

# HALO<sup>®</sup>

## BIPHENYL

SAY HELLO TO ENHANCED  
RETENTION, SELECTIVITY AND EFFICIENCY.

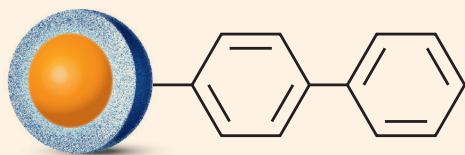




# HALO<sup>®</sup> BIPHENYL

## SELECTIVITY, EFFICIENCY AND RETENTION packed into one powerful new phase

The HALO<sup>®</sup> Biphenyl offers a new perspective on retention mechanisms for polar compounds. With a combination of hydrophobic, aromatic, and polar selectivities, the HALO<sup>®</sup> Biphenyl, joined with the efficiency of robust Fused-Core<sup>®</sup> technology, unlocks powerful separation forces. Experience the difference one phase can make!

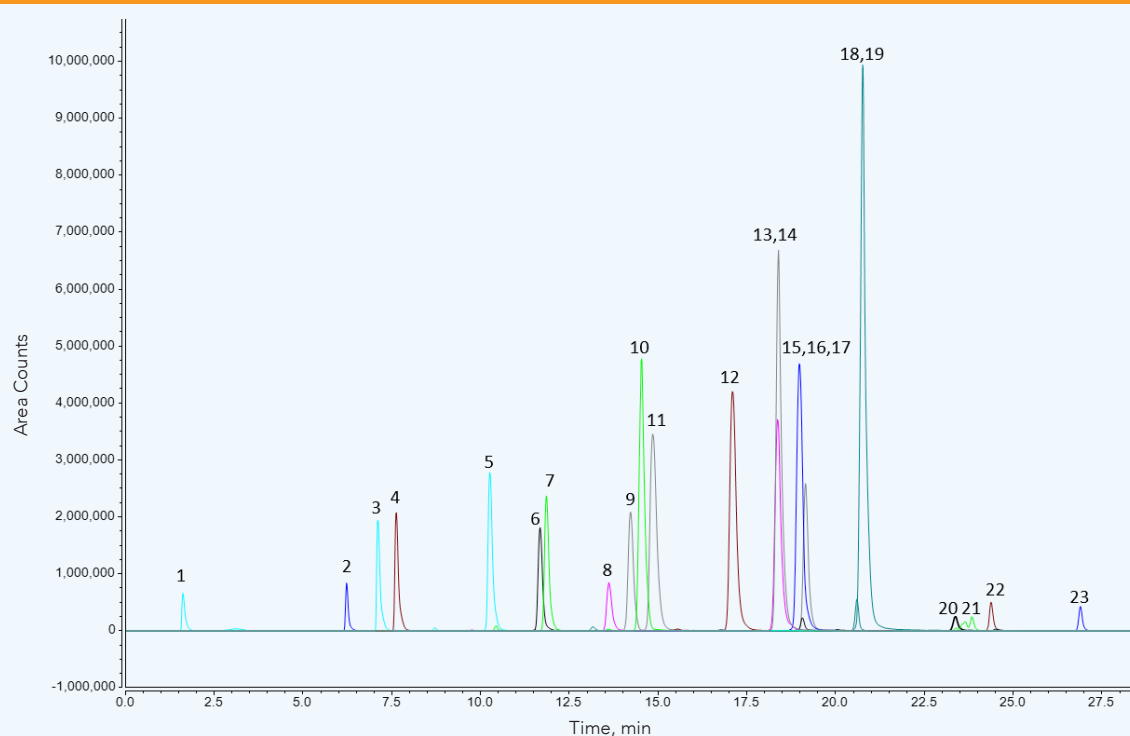


## ADVANTAGES OF THE NEW HALO<sup>®</sup> BIPHENYL

- Enhanced retention, high sensitivity, and increased efficiencies without sacrifice to robustness or reproducibility
- Increased selectivity for challenging polar compounds
- High efficiency resulting in sharp resolved peaks with excellent peak shapes

## CHALLENGING SEPARATIONS REQUESTED

The HALO<sup>®</sup> Biphenyl is ready for the challenge of complex samples. Both polar and non-polar pesticides are well resolved with this commonly required test for cannabis.



### PEAK IDENTITIES

1. Daminozide
2. Flonicamid
3. Thiamethoxam
4. Imidacloprid
5. Paclobutrazol
6. Fenhexamid
7. Myclobutanil
8. Bifenazate
9. Dimethomorph Isomer 1
10. Pirotetramat
11. Dimethomorph Isomer 2
12. Spinosad A
13. Spinosad D
14. Trifloxystrobin
15. Spinetoram
16. Pyrethrin II
17. Piperonyl butoxide
18. Pyrethrin I
19. Etoxazole
20. Abamectin A
21. Cypermethrin
22. Bifenthrin
23. Acequinocyl

### TEST CONDITIONS

Column: HALO 90 Å Biphenyl, 2.7  $\mu$ m, 2.1 x 100 mm

Mobile Phase A: water/0.1% formic acid/4 mM ammonium formate

Mobile Phase B: ACN/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

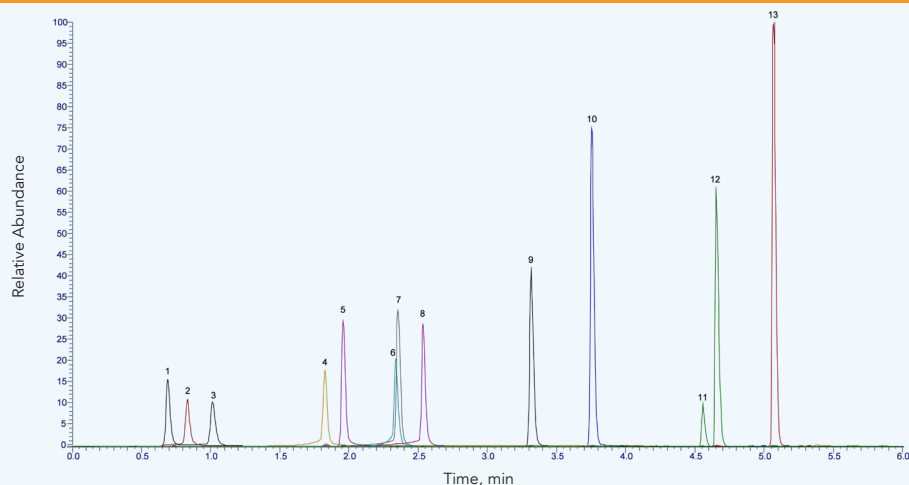
Injection Volume: 1  $\mu$ L

Sample Solvent: Nevada Pesticide Mix

Detection: MS-TOF, ESI+, XIC

## FAST LC-MS SEPARATION OF OPIATES

The 2  $\mu\text{m}$  HALO® Biphenyl is well suited for high throughput analysis of drug panels. In this separation of an opiate pain panel, isobaric species are well separated. Note the resolution between peaks 1 and 3 (morphine, hydromorphone) and peaks 5 and 8 (codeine, hydrocodone).



### PEAK IDENTITIES

1. Morphine
2. Oxycodone
3. Hydromorphone
4. Naloxone
5. Codeine
6. Naltrexone
7. Oxycodone
8. Hydrocodone
9. Cis-Tramadol
10. Meperidine
11. Fentanyl
12. Buprenorphine
13. Methadone

### TEST CONDITIONS

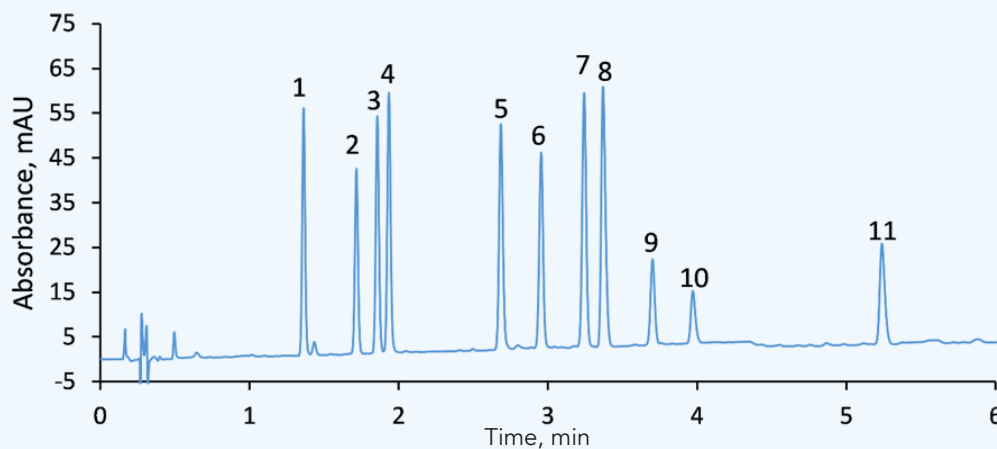
Column: HALO 90 Å Biphenyl, 2  $\mu\text{m}$ , 2.1 x 50 mm  
Mobile Phase A: water/0.1% formic acid  
Mobile Phase B: ACN/0.1% formic acid

Gradient:	Time	% B
	0	10
	2.2	20
	5.0	60
	5.5	60

Flow Rate: 0.4 mL/min  
Temperature: 40 °C  
Injection Volume: 1  $\mu\text{L}$   
Instrument: Shimadzu Nexera X2 coupled to Thermo Q Exactive HF  
Detection: MS

## HIGH RESOLUTION SEPARATION OF STEROIDS

Sharp, fully resolved peaks with excellent peak shape are demonstrated in this high efficiency steroid separation using a 2.7  $\mu\text{m}$  particle size which is amenable to both HPLC and UHPLC conditions.



### PEAK IDENTITIES

1. Estriol
2. Hydrocortisone
3. Prednisone
4. Cortisone
5. Corticosterone
6.  $\beta$ -Estradiol
7. Cortisone Acetate
8. Testosterone
9. 17- $\alpha$ -Hydroxyprogesterone
10. 11-Deoxycorticosterone
11. Progesterone

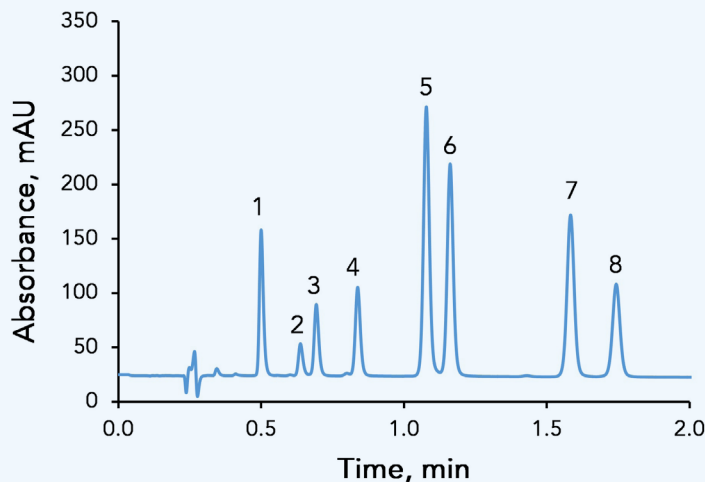
### TEST CONDITIONS

Column: HALO 90 Å Biphenyl, 2.7  $\mu\text{m}$ , 4.6 x 50 mm  
Mobile Phase A: water  
Mobile Phase B: ACN  
Gradient: 20-60% B in 6 minutes  
Flow Rate: 1.85 mL/min

Temperature: 30 °C  
Injection Volume: 4  $\mu\text{L}$   
Instrument: Shimadzu Nexera X2  
Detection: 215 nm, PDA

## HIGH THROUGHPUT SULFONAMIDE SEPARATION

A mixture of sulfonamides is separated on a 2 µm HALO® Biphenyl in less than 2 minutes. These synthetic drugs have several purposes, but are mainly used to treat bacterial infections. HALO® Biphenyl shows increased retention compared to alkyl phases due to the enhanced interactions between the aromatic moieties of the sulfonamides and the biphenyl structure.



### TEST CONDITIONS

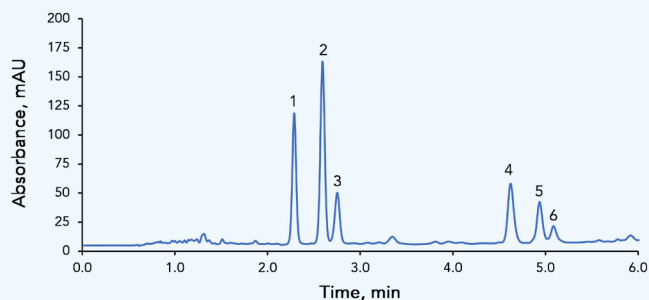
Column: HALO 90 Å Biphenyl, 2 µm, 2.1 x 50 mm  
 Mobile Phase A: water/0.1% formic acid  
 Mobile Phase B: ACN/0.1% formic acid  
 Gradient: 15-20% B in 2 min  
 Flow Rate: 0.5 mL/min  
 Temperature: 40 °C  
 Injection Volume: 1 µL  
 Instrument: Shimadzu Nexera X2  
 Detection: 254 nm, PDA

### PEAK IDENTITIES

1. Sulfacetamide
2. Sulfadiazine
3. Sulfapyridine
4. Sulfamerazine
5. Sulfamethoxazole
6. Sulfamethazine
7. Sulfamethoxyipyridazine
8. Sulfachloropyridazine

## HOP ACIDS ANALYSIS

This separation of alpha and beta acids of hops using a 5 µm HALO® Biphenyl column is ideal for bitterness flavor profiling used by the brewing industry.



### PEAK IDENTITIES

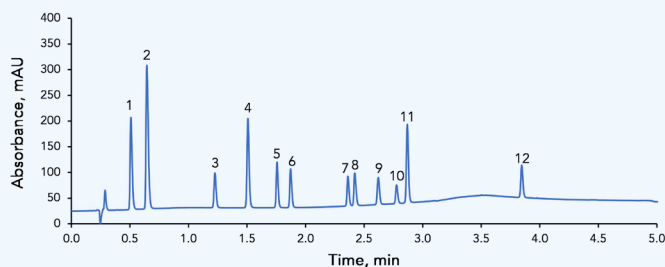
1. Cohumulone
2. Humulone
3. Adhumulone
4. Colupulone
5. Lupulone
6. Adlupulone

### TEST CONDITIONS

Column: HALO 90 Å Biphenyl, 5 µm, 4.6 x 150 mm  
 Mobile Phase A: water/0.1% formic acid  
 Mobile Phase B: ACN/0.1% formic acid  
 Gradient: Hold at 60% B until 3 min; 60-80% B from 3-6 min  
 Flow Rate: 2.0 mL/min  
 Temperature: 30 °C  
 Injection Volume: 5 µL  
 Instrument: Shimadzu Nexera X2  
 Detection: 270 nm, PDA

## RAPID, HIGH RESOLUTION SEPARATION OF BETA BLOCKERS

A mixture of twelve beta blockers is separated on a HALO® 2 µm Biphenyl column with excellent speed and resolution.

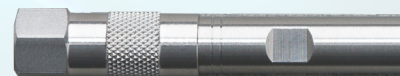


### PEAK IDENTITIES

1. Atenolol
2. Sotalol
3. Nadolol
4. Pindolol
5. Acebutolol
6. Metoprolol
7. Bisoprolol
8. Oxprenolol
9. Labetalol
10. Alprenolol
11. Propranolol
12. Carvedilol

### TEST CONDITIONS

Column: HALO 90 Å Biphenyl, 2 µm, 2.1 x 50 mm  
 Mobile Phase A: water/0.1% formic acid  
 Mobile Phase B: ACN/0.1% formic acid  
 Gradient: 10-50% B in 5 min  
 Flow Rate: 0.5 mL/min  
 Temperature: 35 °C  
 Injection Volume: 1 µL  
 Instrument: Shimadzu Nexera X2  
 Detection: 220 nm, PDA





# SPECIFICATIONS

Ligand: Dimethylbiphenyl  
 Particle Size: 2, 2.7, 5  $\mu\text{m}$   
 Pore Size: 90 Å

USP Designation: L11  
 Carbon Load: 6.7, 7.0, 5.5 %  
 Surface Area: 120, 135, 90  $\text{m}^2/\text{g}$

Endcapped: Yes  
 Low pH Limit /Max T: 2/60°C  
 High pH Limit/Max T: 9/40°C

## PART NUMBERS

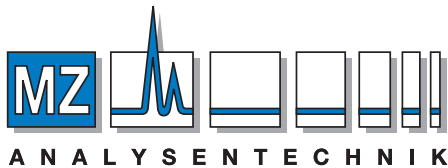
ANALYTICAL COLUMNS				
ID	Length	2 $\mu\text{m}$	2.7 $\mu\text{m}$	5 $\mu\text{m}$
2.1 mm	20 mm	91812-211	92812-211	95812-211
2.1 mm	30 mm	91812-311	92812-311	95812-311
2.1 mm	50 mm	91812-411	92812-411	95812-411
2.1 mm	75 mm	91812-511	92812-511	95812-511
2.1 mm	100 mm	91812-611	92812-611	95812-611
2.1 mm	150 mm	91812-711	92812-711	95812-711
2.1 mm	250 mm	91812-911	92812-911	95812-911
3.0 mm	20 mm	91813-211	92813-211	95813-211
3.0 mm	30 mm	91813-311	92813-311	95813-311
3.0 mm	50 mm	91813-411	92813-411	95813-411
3.0 mm	75 mm	91813-511	92813-511	95813-511
3.0 mm	100 mm	91813-611	92813-611	95813-611
3.0 mm	150 mm	91813-711	92813-711	95813-711
3.0 mm	250 mm	91813-911	92813-911	95813-911
4.6 mm	20 mm		92814-211	95814-211
4.6 mm	30 mm		92814-311	95814-311
4.6 mm	50 mm		92814-411	95814-411
4.6 mm	75 mm		92814-511	95814-511
4.6 mm	100 mm		92814-611	95814-611
4.6 mm	150 mm		92814-711	95814-711
4.6 mm	250 mm		92814-911	95814-911
10.0 mm	50 mm		92810-411	95810-411
10.0 mm	75 mm		92810-511	95810-511
10.0 mm	100 mm		92810-611	95810-611
10.0 mm	150 mm		92810-711	95810-711

CAPILLARY COLUMNS			
ID	Length	2.7 $\mu\text{m}$	5 $\mu\text{m}$
0.075 mm	50 mm	98219-411	98519-411
0.075 mm	100 mm	98219-611	98519-611
0.075 mm	150 mm	98219-711	98519-711
0.1 mm	50 mm	98218-411	98518-411
0.1 mm	100 mm	98218-611	98518-611
0.1 mm	150 mm	98218-711	98518-711
0.2 mm	50 mm	98217-411	98517-411
0.2 mm	100 mm	98217-611	98517-611
0.2 mm	150 mm	98217-711	98517-711
0.3 mm	50 mm	98216-411	98516-411
0.3 mm	100 mm	98216-611	98516-611
0.3 mm	150 mm	98216-711	98516-711
0.5 mm	50 mm	98215-411	98515-411
0.5 mm	100 mm	98215-611	98515-611
0.5 mm	150 mm	98215-711	98515-711
1.0 mm	30 mm	92811-311	95811-311
1.0 mm	50 mm	92811-411	95811-411
1.0 mm	75 mm	92811-511	95811-511
1.0 mm	100 mm	92811-611	95811-611
1.0 mm	150 mm	92811-711	95811-711
GUARD COLUMNS (3 PK)			
Dimensions: ID x Length (in mm)	2 $\mu\text{m}$	2.7 $\mu\text{m}$	5 $\mu\text{m}$
2.1 x 5	91812-111	92812-111	95812-111
3.0 x 5	91813-111	92813-111	95813-111
4.6 x 5		92814-111	95814-111
Guard Column Holder		92814-111	

**INNOVATION YOU CAN TRUST – PERFORMANCE YOU CAN RELY ON**



# HALO®



**AUTHORIZED DISTRIBUTOR**

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