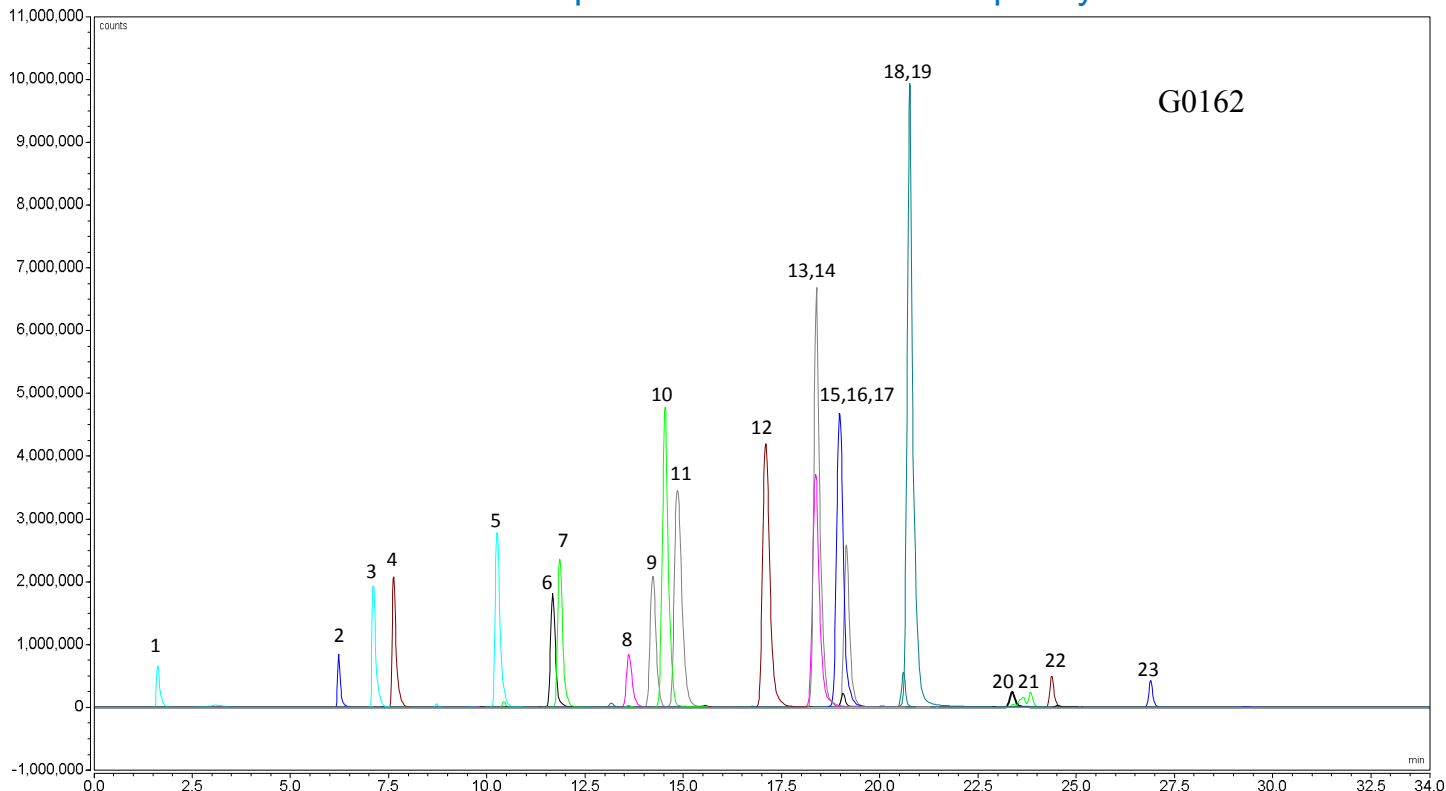


Pesticides Separation on HALO 90Å Biphenyl



TEST CONDITIONS:

Column: HALO 90Å Biphenyl, 2.7 μm , 2.1 x 100 mm
Part Number: 92812-611

A= Water/0.1% formic acid/4 mM ammonium formate

B= Acetonitrile/0.1% formic acid/4 mM ammonium formate

Gradient:

Time (min.)	%B
0.00	0
1.01	15
4.00	35
5.00	62
30.00	100
34.00	100

Flow Rate: 0.2 mL/min

Pressure: 89 bar (initial)

Temperature: 40 °C

Injection Volume: 1 μL

Sample Solvent: acetonitrile

Detection: UV 254 nm

Data Rate: 10 Hz

LC System: Shimadzu Nexera

MS System: Thermo Fisher Orbitrap VelosPro ETD

ESI: +3.8 kV

Scan range: 150-1000 m/z

Scan rate: 1.33 pps

Capillary: 350 °C

Sheath gas: 35

Auxiliary gas: 10

Scan Time: 2 μs scans/50 ms max inject time

Heater Temperature: 150 °C

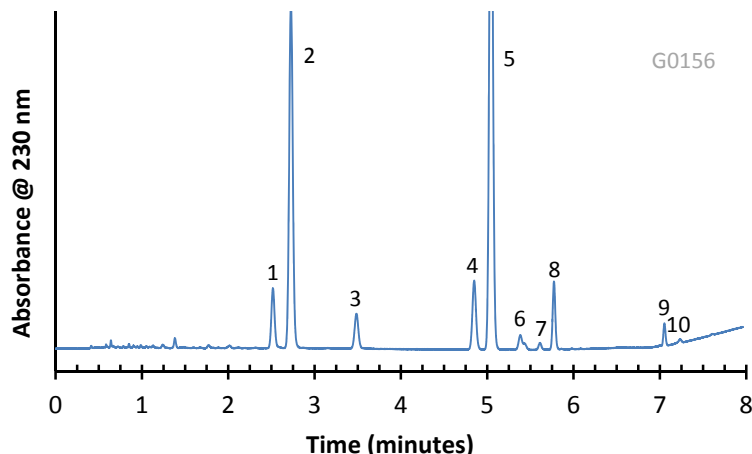
A mixture of pesticides with a wide range of polarities is separated with high efficiency using a HALO 90Å Biphenyl column. Closely-eluting and co-eluting compounds are easily identified using mass spectrometry detection, and quantified using extracted-ion chromatograms (see page 2 for peak identities). Pesticides, such as these, are commonly screened for in medical marijuana samples.

PEAK IDENTITIES:

	Compound	m/z	Retention (min)
1	Daminozide	161.096	1.616
2	Flonicamid	230.000	6.224
3	Thiamethoxam	292.000	7.109
4	Imidacloprid	256.050	7.631
5	Paclobutrazol	294.130	10.256
6	Fenhexamid	302.079	11.678
7	Myclobutanil	289.129	11.849
8	Bifenazate	301.150	13.610
9	Dimethomorph Isomer 1	388.130	14.226
10	Spirotetramat	374.190	14.535
11	Dimethomorph Isomer 2	388.130	14.846
12	Spinosad A	732.480	17.089
13	Spinosad D	746.490	18.363
14	Trifloxystrobin	409.100	18.391
15	Spinetoram	748.520	18.970
16	Pyrethrin II	373.200	19.068
17	Piperonyl butoxide	356.240	19.151
18	Pyrethrin I	329.210	20.594
19	Etoxazole	360.180	20.759
20	Abamectin A	895.500	23.370
21	Cypermethrin	433.110	23.610
22	Bifenthrin	440.160	24.370
23	Acequinocyl	407.230	26.890
observed in negative ion mode	Fludioxonil	247.048	9.763

An important advantage of the HALO 90Å Biphenyl column is that it can be used with 100% aqueous mobile phase without pore dewetting and loss of retention. This is especially useful for very polar pesticides, which are sometimes unretained or poorly retained on other column phases.

Separation of 6 Pyrethrins on HALO AQ-C18, 2.7 µm



PEAK IDENTITIES:

1. Cinerin II
2. Pyrethrin II
3. Jasmolin II
4. Cinerin I
5. Pyrethrin I
6. Unknown
7. Unknown
8. Jasmolin I
9. Unknown
10. Unknown

TEST CONDITIONS:

Column: HALO 90 Å, AQ-C18, 2.7 µm, 3.0 x 100 mm

Part Number: 92813-622

Mobile Phase:

A= 0.02 M sodium phosphate buffer, pH= 3

B= Acetonitrile

Gradient:

Time	%B
0.0	65
2.5	65
5.0	75
6.0	90
8.0	90

Flow Rate: 2.2 mL/min.

Pressure: 245 Bar

Temperature: 30°C

Detection: UV 230 nm, VWD

Injection Volume: 4 µL

Sample Solvent: acetonitrile

Response Time: 0.02 sec.

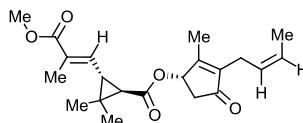
Data rate: 25 Hz

Flow Cell: 2.5 µL semi-micro

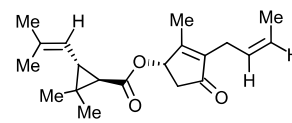
LC System: Shimadzu Prominence UFLC XR

ECV: ~14 µL

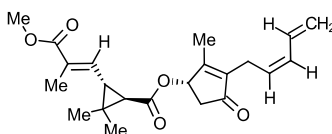
STRUCTURES:



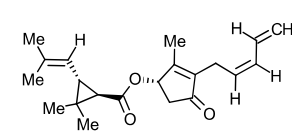
Cinerin II



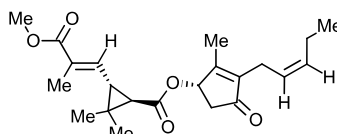
Cinerin I



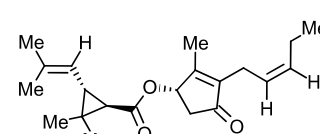
Pyrethrin II



Pyrethrin I



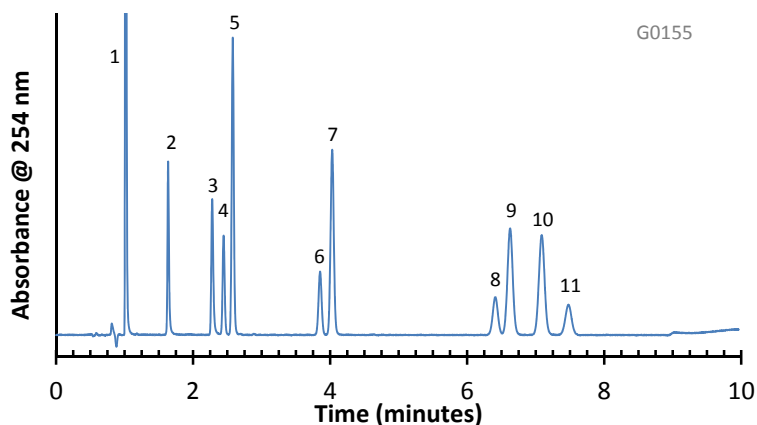
Jasmolin II



Jasmolin I

Pyrethrins are insecticides derived from chrysanthemum flowers. The extracted chemicals can paralyze the nervous systems of insects and lead to death. These naturally occurring pyrethrin isomers can be separated rapidly with good resolution using a HALO AQ-C18 column.

Separation of Triazine Pesticides on HALO AQ-C18, 2.7 µm



PEAK IDENTITIES:

1. Acetone (solvent)
2. Atraton
3. Prometon
4. Simazine
5. Simetryn
6. Atrazine
7. Ametryn
8. Propazine
9. Prometryn
10. Terbutryn
11. Terbutylazine

TEST CONDITIONS:

Column: HALO AQ-C18, 2.7 µm, 4.6 x 150 mm

Part Number: 92814-722

Mobile Phase:

A= 0.02 M sodium phosphate buffer, pH=3.0

B= Acetonitrile

Gradient:

Time	%B
0.0	40
8.0	40
10.0	75

Flow Rate: 1.6 mL/min.

Pressure: 310 bar at start

Temperature: 35°C

Detection: UV 254 nm, VWD

Injection Volume: 2.0 µL

Sample Solvent: 25/75: acetone/acetonitrile

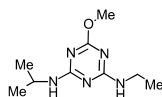
Response Time: 0.02 sec.

Data rate: 25 Hz.

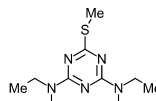
Flow Cell: 2.5 µL semi-micro

LC System: Shimadzu Prominence UFLC XR

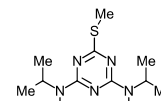
STRUCTURES:



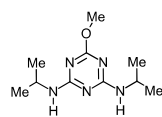
Atraton



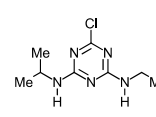
Simetryn



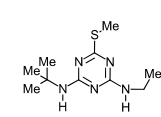
Prometryn



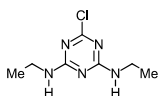
Prometon



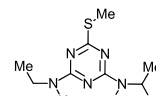
Atrazine



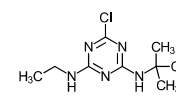
Terbutryn



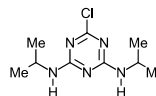
Simazine



Ametryn



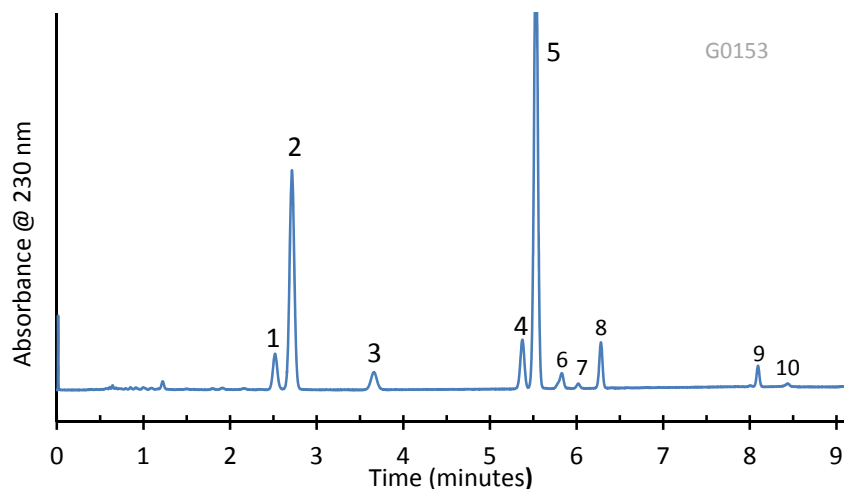
Terbutylazine



Propazine

This mixture of s-triazine herbicides can be readily analyzed using a HALO AQ-C18 column in under 10 minutes.

Separation of 6 Pyrethrins on HALO-5 C18



PEAK IDENTITIES:

1. Cinerin II
2. Pyrethrin II
3. Jasmolin II
4. Cinerin I
5. Pyrethrin I
6. Unknown
7. Unknown
8. Jasmolin I
9. Unknown
10. Unknown

TEST CONDITIONS:

Column: HALO 90 Å, C18, 5 µm, 3.0 x 150 mm

Part Number: 95813-702

Mobile Phase:

A= Water

B= Acetonitrile

Gradient:

Time	%B
0.0	60
3.0	60
5.0	72
7.0	90
9.0	90

Flow Rate: 1.1 mL/min.

Pressure: 170 Bar

Temperature: 30°C

Detection: UV 230 nm, VWD

Injection Volume: 3.0 µL

Sample Solvent: acetonitrile

Response Time: 0.02 sec.

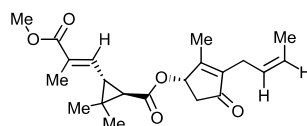
Data rate: 17 Hz

Flow Cell: 2.5 µL semi-micro

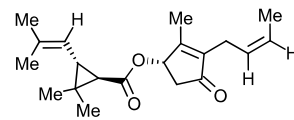
LC System: Shimadzu Prominence UFLC XR

ECV: ~14 µL

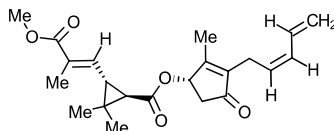
STRUCTURES:



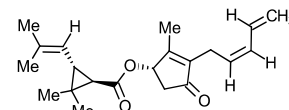
Cinerin II



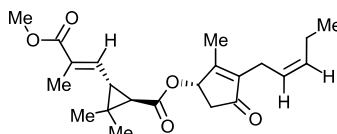
Cinerin I



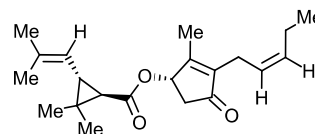
Pyrethrin II



Pyrethrin I



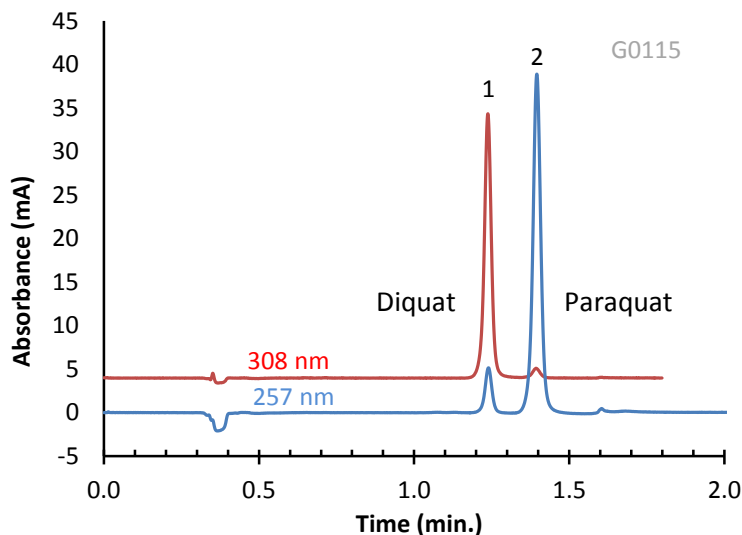
Jasmolin II



Jasmolin I

Pyrethrins are potent insecticides that affect the nervous systems of insects. These six pyrethrin isomers can be separated rapidly using a HALO-5 C18 column with low backpressure and good resolution.

Separation of Nonselective Herbicides on HALO-5 Phenyl-Hexyl



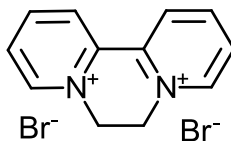
PEAK IDENTITIES:

1. Diquat dibromide
2. Paraquat dichloride

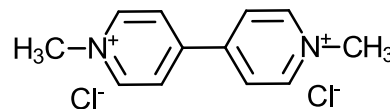
TEST CONDITIONS:

Column: 3.0 x 100 mm, HALO-5 Phenyl-Hexyl
Part Number: 95813-606
Mobile Phase: 13.5 mL orthophosphoric acid,
10.3 mL diethylamine and 3.0 g of hexane-
sulfonic acid, sodium salt in 1 L of water
Flow Rate: 1.0 mL/min.
Pressure: 156 Bar
Temperature: 30°C
Detection: UV 257, 308 nm, VWD
Injection Volume: 40 µL
Sample Solvent: water
Response Time: 0.02 sec.
Flow Cell: 2.5 µL semi-micro
LC System: Shimadzu Prominence UFLC XR
ECV: ~14 µL

STRUCTURES:



Diquat Dibromide

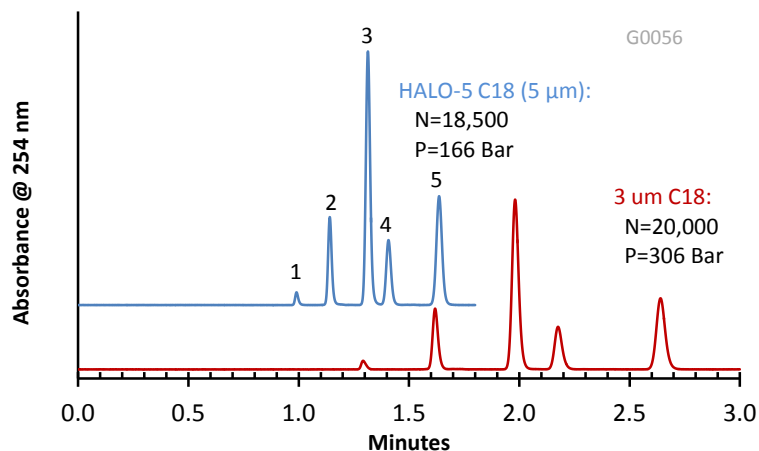


Paraquat Dichloride

The herbicides paraquat and diquat may be separated rapidly in under 2 minutes using a HALO-5 Phenyl-Hexyl HPLC column. Large injection volumes are required to achieve the desired sensitivity. The separation conditions are based on the EPA method 549.2.

HPLC Application Note: 073-PS

Comparison of Separations on HALO-5 Fused-Core C18 and a Competitive 3 Micron Totally Porous C18 Phase



PEAK IDENTITIES:

1. Uracil (to)
2. Fenuron
3. Monuron
4. Fluometuron
5. Diuron

TEST CONDITIONS:

Columns: 4.6 x 150 mm, HALO-5 C18 5 µm (Part Number: 95814-702) and a 4.6 x 150 mm, 3 µm totally porous C18 column

Mobile Phase: 25/75: A/B

A= 0.02 M Potassium phosphate buffer, adj. to pH=3

B= Methanol

Flow Rate: 1.3 mL/min.

Pressure: 166 Bar (HALO-5)

Pressure: 306 Bar (3 µm)

Temperature: 30°C

Detection: UV 254 nm, VWD

Injection Volume: 0.5 µL

Sample Solvent: 50/50: Water/methanol

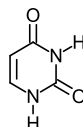
Response Time: 0.02 sec.

Flow Cell: 2.5 µL semi-micro

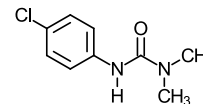
LC System: Shimadzu Prominence UFLC XR

ECV: ~14 µL

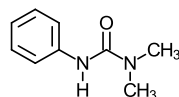
STRUCTURES:



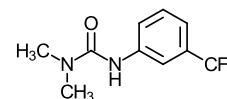
Uracil



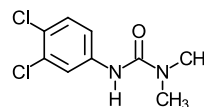
Monuron



Fenuron



Fluometuron

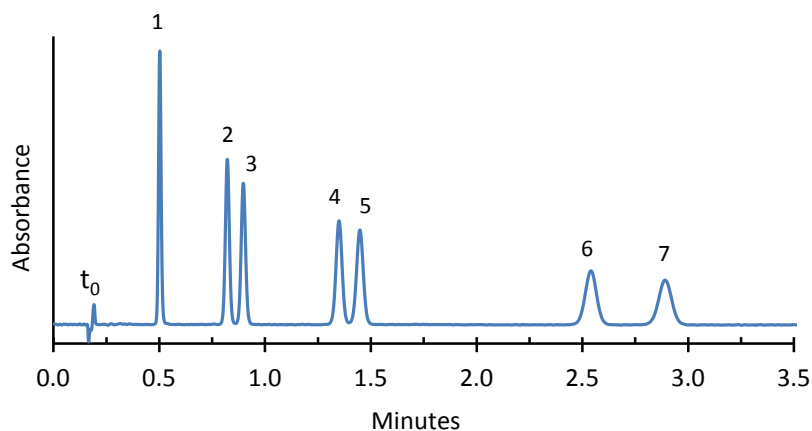


Diuron

The chromatograms pictured show similar column efficiencies between the two packings but with much lower back pressure in the case of the HALO-5, allowing users with lower pressure HPLC instruments to get 3 micron particle performance with the lower pressure requirement of a 5 micron particle.

Application Note: 41-TR

Rapid Separation of Triazine Pesticides on HALO C18 Phase



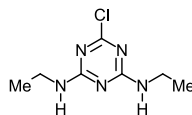
PEAK IDENTITIES:

1. Simazine
2. Atrazine
3. Prometon
4. Ametryn
5. Propazine
6. Prometryn
7. Terbutryn

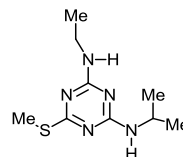
TEST CONDITIONS:

Column: 4.6 x 50 mm, HALO C18
 Part Number: 92814-402
 Mobile Phase: 50/50-A/B
 A= 0.02 M Ammonium formate, adj. to pH=6.0
 B=Acetonitrile
 Flow Rate: 2.5 mL/min.
 Pressure: 270 Bar
 Temperature: 30 °C
 Detection: UV 220 nm, VWD
 Injection Volume: 0.3 µL
 Sample: Supelco Triazine Pesticides Mix-48392
 Sample Solvent: Methanol
 Response Time: 0.02 sec.
 Flow Cell: 2.5 µL semi-micro
 LC System: Shimadzu Prominence UFLC XR
 Extra column volume: ~14 µL

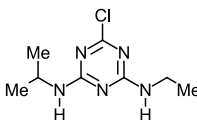
STRUCTURES:



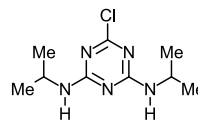
Simazine



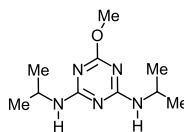
Ametryn



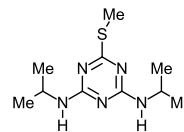
Atrazine



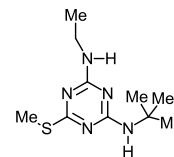
Propazine



Prometon



Prometryn



Terbutryn

This triazine pesticides mixture can be rapidly separated on a HALO Fused-Core C18 column while retaining good peak shape and high column efficiency.