



# REZEX™

Carbohydrate and Organic Acid LC

## Carbohydrate and Organic Acid Separations

*Long column lifetimes.  
Accurate, reproducible analysis.*



Food and Beverages • Bioethanol • Drug Formulation • Quality Control • Excipient Analysis

# Trust Rezex™ For Excellent Resolution and Reproducibility

Phenomenex Rezex HPLC columns are guaranteed to give you the performance you need. From drug formulation and excipient analysis to quality control testing of finished food products, Rezex columns consistently provide accurate and reproducible results.



*“ I have been using Phenomenex Rezex ...for sugar quantitation in the last few years, we are very happy with the resolution of this column, plus a short running time. ”*

- Global Leader, Food & Beverage Ingredient Production

Try Rezex Risk Free! Rezex is a guaranteed alternative to:

- Bio-Rad® Aminex®
- Waters® Sugar-Pak™
- Supelco® SUPELCOGEL™
- Transgenomic® CARBOSep™
- Sepax® Carbomix®

**BE-HAPPY™**  
GUARANTEE

Your happiness is our mission. Take 45 days to try our products. If you are not happy, we'll make it right.

[www.phenomenex.com/behappy](http://www.phenomenex.com/behappy)

# Experience the Rezex™ Performance Advantage

<b>Broad Range of Phases to Perfectly Suit Your Application Needs</b> .....	2
<b>Column Selection</b> – Variety Gives You the Power of Optimization.....	3
<b>See the Difference!</b> The Rezex Performance Advantage	
Sharper Peak Shape = Easy & Accurate Quantitation .....	4
Lower Backpressure = Longer Column Lifetimes & Faster Run Time Capability .....	5
Higher Efficiency = Baseline Separation of Critical Sample Components .....	5
<b>The Proof is in the Performance</b> – Select Applications	
Food and Beverages.....	6
Fermentation / Bioethanol.....	6
Carbohydrates / Saccharides.....	7–8
Alcohols.....	8
Other Applications .....	9
<b>Specifications and Operating Recommendations</b> .....	10
<b>Phenex™ Syringe Filters</b> .....	11
<b>Verex™ Filter Vials</b> .....	12
<b>Ordering Information</b> .....	13



# Broad Range Of Phases To Perfectly Suit Your Application Needs

Rezex™ columns achieve separations based on multiple modes of interaction including ion-exchange, ion-exclusion, size exclusion, reversed phase, and partition. In many cases, this allows for separation of multiple compound classes with one column. The 8 % cross-linked materials exhibit excellent strength and durability while maintaining low system backpressures not typical with highly cross-linked resins. The 4 % cross-linked silver and sodium phases have a larger effective pore volume and are ideal for larger starches, such as oligosaccharides.

Table 1

Cross Referencing Guide

Rezex	Description	Applications	Bio-Rad® Aminex®	Supelco® SUPELCOGEL™	Waters® Sugar-Pak™	Transgenomic® CARBOSep™	Sepax® Carbomix®
<b>RCM-Monosaccharide</b> (L19 packing)*	8 % cross-linked <b>CALCIUM</b>	– Monosaccharides and sugar alcohols, including sorbitol and mannitol from sweeteners and corn and cane sugars – Class separation of di-, tri-, and tetra- saccharides	HPX-87C 125-0095	SUPELCOGEL Ca	Sugar-Pak 1	CARBOSep CHO-820	Carbomix Ca
<b>RHM-Monosaccharide</b> (L17 packing)*	8 % cross-linked <b>HYDROGEN</b>	– Monosaccharides in combination with organic acids, fatty acids, alcohols, ketones, neutral compounds, or inorganic salts	HPX-87H 125-0140	SUPELCOGEL C-610H & H	N/A	ICSep ION-300	Carbomix H
<b>RAM-Carbohydrate</b>	8 % cross-linked <b>SILVER</b>	– Selectivity complementary to other Rezex column types	N/A	N/A	N/A	—	—
<b>RSO-Oligosaccharide</b>	4 % cross-linked <b>SILVER</b>	– High resolution of oligosaccharides up to 18 degrees of polymerization (Dp)	HPX-42A 125-0097	SUPELCOGEL AG1 & AG2	N/A	—	—
<b>RNO-Oligosaccharide</b>	4 % cross-linked <b>SODIUM</b>	– High resolution of oligosaccharides	N/A	N/A	N/A	CARBOSep COREGEL-87N	—
<b>RPM-Monosaccharide</b> (L34 packing)*	8 % cross-linked <b>LEAD</b>	– 100 x 7.8 mm dimensions available for sugar alcohol analysis according to the USP procedure – Monosaccharides and sugar alcohol analysis – Cellobiose, glucose, xylose, arabinose, and mannose and other cellulose products	HPX-87P 125-0098	SUPELCOGEL Pb	N/A	CARBOSep COREGEL-87P	Carbomix Pb
<b>RNM-Carbohydrate</b> (L58 packing)*	8 % cross-linked <b>SODIUM</b>	– Analysis of mono-, di-, and tri- saccharides – For matrices which contain high concentration of inorganic sodium (i.e. molasses)	HPX-87N 125-0143	N/A	N/A	—	Carbomix Na
<b>ROA-Organic Acid</b> (L22 packing)*	8 % cross-linked <b>HYDROGEN</b>	– Organic acids alone – Organic acids in combination with carbohydrates, alcohols, fatty acids, or neutral compounds – Ethanol, acetic acid, glycerol, and standard alcohol mixtures – Amino sugars	HPX-87H 125-0140	SUPELCOGEL C-610H & H	N/A	—	—
<b>RFQ-Fast Acid</b>	8 % cross-linked <b>HYDROGEN</b>	– Rapid screening of fruit quality – Ethanol, acetic acid, glycerol and standard alcohol mixtures	Fast Acid 125-0100	N/A	N/A	—	—
<b>RKP-Potassium</b>	8 % cross-linked <b>POTASSIUM</b>	– Analysis of glyphosate	HPX-87K 125-0142	SUPELCOGEL K	N/A	CARBOSep COREGEL-87K	Carbomix K
<b>RCU-USP Sugar Alcohols</b> (L19 packing)*	8 % cross-linked <b>CALCIUM</b>	– Sugar analysis according to the USP procedures on a 250 x 4.0 mm dimension	Sugar Alcohols 125-0094	N/A	N/A	—	—

\* United States Pharmacopeia (USP)



# Column Selection – Variety Gives You The Power Of Optimization

Rezex™ columns utilize different ligands. Selecting the right column will allow you to achieve the best resolution for your peaks of interest.

## Column Selection Guidelines:

1. Application examples (Table 1)
2. Cross referencing guide (Table 1)
3. Retention time chart (Table 2)
4. Our support staff – Knowledgeable consultants who can provide excellent recommendations on applications
5. Application library available at [www.phenomenex.com/rezex](http://www.phenomenex.com/rezex)

## Retention Times For Some Carbohydrates And Sugar Alcohols

Still not sure what phase to choose? It is important to ensure that you get adequate resolution between your peaks of interest. The retention time chart below gives the retention times for common carbohydrates and sugar alcohols on the most popular Rezex phases.

Table 2

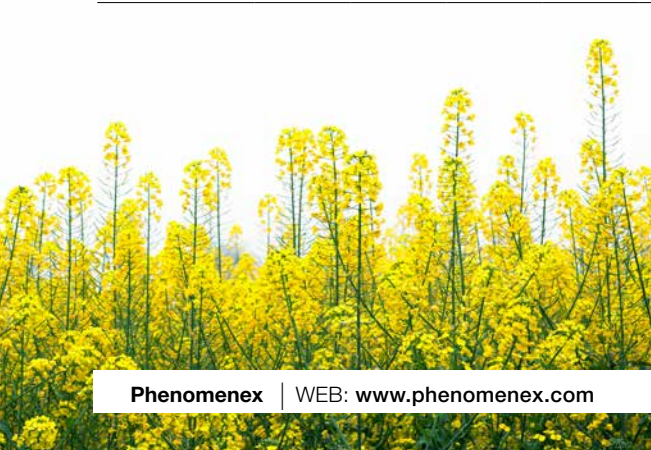
Counter Ion Analyte	RAM Ag <sup>+</sup>	RCM Ca <sup>+2</sup>	RNM Na <sup>+</sup>	RHM H <sup>+</sup>	RPM Pb <sup>2+</sup>
Adonitol (Ribitol)	11.54	14.93	11.10	11.11	20.15
D-Altrose	11.95	12.71	11.45	10.21	15.82
D-(-)-Arabinose	13.01	13.56	12.65	11.24	16.47
D-(+)-Cellobiose	8.86	8.60	8.49	8.02	11.00
D-(+)-Digitoxose	11.90	13.82	11.39	12.59	15.32
Dulcitol	11.64	21.61	11.10	10.71	33.25
Meso-Erythritol	12.31	15.49	11.78	12.14	19.82
D-(-)-Fructose	12.05	13.65	11.76	10.31	17.71
L-(-)-Fucose	12.75	13.19	12.30	11.65	16.19
D-(+)-Galactose	11.87	11.73	11.47	10.19	14.94
Gentiobiose	8.70	8.40	8.40	7.87	10.53
D-(+)-Glucose	11.04	10.37	10.71	9.62	12.92
Inositol	12.59	13.35	12.14	9.98	18.87
Isomaltose	9.11	8.74	8.76	8.02	11.28
Lactose	9.27	9.03	8.78	8.32	11.89
Lactulose	9.75	10.32	9.23	8.57	13.95
D- Lyxose	12.41	14.06	11.98	10.68	16.66
D- Maltose	9.16	8.81	8.75	8.18	11.59
Maltotriose	8.27	8.10	7.94	7.51	11.02
Maltulose	9.25	9.47	8.82	8.27	12.40

Counter Ion Analyte	RAM Ag <sup>+</sup>	RCM Ca <sup>+2</sup>	RNM Na <sup>+</sup>	RHM H <sup>+</sup>	RPM Pb <sup>2+</sup>
D- Mannitol	11.36	17.82	10.80	10.59	24.90
D-(+)-Mannose	12.04	12.04	11.54	10.16	16.39
Melibiose	9.26	9.04	8.82	8.14	11.97
D-(+)-Melezitose	8.00	7.93	7.66	7.54*	9.94
D-(+)-Raffinose	8.10	8.16	7.76	7.88*	10.28
L-(+)-Rhamnose	11.50	12.18	11.00	10.90	14.47
D-(-)-Ribose	14.59	23.38	14.34	11.42	33.48
Salicin	18.51	18.58	17.36	14.98	26.81
D-Sorbitol	11.91	22.45	11.39	10.83	35.97
Stachyose	7.60	7.59	7.30	7.27	9.72
Sucrose	9.03	8.71	8.65	9.24*	11.00
Trehalose	8.91	8.72	8.49	8.32	11.01
Xylitol	12.69	22.01	12.16	11.78	32.38
D-(+)-Xylose	12.06	11.62	11.68	10.24	13.84

### Conditions

Dimensions: 300 x 7.8 mm  
 Mobile Phase: Water (degassed)  
 Flow Rate: 0.6 mL/min  
 Detection: RI @ 40 °C  
 Temperature: 80 °C

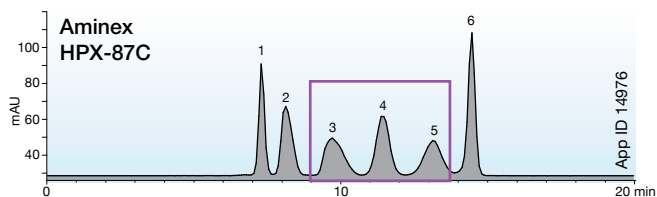
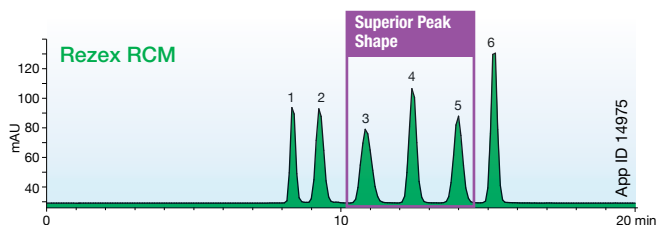
\* Partial hydrolysis results.



# Phenomenex® Rezex™ vs. Bio-Rad® Aminex®

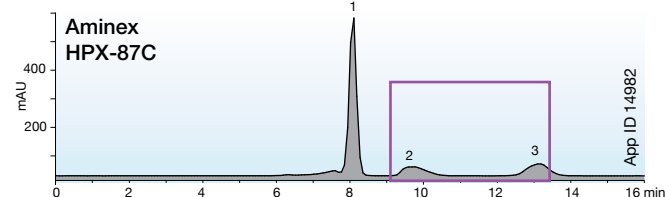
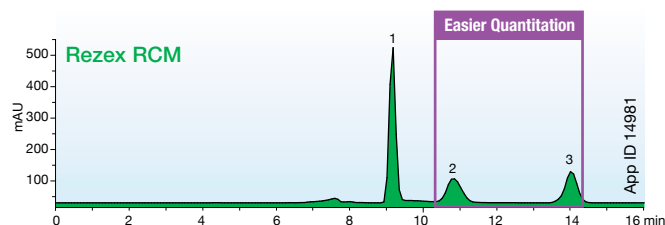
Sharper Peak Shape = Easy & Accurate Quantitation

## ► Saccharides



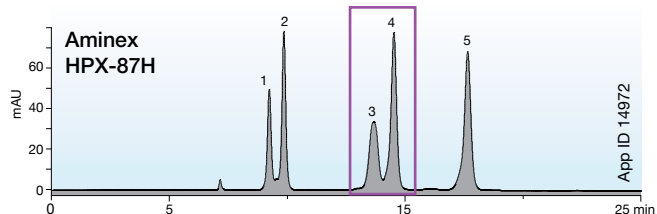
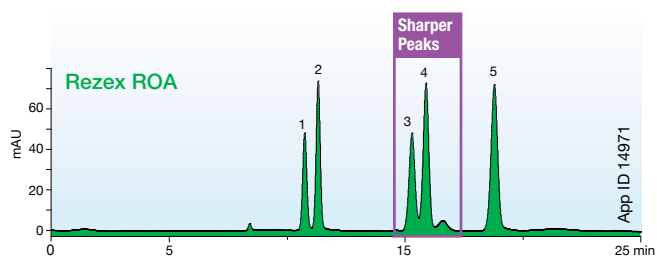
**Columns:** Rezex RCM-Monosaccharide  
Aminex HPX-87C  
**Dimensions:** 300 x 7.8 mm  
**Mobile Phase:** Water  
**Recommended Guard Column:** 03B-0130-K0  
**Recommended Guard Cartridge\*:** AJ0-4493  
**Flow Rate:** 0.6 mL/min  
**Detection:** ELSD  
**Temperature:** 80 °C  
**Sample:** 1. Melezitose 4. Mannose  
2. Maltose 5. Fructose  
3. Glucose 6. Ribitol

## ► Orange Juice



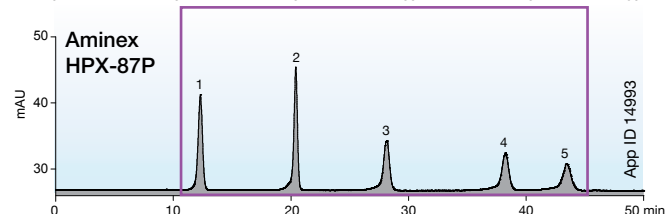
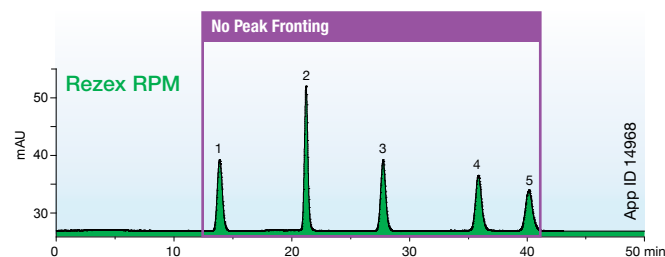
**Columns:** Rezex RCM-Monosaccharide  
Aminex HPX-87C  
**Dimensions:** 300 x 7.8 mm  
**Mobile Phase:** Water  
**Recommended Guard Column:** 03B-0130-K0  
**Recommended Guard Cartridge\*:** AJ0-4493  
**Flow Rate:** 0.6 mL/min  
**Detection:** ELSD  
**Temperature:** 80 °C  
**Sample:** 1. Sucrose  
2. Glucose  
3. Fructose

## ► Organic Acids in Wine



**Columns:** Rezex ROA-Organic Acid  
Aminex HPX-87H  
**Dimensions:** 300 x 7.8 mm  
**Mobile Phase:** 0.005 N H<sub>2</sub>SO<sub>4</sub>  
**Recommended Guard Column:** 03B-0138-K0  
**Recommended Guard Cartridge\*:** AJ0-4490  
**Flow Rate:** 0.5 mL/min  
**Detection:** UV @ 210 nm  
**Temperature:** 40 °C  
**Sample:** 1. Citric acid 4. Lactic acid  
2. Tartaric acid 5. Acetic acid  
3. Succinic acid

## ► Sugar Alcohols



**Columns:** Rezex RPM-Monosaccharide  
Aminex HPX-87P  
**Dimensions:** 300 x 7.8 mm  
**Mobile Phase:** Water  
**Recommended Guard Column:** 03B-0135-K0  
**Recommended Guard Cartridge\*:** AJ0-4492  
**Flow Rate:** 0.6 mL/min  
**Detection:** ELSD  
**Temperature:** 80 °C  
**Sample:** 1. Glucose 4. Xylitol  
2. Erythritol 5. Sorbitol  
3. Mannitol

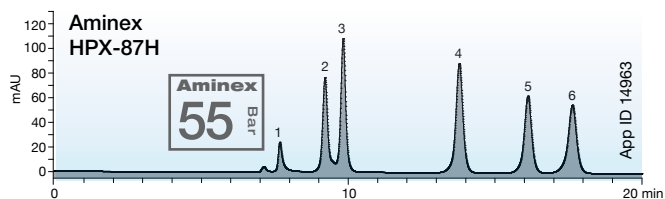
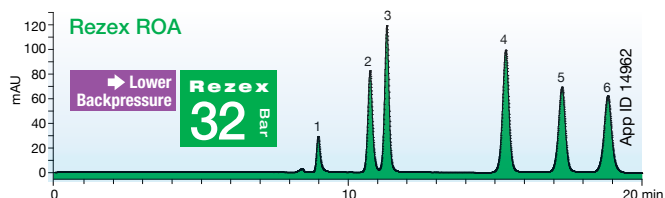
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\* SecurityGuard Analytical Cartridges require universal holder Part No.: KJ0-4282

# Phenomenex® Rezex™ vs. Bio-Rad® Aminex®

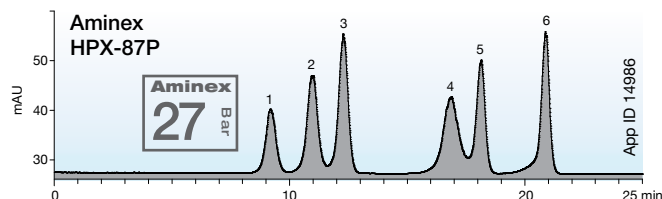
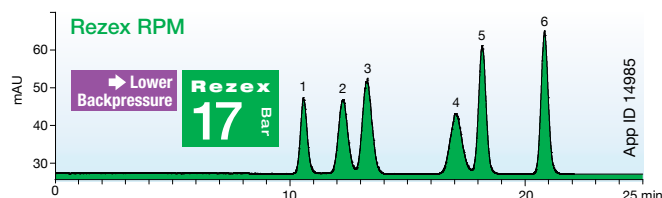
Lower Backpressure = Longer Column Lifetimes and Faster Run Time Capability

## ▶ Aliphatic Acids



**Columns:** Rezex ROA-Organic Acid  
Aminex HPX-87H  
**Dimensions:** 300 x 7.8 mm  
**Mobile Phase:** 0.005 N H<sub>2</sub>SO<sub>4</sub>  
**Recommended Guard Column:** 03B-0138-K0  
**Recommended Guard Cartridge\*:** AJ0-4490  
**Flow Rate:** 0.5 mL/min  
**Detection:** UV @ 210 nm  
**Temperature:** 40 °C  
**Sample:** 1. Oxalic acid 4. Succinic acid  
2. Citric acid 5. Formic acid  
3. Tartaric acid 6. Acetic acid

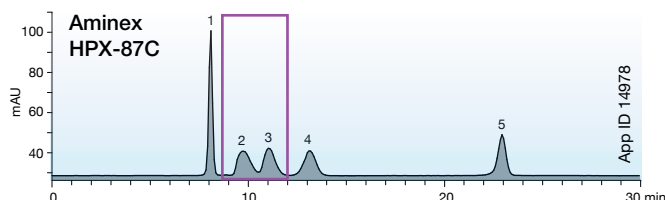
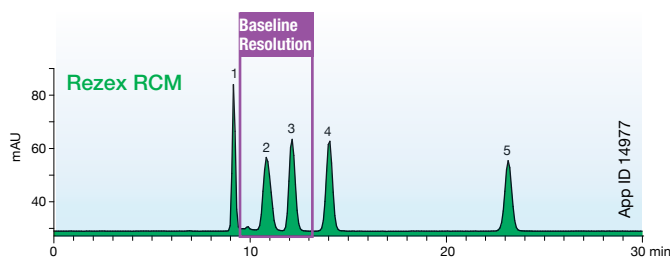
## ▶ Saccharides



**Columns:** Rezex RPM-Monosaccharide  
Aminex HPX-87P  
**Dimensions:** 300 x 7.8 mm  
**Mobile Phase:** Water  
**Recommended Guard Column:** 03B-0135-K0  
**Recommended Guard Cartridge\*:** AJ0-4492  
**Flow Rate:** 0.6 mL/min  
**Detection:** ELSD  
**Temperature:** 75 °C  
**Sample:** 1. Melezitose 4. Mannose  
2. Maltose 5. Fructose  
3. Glucose 6. Ribitol

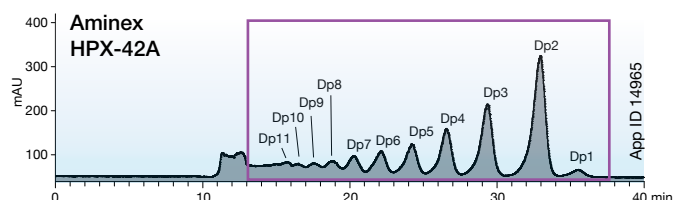
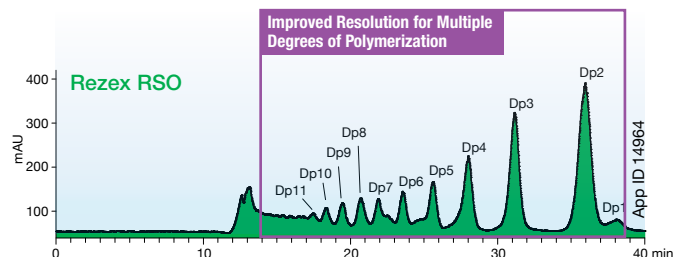
Higher Efficiency = Baseline Separation of Critical Sample Components

## ▶ Sugars



**Columns:** Rezex RCM-Monosaccharide  
Aminex HPX-87C  
**Dimensions:** 300 x 7.8 mm  
**Mobile Phase:** Water  
**Recommended Guard Column:** 03B-0130-K0  
**Recommended Guard Cartridge\*:** AJ0-4493  
**Flow Rate:** 0.6 mL/min  
**Detection:** ELSD  
**Temperature:** 80 °C  
**Sample:** 1. Sucrose 4. Fructose  
2. Glucose 5. Sorbitol  
3. Galactose

## ▶ Oligosaccharides



**Columns:** Rezex RSO-Oligosaccharide  
Aminex HPX-42A  
**Dimensions:** 200 x 10.0 mm  
**Mobile Phase:** Water  
**Recommended Guard Column:** 03R-0133-N0  
**Flow Rate:** 0.3 mL/min  
**Detection:** ELSD  
**Temperature:** 80 °C  
**Sample:** Malto-Oligosaccharides (Dp1-Dp14)  
(Dp refers to degree of polymerization)

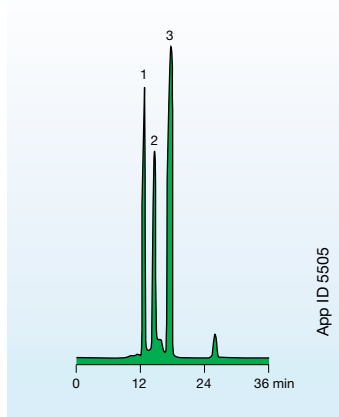
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\* SecurityGuard Analytical Cartridges require universal holder Part No.: KJ0-4282

# Select Applications On Rezex™ HPLC Columns

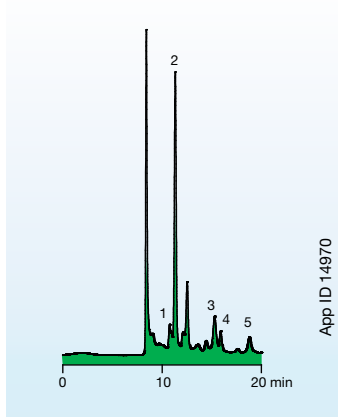
## Food and Beverage

### ▶ Apple Juice



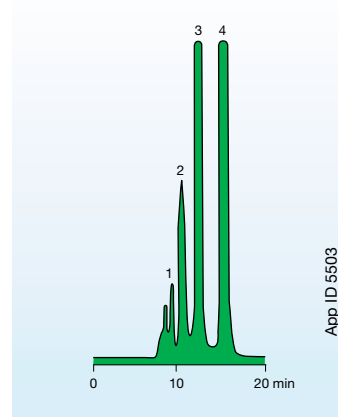
**Column:** Rezex RCM-Monosaccharide  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0130-K0  
**Recommended Guard Column:** 03B-0130-K0  
**Recommended Guard Cartridge:** AJ0-4493  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI  
**Temperature:** 75 °C  
**Sample:** 1. Sucrose  
 2. Glucose  
 3. Fructose

### ▶ White Wine



**Column:** Rezex ROA-Organic Acid  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0138-K0  
**Recommended Guard Column:** 03B-0138-K0  
**Recommended Guard Cartridge:** AJ0-4490  
**Mobile Phase:** 0.005 N H<sub>2</sub>SO<sub>4</sub>  
**Flow Rate:** 0.5 mL/min  
**Detection:** UV @ 210 nm  
**Temperature:** 40 °C  
**Sample:** 1. Citric acid  
 2. Tartaric acid  
 3. Succinic acid  
 4. Lactic acid  
 5. Acetic acid

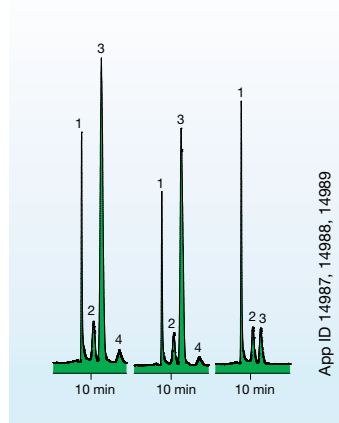
### ▶ Honey



**Column:** Rezex RCM-Monosaccharide  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0130-K0  
**Recommended Guard Column:** 03B-0130-K0  
**Recommended Guard Cartridge:** AJ0-4493  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI  
**Temperature:** 75 °C  
**Sample:** 1. Dp 3  
 2. Dp 2  
 3. Glucose

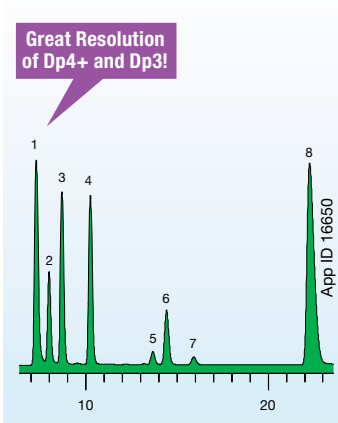
## Fermentation and Bioethanol

### ▶ Fermentation Broth



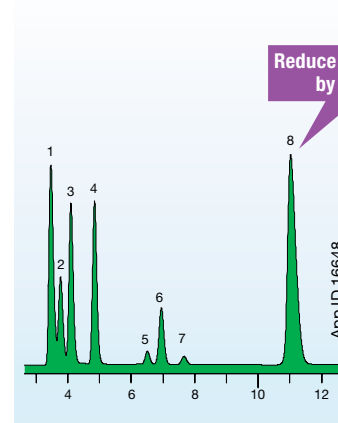
**Column:** Rezex RCM-Monosaccharide  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0130-K0  
**Recommended Guard Column:** 03B-0130-K0  
**Recommended Guard Cartridge:** AJ0-4493  
**Mobile Phase:** Water  
**Flow Rate:** 0.5 mL/min  
**Detection:** ELSD  
**Temperature:** 80 °C  
**Sample:** 1. Sucrose  
 2. Glucose  
 3. Galactose  
 4. Fructose

### ▶ Bioethanol



**Column:** Rezex ROA-Organic Acid  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0138-K0  
**Recommended Guard Column:** 03B-0138-K0  
**Recommended Guard Cartridge:** AJ0-4490  
**Mobile Phase:** 0.005 N Sulfuric Acid  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI @ 40 °C  
**Temperature:** 60 °C  
**System:** Shimadzu® Prominence® LC-20A System  
**Sample:** 1. Dp4+ 5. Lactic Acid  
 2. Dp3 6. Glycerol  
 3. Maltose 7. Acetic Acid  
 4. Glucose 8. Ethanol

### ▶ Bioethanol



**Column:** Rezex ROA-Organic Acid  
**Dimensions:** 150 x 7.8 mm  
**Part No.:** 00F-0138-K0  
**Recommended Guard Column:** 03B-0138-K0  
**Recommended Guard Cartridge:** AJ0-4490  
**Mobile Phase:** 0.005 N Sulfuric Acid  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI @ 40 °C  
**Temperature:** 60 °C  
**System:** Shimadzu Prominence LC-20A System  
**Sample:** 1. Dp4+ 5. Lactic Acid  
 2. Dp3 6. Glycerol  
 3. Maltose 7. Acetic Acid  
 4. Glucose 8. Ethanol

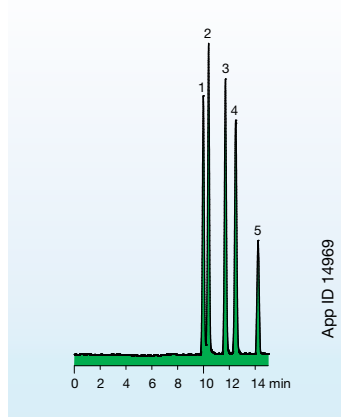
\* SecurityGuard Analytical Cartridges require universal holder Part No.: KJO-4282



# Select Applications On Rezex™ HPLC Columns

## Saccharides

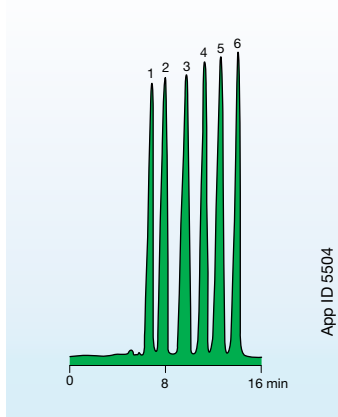
### ▶ Monosaccharides with Organic Acids



App ID 14969

**Column:** Rezex ROA-Organic Acid  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0138-K0  
**Recommended Guard Column:** 03B-0138-K0  
**Recommended Guard Cartridge\*:** AJ0-4490  
**Mobile Phase:** 0.1 % formic acid  
**Flow Rate:** 0.5 mL/min  
**Detection:** ELSD  
**Temperature:** 75 °C  
**Sample:** 1. Citric acid  
 2. Tartaric acid  
 3. Glucose  
 4. Fructose  
 5. Succinic acid

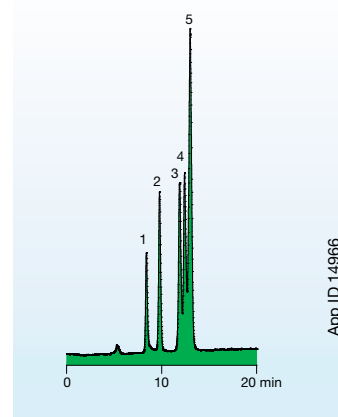
### ▶ Saccharides



App ID 5504

**Column:** Rezex RCM-Monosaccharide  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0130-K0  
**Recommended Guard Column:** 03B-0130-K0  
**Recommended Guard Cartridge\*:** AJ0-4493  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI  
**Temperature:** 85 °C  
**Sample:** 1. Melezitose  
 2. Maltose  
 3. Glucose  
 4. Mannose  
 5. Fructose  
 6. Ribitol

### ▶ Saccharides

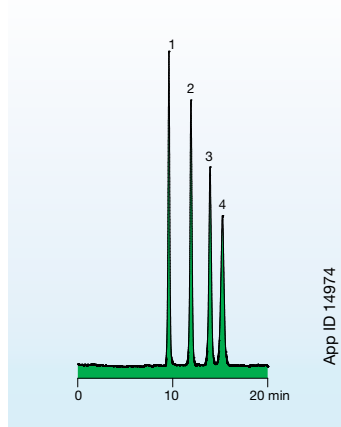


App ID 14966

**Column:** Rezex RAM-Carbohydrate  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0131-K0  
**Recommended Guard Cartridge\*:** AJ0-4491  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** ELSD  
**Temperature:** 75 °C  
**Sample:** 1. Melezitose  
 2. Mannose  
 3. Maltose  
 4. Fructose  
 5. Glucose

## Carbohydrates

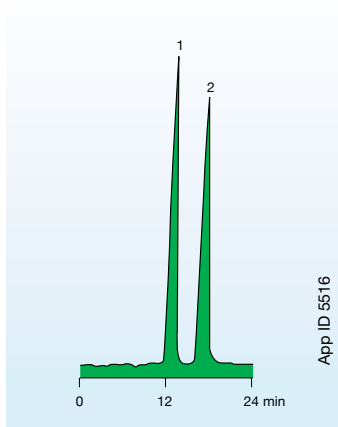
### ▶ Carbohydrates



App ID 14974

**Column:** Rezex RAM-Carbohydrate  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0131-K0  
**Recommended Guard Cartridge\*:** AJ0-4491  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** ELSD  
**Temperature:** 80 °C  
**Sample:** 1. Sucrose  
 2. Glucose  
 3. Arabinose  
 4. Ribose

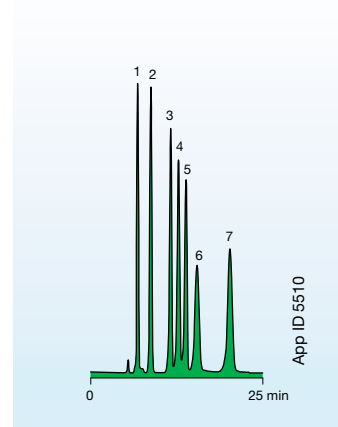
### ▶ Carbohydrates



App ID 5516

**Column:** Rezex RCU-USP Sugar Alcohols  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-0130-D0  
**Recommended Guard Column:** 03A-0130-D0  
**Recommended Guard Cartridge\*:** AJ0-4493  
**Mobile Phase:** Water  
**Flow Rate:** 0.2 mL/min  
**Detection:** RI  
**Temperature:** 30 °C  
**Sample:** 1. Mannitol  
 2. Sorbitol

### ▶ Carbohydrates



App ID 5510

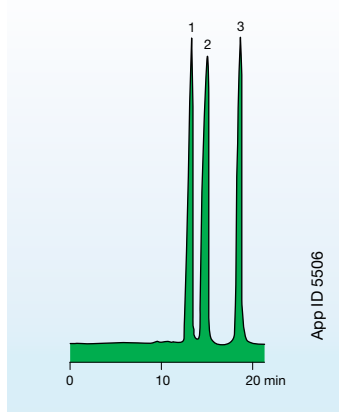
**Column:** Rezex RNM-Carbohydrate  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0136-K0  
**Recommended Guard Column:** 03B-0136-K0  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI  
**Temperature:** 75 °C  
**Sample:** 1. Stachyose  
 2. Cellobiose  
 3. Glucose  
 4. Fructose  
 5. Arabinose  
 6. Ribose  
 7. Salicin  
 (1 % solution of each)

\* SecurityGuard Analytical Cartridges require universal holder Part No.: KJ0-4282

# Select Applications On Rezex™ HPLC Columns

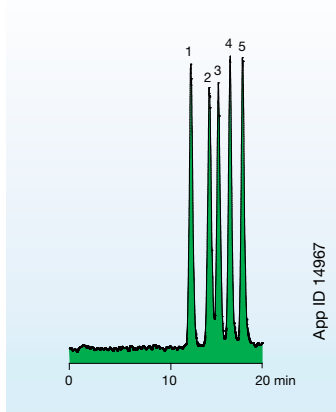
## Carbohydrates / Saccharides (Cont'd)

### ▶ Carbohydrates



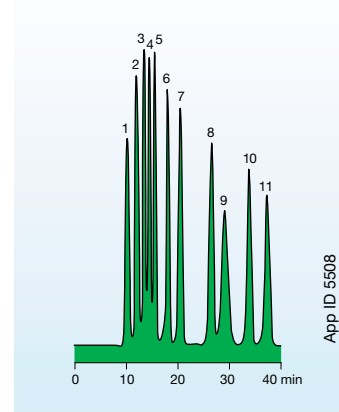
**Column:** Rezex RKP-Potassium  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-3252-K0  
**Mobile Phase:** Water  
**Flow Rate:** 0.4 mL/min  
**Detection:** RI  
**Temperature:** 85 °C  
**Sample:** 1. Maltotriose  
 2. Maltose  
 3. Glucose

### ▶ Wood Saccharides



**Column:** Rezex RPM-Monosaccharide  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0135-K0  
**Recommended Guard Column:** 03B-0135-K0  
**Recommended Guard Cartridge\*:** AJ0-4492  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** ELSD  
**Temperature:** 85 °C  
**Sample:** 1. D-Cellobiose  
 2. α-D-glucose  
 3. D-(+)-Xylose  
 4. D-(+)-Galactose  
 5. D-(-)-Arabinose

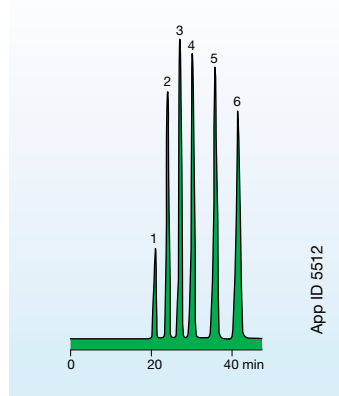
### ▶ Saccharides and Alcohols



**Column:** Rezex RPM-Monosaccharide  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0135-K0  
**Recommended Guard Column:** 03B-0135-K0  
**Recommended Guard Cartridge\*:** AJ0-4492  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI  
**Temperature:** 75 °C  
**Sample:** 1. Stachyose 7. meso-Erythritol  
 2. Maltose 8. Mannitol  
 3. Glucose 9. Salicin  
 4. Xylose 10. Xylitol  
 5. Galactose 11. Sorbitol  
 6. Fructose

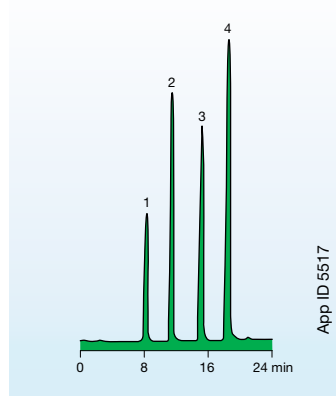
## Alcohols

### ▶ Alcohols



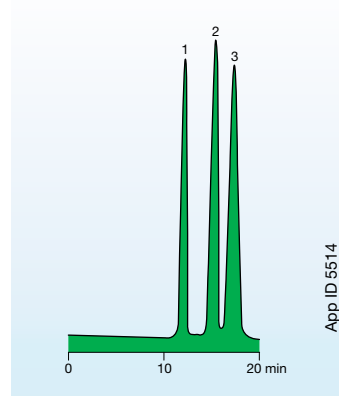
**Column:** Rezex RHM-Monosaccharide  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0132-K0  
**Recommended Guard Column:** 03B-0132-K0  
**Recommended Guard Cartridge\*:** AJ0-4490  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI  
**Temperature:** 60 °C  
**Sample:** 1. Methanol  
 2. Ethanol  
 3. Isopropanol  
 4. n-Propanol  
 5. sec-Butanol  
 6. n-Butanol

### ▶ Carboxylic Acids



**Column:** Rezex ROA-Organic Acid  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0138-K0  
**Recommended Guard Column:** 03B-0138-K0  
**Recommended Guard Cartridge\*:** AJ0-4490  
**Mobile Phase:** Water + 0.5% Trifluoroacetic Acid  
**Flow Rate:** 1.0 mL/min  
**Detection:** RI  
**Temperature:** 40 °C  
**Sample:** 1. Acetylene Carboxylic Acid  
 2. Maleic Acid  
 3. Succinic Acid  
 4. Fumaric Acid

### ▶ Amino Sugars



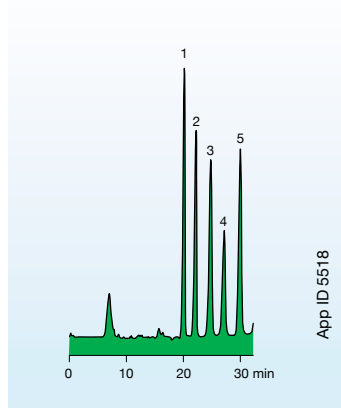
**Column:** Rezex ROA-Organic Acid  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0138-K0  
**Recommended Guard Column:** 03B-0138-K0  
**Recommended Guard Cartridge\*:** AJ0-4490  
**Mobile Phase:** 1% Phosphoric Acid  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI  
**Temperature:** Ambient  
**Sample:** 1. Glucose  
 2. N-Acetylglucose  
 3. N-Acetylgalactosamine

\* SecurityGuard Analytical Cartridges require universal holder Part No.: KJ0-4282

# Select Applications On Rezex™ HPLC Columns

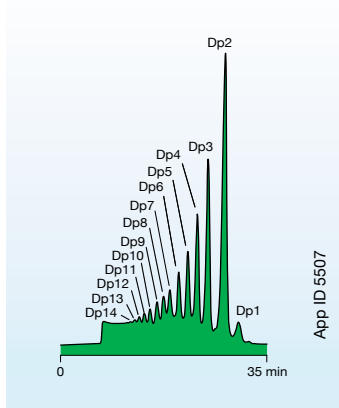
## Other Applications

### ▶ Food Softeners



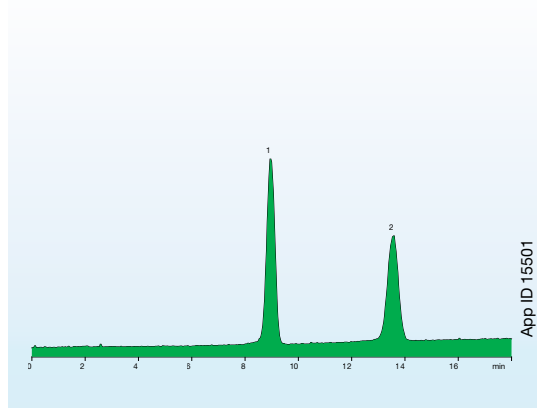
**Column:** Rezex RCM-Monosaccharide  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** 00H-0130-K0  
**Recommended Guard Column:** 03B-0130-K0  
**Recommended Guard Cartridge\*:** AJ0-4493  
**Mobile Phase:** Water  
**Flow Rate:** 0.5 mL/min  
**Detection:** RI  
**Temperature:** 60 °C  
**Sample:** 1. Glycerol  
 2. Methoxypolyethylene Glycol  
 3. Triethylene Glycol  
 4. Sorbitol  
 5. Urea

### ▶ Oligosaccharides



**Column:** Rezex RSO-Oligosaccharide  
**Dimensions:** 200 x 10 mm  
**Part No.:** 00P-0133-N0  
**Recommended Guard Column:** 03R-0133-N0  
**Mobile Phase:** Water  
**Flow Rate:** 0.3 mL/min  
**Detection:** RI  
**Temperature:** 75 °C  
**Sample:** Malto-Oligosaccharides as shown

### ▶ Oligosaccharides



**Column:** Rezex RPM-Monosaccharide  
**Dimensions:** 100 x 7.8 mm  
**Part No.:** 00D-0135-K0  
**Recommended Guard Column:** 03B-0135-K0  
**Recommended Guard Cartridge\*:** AJ0-4492  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** ELSD (Ambient)  
**Temperature:** 80 °C  
**Sample:** 1. Mannitol  
 2. Sorbitol

### ▶ Applications (partial list)

Compound	Rezex Phase	App ID No.
Acetic acid	ROA	5515
	RHM	14962
Acetylene carboxylic acid	ROA	5517
Arabinose	RNM	5510
	RAM	14974
Citric acid	ROA	5515
	RHM	14970
D-Cellobiose	RNM	5510
	RPM	14967
D-(+)-Galactose	RPM	14967
	RPM	14967
D-(+)-Xylose	RPM	14967
	RPM	14967
Erythritol	RPM	14968
	ROA	5512
Ethanol	ROA	5515
	RHM	14962
Fructose	RCM	5504, 5505, 14975, 14981, 14977, 14987
		5508, 14985
	RNM	5510
	RAM	14966
	ROA	5517
Fumaric acid	ROA	5517
	RPM	5508
Galactose	RCM	14977, 14987
	RPM	5508
Glucose	RCM	5504, 5505, 14975, 14977, 14979, 14981, 14987, 14983
		5508, 14985
	RKP	5506
	ROA	5514
	RNM	5510
	RAM	14966, 14974
	RHM	14966
RCU	5516	
Glycerol	RCM	5518
Isopropanol	ROA	5512
Lactic acid	RHM	14970, 14971
Maleic acid	ROA	5517
Malto-Oligosaccharides	RSO	5507
Maltose	RCM	5504, 14975
	RPM	5508, 14985
	RKP	5506
	RAM	14966
	RKM	5506
Maltotriose	RKP	5506
Mannitol	RPM	5508, 14968
	RCU	5516

Chat with us for assistance in selecting the right column for your needs





Compound	Rezex Phase	App ID No.
Mannose	RCM	5504, 14975
	RPM	14985
	RAM	14966
Melezitose	RCM	5504, 14975
	RPM	14985
	RAM	14966
meso-Erythritol	RPM	5508
Methanol	ROA	5512
Methoxypolyethylene Glycol	RCM	5518
n-Butanol	ROA	5512
n-Propanol	ROA	5512
N-Acetylgalactosamine	ROA	5514
N-Acetylglucose	ROA	5514
Oxalic acid	ROA	5515
	RHM	14962
Ribose	RNM	5510
	RAM	14974
Ribitol	RCM	5504, 14975
	RAM	14966
	RHM	14991
	RPM	14985
Salicin	RPM	5508
	RNM	5510
sec-Butanol	ROA	5512
Sorbitol	RPM	5508, 14968
	RCM	5518, 14977
	RCU	5516
Stachyose	RPM	5508
	RNM	5510
Succinic acid	ROA	5515
	RHM	14962
	RCM	5505, 14981, 14977, 14987
Sucrose	RAM	14974
	RCM	5504
Tartaric acid	RHM	14970
	RCM	5518
Triethylene glycol	RCM	5518
	RCM	5518
Urea	RPM	5508, 14968
Xylose	RPM	5508

\* SecurityGuard Analytical Cartridges require universal holder Part No.: KJ0-4282

\*\* For applications not in this brochure, copies are available through Phenomenex or your local Phenomenex distributor.

# Specifications And Operating Recommendations

	RCM Monosaccharide	RSO Oligosaccharide	RNO Oligosaccharide	RNM Carbohydrate	RAM Carbohydrate
Part No.	00H-0130-K0	00P-0133-N0	00P-0137-N0	00H-0136-K0	00H-0131-K0
Ionic Form	Calcium	Silver	Sodium	Sodium	Silver
Standard Dimensions	300 x 7.8 mm	200 x 10 mm	200 x 10 mm	300 x 7.8 mm	300 x 7.8 mm
Matrix	Sulfonated Styrene Divinyl Benzene				
Cross Linking	8 %	4 %	4 %	8 %	8 %
Particle Size (µm)	8	12	12	8	8
Min. Efficiency (p/m) based on last peak	35,000	N/A	N/A	30,000	35,000
Typical Pressure (psi @ Testing Flow Rate)	260	115	130	170	285
Max. Pressure (psi @ Max Flow Rate)	1,000	300	300	1,000	1,000
Max. Flow Rate (mL/min)	1.0	0.3	0.3	1.0	1.0
Max. Temperature (°C)	85	85	85	85	85
Typical Mobile Phase	Water	Water	Water	Water	Water
pH Range	Neutral	Neutral	Neutral	Neutral	Neutral
Guard Column Part No.	03B-0130-K0	03R-0133-N0	03R-0137-N0	03B-0136-K0	03B-0131-K0
<b>Cleaning, Regeneration and Storage</b>					
Organic Modifiers (Max)	5 % Methanol, IPA, EtOH				
Inorganic Modifiers	5 % CaSO <sub>4</sub> , Ca(NO <sub>3</sub> ) <sub>2</sub> , CaCl <sub>2</sub>	5 % Silver Nitrate	5 % Sodium Salts	5 % Sodium Salts	2 % Silver Nitrate
Avoid	Acids, Bases, Non-Calcium Salts or Metal Ions, > 30 % Acetonitrile	Acids, Bases, Non-Silver Salts or Metal Ions, > 30 % Acetonitrile	Acids, Bases, Non-Sodium Salts or Metal Ions, > 30 % Acetonitrile	Acids, Bases, Non-Sodium Salts or Metal Ions, > 30 % Acetonitrile	Acids, Bases, Non-Silver Salts or Metal Ions, > 30 % Acetonitrile
					
Cleaning Solvent	100 % Water	100 % Water	100 % Water	100 % Water	100 % Water
Flow Rate (mL/min)	0.4	0.1	0.1	0.4	0.4
Temperature (°C)	85	85	85	85	85
Duration (hrs)	12	12	12	12	12
Regeneration Solvent	0.1 M Ca(NO <sub>3</sub> ) <sub>2</sub>	0.1 M AgNO <sub>3</sub>	0.1 M NaNO <sub>3</sub>	0.1 M NaNO <sub>3</sub>	0.1 M AgNO <sub>3</sub>
Flow Rate (mL/min)	0.2	0.1	0.2	0.2	0.2
Temperature (°C)	85	85	85	85	85
Duration (hrs)	4-16	4-16	4-16	4-16	4-16
Ship/Storage Solvent	Water	Water	Water	Water	Water

	RPM Monosaccharide	RHM Monosaccharide	ROA Organic Acid	RFQ Fast Acid	RCU Sugar Alcohols
Part No.	00H-0135-K0	00H-0132-K0	00H-0138-K0	00D-0223-K0	00G-0130-D0
Ionic Form	Lead	Hydrogen	Hydrogen	Hydrogen	Calcium
Standard Dimensions	300 x 7.8 mm	300 x 7.8 mm	300 x 7.8 mm	100 x 7.8 mm	250 x 4.0 mm
Matrix	Sulfonated Styrene Divinyl Benzene				
Cross Linking	8 %	8 %	8 %	8 %	8 %
Particle Size (µm)	8	8	8	8	8
Min. Efficiency (p/m) based on last peak	35,000	35,000	50,000 (Acetic Acid)	30,000	12,000
Typical Pressure (psi @ Testing Flow Rate)	190	275	580	365	90
Max. Pressure (psi @ Max Flow Rate)	1,000	1,000	1,000	1,000	1,000
Max. Flow Rate (mL/min)	1.0	1.0	1.0	1.0	0.5
Max. Temperature (°C)	85	85	85	85	85
Typical Mobile Phase	Water	Water	0.005 N H <sub>2</sub> SO <sub>4</sub>	0.005 N H <sub>2</sub> SO <sub>4</sub>	Water
pH Range	Neutral	1-8	1-8	1-8	Neutral
Guard Column Part No.	03B-0135-K0	03B-0132-K0	03B-0138-K0	03B-0223-K0	03A-0130-D0
<b>Cleaning, Regeneration and Storage</b>					
Organic Modifiers (Max)	5 % Methanol, IPA, EtOH				
Inorganic Modifiers	5 % Lead Nitrate	5 % HNO <sub>3</sub> , H <sub>3</sub> PO <sub>4</sub>	5 % HNO <sub>3</sub> , H <sub>3</sub> PO <sub>4</sub>	5 % HNO <sub>3</sub> , H <sub>3</sub> PO <sub>4</sub>	5 % CaSO <sub>4</sub> , Ca(NO <sub>3</sub> ) <sub>2</sub> , CaCl <sub>2</sub>
Avoid	Acids, Bases, Non-Lead Salts or Metal Ions, > 30 % Acetonitrile	Acids, Bases, Salts or Metal Ions, > 30 % Acetonitrile	Acids, Bases, Salts or Metal Ions, pH > 3, > 30 % Acetonitrile	Acids, Bases, Salts or Metal Ions, pH > 3, > 30 % Acetonitrile	Acids, Bases, Non-Calcium Salts or Metal Ions, > 30 % Acetonitrile
					
Cleaning Solvent	100 % Water	100 % Water	100 % Water	100 % Water	100 % Water
Flow Rate (mL/min)	0.4	0.4	0.4	0.4	0.1
Temperature (°C)	85	85	85	85	85
Duration (hrs)	12	12	12	12	12
Regeneration Solvent	0.1 M Pb(NO <sub>3</sub> ) <sub>2</sub>	0.025 M H <sub>2</sub> SO <sub>4</sub>	0.025 M H <sub>2</sub> SO <sub>4</sub>	0.025 M H <sub>2</sub> SO <sub>4</sub>	0.1 M Ca(NO <sub>3</sub> ) <sub>2</sub>
Flow Rate (mL/min)	0.2	0.2	0.2	0.2	0.1
Temperature (°C)	85	85	85	85	85
Duration (hrs)	4-16	4-16	4-16	4-16	4-16
Ship/Storage Solvent	Water	Water	0.005 N H <sub>2</sub> SO <sub>4</sub>	0.005 N H <sub>2</sub> SO <sub>4</sub>	Water

# Phenex™ Syringe Filters



For Sample and Solvent Filtration Prior to Chromatography!

- Less system downtime
- More consistent, reproducible results
- Increased column lifetime

## Ordering Information<sup>1</sup>

Membrane Type/Size	4 mm Diameter for ≤ 2 mL sample volumes		15 mm Diameter for 2 – 10 mL sample volumes		25 - 28 mm Diameter for 10 – 100 mL sample volumes	
	Part No.	Unit	Part No.	Unit	Part No.	Unit
<b>0.20 µm</b>						
Phenex-RC (Regenerated Cellulose)	AF0-3203-12	100/pk	AF0-2203-12	100/pk	AF0-8203-12 <sup>5</sup>	100/pk
	AF0-3203-52	500/pk	AF0-2203-52	500/pk	AF0-8203-52 <sup>5</sup>	500/pk
Phenex-PES <sup>3</sup> (Polyethersulfone)	—	—	—	—	AF0-8208-12 <sup>7</sup>	100/pk
	—	—	—	—	AF0-8208-52 <sup>7</sup>	500/pk
Phenex-PTFE <sup>6</sup> (Polytetrafluoroethylene)	AF0-3202-12	100/pk	AF0-2202-12	100/pk	AF0-1202-12	100/pk
	AF0-3202-52	500/pk	AF0-2202-52	500/pk	AF0-1202-52	500/pk
Phenex-NY (Nylon)	AF3-3207-12	100/pk	AF0-2207-12	100/pk	AF0-1207-12	100/pk
	AF3-3207-52	500/pk	AF0-2207-52	500/pk	AF0-1207-52	500/pk
Phenex-GF/NY <sup>2</sup> (Glass Fiber/Nylon)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a Nylon (NY) membrane. Excellent for filtration of particle-laden samples, such as foods and beverages, environmental, biofuels, and dissolution samples. Use less hand pressure to filter even the most difficult samples. Outlet connection is luer lock.				AF0-1A47-12 <sup>7</sup>	100/pk
Phenex-PVDF (Polyvinylidene Fluoride)	—	—	AF6-5206-12 <sup>8</sup>	100/pk	AF6-6206-12	100/pk
	—	—	AF6-5206-52 <sup>8</sup>	500/pk	AF6-6206-52	500/pk
Phenex-GF/PVDF (Glass Fiber/Polyvinylidene Fluoride)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a PVDF membrane. The hydrophilic PVDF membrane provides high flow rates and throughput, low extractables and broad chemical compatibility. This membrane binds less protein than nylon or PTFE membranes.				AF6-6C06-12	100/pk
					AF6-6C06-52	500/pk
Phenex-CA <sup>4</sup> (Cellulose Acetate)	—	—	—	—	AF0-8204-12 <sup>7</sup>	100/pk
	—	—	—	—	AF0-8204-52 <sup>7</sup>	500/pk
Phenex-GF/CA <sup>2,3,4</sup> (Glass Fiber/Cellulose Acetate)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a CA membrane. Excellent for filtration of tissue culture media, general biological sample filtration and clarification. Outlet connection is luer lock.				AF0-8A09-12 <sup>7</sup>	100/pk
					AF0-8A09-52 <sup>7</sup>	500/pk
<b>0.45 µm</b>						
Phenex-RC (Regenerated Cellulose)	AF0-3103-12	100/pk	AF0-2103-12	100/pk	AF0-8103-12 <sup>5</sup>	100/pk
	AF0-3103-52	500/pk	AF0-2103-52	500/pk	AF0-8103-52 <sup>5</sup>	500/pk
Phenex-PES <sup>3</sup> (Polyethersulfone)	—	—	—	—	AF0-8108-12 <sup>7</sup>	100/pk
	—	—	—	—	AF0-8108-52 <sup>7</sup>	500/pk
Phenex-PTFE <sup>6</sup> (Polytetrafluoroethylene)	AF0-3102-12	100/pk	AF0-2102-12	100/pk	AF0-1102-12	100/pk
	AF0-3102-52	500/pk	AF0-2102-52	500/pk	AF0-1102-52	500/pk
Phenex-NY (Nylon)	AF3-3107-12	100/pk	AF0-2107-12	100/pk	AF0-1107-12	100/pk
	AF3-3107-52	500/pk	AF0-2107-52	500/pk	AF0-1107-52	500/pk
Phenex-GF/NY <sup>2</sup> (Glass Fiber/Nylon)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a Nylon (NY) membrane. Excellent for filtration of particle-laden samples, such as foods and beverages, environmental, biofuels, and dissolution samples. Use less hand pressure to filter even the most difficult samples. Outlet connection is luer lock.				AF0-1B47-12 <sup>7</sup>	100/pk
Phenex-PVDF (Polyvinylidene Fluoride)	—	—	AF6-5106-12 <sup>9</sup>	100/pk	AF6-6106-12	100/pk
	—	—	AF6-5106-52 <sup>9</sup>	500/pk	AF6-6106-52	500/pk
Phenex-GF/PVDF (Glass Fiber/Polyvinylidene Fluoride)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a PVDF membrane. The hydrophilic PVDF membrane provides high flow rates and throughput, low extractables and broad chemical compatibility. This membrane binds less protein than nylon or PTFE membranes.				AF6-6D06-12	100/pk
					AF6-6D06-52	500/pk
Phenex-GF/CA <sup>2,3,4</sup> (Glass Fiber/Cellulose Acetate)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a CA membrane. Excellent for filtration of tissue culture media, general biological sample filtration and clarification. Outlet connection is luer lock.				AF0-8B09-12 <sup>7</sup>	100/pk
					AF0-8B09-52 <sup>7</sup>	500/pk
<b>1.20 µm</b>						
Phenex-GF <sup>2,3</sup> (Glass Fiber)	Prefiltration of heavily contaminated or highly viscous samples. When used in-series preceding a membrane filter, clogging of the membrane filter is prevented and sample clean up is optimized. Outlet connection is luer lock.				AF0-8515-12 <sup>7</sup>	100/pk
					AF0-8515-52 <sup>7</sup>	500/pk

Syringe filters are non-sterile. Housing is made of medical-grade polypropylene (PP) and offer luer lock inlet/slip outlet connections, unless otherwise indicated.

1. Larger quantity purchases at significant savings are available.
2. Glass fiber filters are 28 mm diameter and made of borosilicate. They will remove 90% of all particles >1.2 µm.
3. Housing material is methacrylate butadiene styrene (MBS) polymerisate. Also known as Cyrolite®.
4. Cellulose acetate is surfactant-free.
5. 26 mm diameter.
6. Hydrophobic membrane. Can be made hydrophilic by pre-wetting with IPA.
7. 28 mm diameter.
8. 17 mm diameter.

Additional dimensions and membrane types are available.

Please contact your local Phenomenex technical consultant or distributor for availability or assistance.

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## Find More Online!

To find the perfect Phenex syringe filter for any application go to [www.phenomenex.com/syringefilterfinder](http://www.phenomenex.com/syringefilterfinder)

# Verex Filter Vials



Verex Filter Vials simplify your workflow and reduce lab waste.

Verex Filter Vials combine syringe filter and vial technology into an all-in-one sample prep solution eliminating the need for syringes, syringe filters, vials, and cap/septa.



### Reduce Sample Loss and Contamination

Eliminate multiple transfers with this all-in-one filtration device

### Internal Plunger

### External Vial

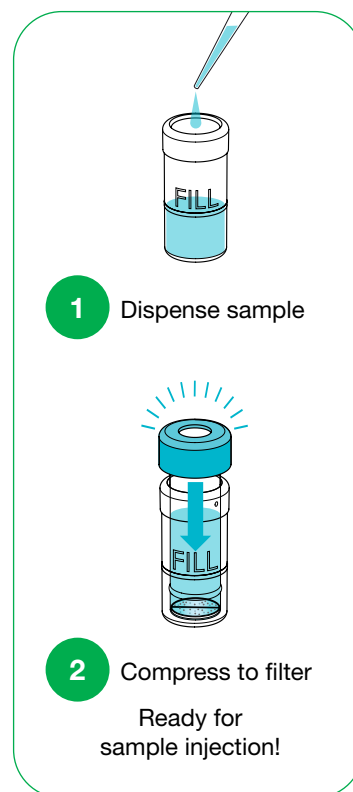
### Particulate-Free Sample

The filter membrane is attached to the internal plunger to ensure removal of particulates

### Save Your Sample

With a low dead volume of 30  $\mu$ L, more of your sample can be analyzed

## Verex Filter Vials



### Verex Filter Vial Specifications

- Dimensions: 12 x 32 mm
- Vial material: Polypropylene
- Septa: PTFE/Silicone preSlit
- Filtering capacity: 450  $\mu$ L
- Dead-volume: 30  $\mu$ L
- Cap: 11 mm snap-top cap



## Verex Ordering Information

Description	Membrane Pore	Part No.	Unit
Verex Filter Vial-RC (Regenerated Cellulose)	0.20 $\mu$ m	AR0-F103-12	100/pk
	0.45 $\mu$ m	AR0-F203-12	100/pk
Verex Filter Vial-PTFE (Polytetrafluoroethylene)	0.20 $\mu$ m	AR0-F102-12	100/pk
	0.45 $\mu$ m	AR0-F202-12	100/pk
Verex Filter Vial-NY (Nylon)	0.20 $\mu$ m	AR0-F107-12	100/pk
	0.45 $\mu$ m	AR0-F207-12	100/pk
Verex Filter Vial-PES (Polyethersulfone)	0.20 $\mu$ m	AR0-F108-12	100/pk
	0.45 $\mu$ m	AR0-F208-12	100/pk
Verex Filter Vial-PVDF (Polyvinylidene Fluoride)	0.20 $\mu$ m	AR0-F106-12	100/pk
	0.45 $\mu$ m	AR0-F206-12	100/pk

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# Ordering Information

## Rezex HPLC Columns

Columns					Guards		SecurityGuard <sup>™</sup> Cartridges (mm)
Description	Part No.	Cross Linkage	Ionic Form	Size (mm)	Part No.	Size (mm)	4 x 3.0* /10pk
RCM-Monosaccharide	00F-0130-KO	8%	Calcium	150 x 7.8	03B-0130-KO	50 x 7.8	AJO-4493
RCM-Monosaccharide	00H-0130-KO	8%	Calcium	300 x 7.8	03B-0130-KO	50 x 7.8	AJO-4493
RHM-Monosaccharide	00H-0132-KO	8%	Hydrogen	300 x 7.8	03B-0132-KO	50 x 7.8	AJO-4490
RAM-Carbohydrate	00H-0131-KO	8%	Silver	300 x 7.8	—	—	AJO-4491
RSO-Oligosaccharide	00P-0133-NO	4%	Silver	200 x 10.0	03R-0133-NO	60 x 10.0	—
RNO-Oligosaccharide	00P-0137-NO	4%	Sodium	200 x 10.0	03R-0137-NO	60 x 10.0	—
RPM-Monosaccharide (for USP procedure)	00H-0135-KO	8%	Lead	300 x 7.8	03B-0135-KO	50 x 7.8	AJO-4492
	00D-0135-KO	8%	Lead	100 x 7.8	03B-0135-KO	50 x 7.8	AJO-4492
RNM-Carbohydrate	00H-0136-KO	8%	Sodium	300 x 7.8	03B-0136-KO	50 x 7.8	—
ROA-Organic Acid	00F-0138-E0	8%	Hydrogen	150 x 4.6	—	—	AJO-4490
ROA-Organic Acid	00G-0138-E0	8%	Hydrogen	250 x 4.6	—	—	AJO-4490
ROA-Organic Acid	00F-0138-KO	8%	Hydrogen	150 x 7.8	03B-0138-KO	50 x 7.8	AJO-4490
ROA-Organic Acid	00H-0138-KO	8%	Hydrogen	300 x 7.8	03B-0138-KO	50 x 7.8	AJO-4490
RKP-Potassium	00H-3252-KO	8%	Potassium	300 x 7.8	—	—	—
RFQ-Fast Acid	00D-0223-KO	8%	Hydrogen	100 x 7.8	03B-0223-KO	50 x 7.8	AJO-4490
RCU-USP Sugar Alcohols	00G-0130-D0	8%	Calcium	250 x 4.0	03A-0130-D0	30 x 4.0	AJO-4493

for ID: 3.2-8.0 mm

\* SecurityGuard Analytical Cartridges require universal holder Part No.: KJO-4282

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SecurityGuard is patented by Phenomenex. U.S. Patent No. 6,162,362

**Caution:** *this patent only applies to the analytical-sized guard cartridge holder, and does not apply to Semi-Prep, PREP or ULTRA holders, or to any cartridges.*

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