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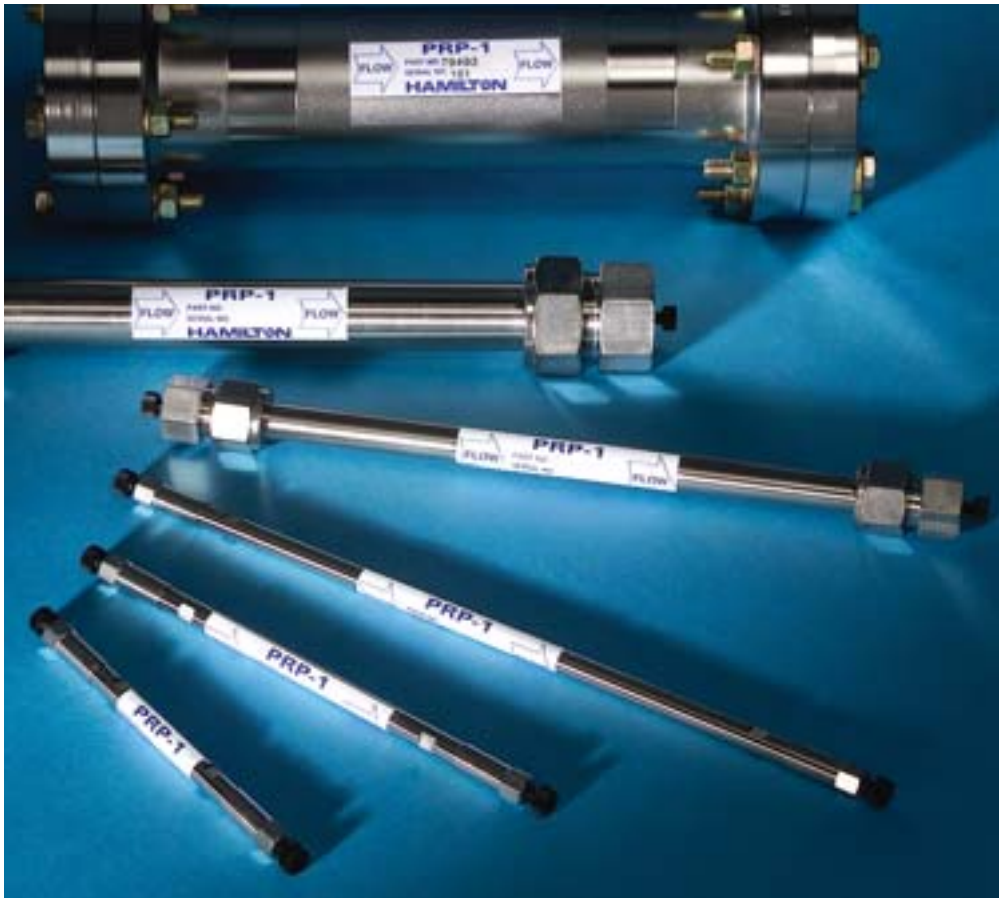
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# HPLC COLUMNS




## HPLC Columns & Bulk Resins

HAMILTON
THE MEASURE OF EXCELLENCE™

# The Measure of Excellence

## Hamilton

For nearly 50 years, Hamilton Company has been satisfying customer needs in the field of precision fluid measuring. It all started with syringes. Not commercial, mass produced medical syringes, but precision measuring instruments. About 25 years ago Hamilton was the first company to develop and manufacture pressure stable polymeric HPLC columns.

## Columns

We now offer 16 different polymer-based HPLC columns for reversed phase, anion exchange, cation exchange, ion exclusion and amino separations. Two silica-based C8 and C18 columns are available for reversed phase separations.

## Choosing the Right HPLC Column

Before you select an HPLC column to separate your sample please check the Hamilton Company HPLC web site at **http://www.hamiltoncompany.com/product/hplc/myappindex.html** or e-mail **hplc@hamiltoncompany.com** for a complete list of compounds that have been separated on Hamilton HPLC columns.



This brochure only contains a few of the applications which have been performed on Hamilton HPLC columns. In the brochure, columns are grouped by separation mechanism: reversed phase, anion exchange, cation exchange, ion exclusion, and amino.

The Recommended Uses Table below lists a few of the possible uses for each of the column packings.

| | | Recommended Uses |
|---|---|---|
| **Reversed Phase** | PRP®-1 | General purpose pH stable long life column, synthesized DNA |
| | PRP-3 | Gradient protein and peptide separations |
| | PRP-Infinity | Nonporous support for very fast gradient separation of large proteins |
| | HxSil C8, C18 | General purpose silica-based reversed phase |
| **Anion Exchange** | PRP-X100 | Anions, inorganic and organic using conductivity or UV detection. 0 to 100% solvent compatible. |
| | PRP-X110 | Similar to PRP-X100 but for lower level anions (20 ppb to 20 ppm) |
| | PRP-X500 | Gradient separation of large proteins and labeled DNA |
| | PRP-X600 | Gradient separation of labeled and unlabeled DNA |
| | RCX-10 | Isocratic or gradient separation of carbohydrate oligomers up to DP8 |
| | RCX-30 | Gradient separation of complex carbohydrates |
| **Cation Exchange** | PRP-X200 | Inorganic and organic cations using conductivity or UV detection. Separate mono or divalent cations depending on mobile phase conditions. |
| | PRP-X400 | Glyphosate and metabolite in drinking water. Also unique hydrophilic interaction separations |
| | PRP-X800 | Mono and divalent cations in the same run. Transition metals |
| | HC-40 | Sugar oligomers up to DP8. Max pressure 1,000 psi |
| | HC-75 Calcium Form | Mono and disaccharides in corn syrup. Max pressure 1,000 psi |
| | HC-75 Hydrogen Form | Organic acids and sugars. Max pressure 1,000 psi |
| | HC-75 Lead Form | Sugar alcohols. Max pressure 1,000 psi |
| **Ion Exclusion** | PRP-X300 | Organic acids and alcohols |
| **Amino** | PRP-X700 | Normal phase separation of mono and disaccharides |

# USP "L" Numbers & Bulk Resins

## USP "L" Number and Hamilton HPLC Columns

| USP "L" Number | | HAMILTON Column |
|---|---|---|
| L1 | Octadecylsilane chemically bonded to porous silica or ceramic micro-particles, 3 to 10 µm in diameter. | **HxSil C18** |
| L7 | Octylsilane chemically bonded to porous silica particles, 3 to 10 µm in diameter. | **HxSil C8** |
| L17 | Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 7 to 11 µm in diameter. | **HC-75 Hydrogen Form** |
| L19 | Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, about 9 µm in diameter. | **HC-75 Calcium Form** |
| L21 | A rigid, spherical styrene-divinylbenzene copolymer, 5 to 10 µm in diameter. | **PRP-1**<br>**PRP-3** |
| L23 | An anion-exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups, about 10 µm in size. | **PRP-X500** |
| L34 | Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, about 9 µm in diameter. | **HC-75 Lead Form** |

## Bulk Resins

| Reversed Phase Supports | Support Material | Exchange Capacity | Pore Size | 3 µm | 5 µm | 7 µm | 10 µm | 12-20 µm | 30-50 µm | 50-75µm |
|---|---|---|---|---|---|---|---|---|---|---|
| PRP-1 | PSDVB* | N/A | 100 Å | 79821 | 79578 | 79579 | 79580 | 79581 | 79582 | 79583 |
| PRP-3 | PSDVB* | N/A | 300 Å | 79822 | | | 79701 | 79702 | | |
| **Anion Exchange Supports** | **Support Material** | **Exchange Capacity** | **Pore Size** | **3 µm** | **5 µm** | **7 µm** | **10 µm** | **12-20 µm** | **30-50 µm** | **50-75µm** |
| PRP-X100 | PSDVB* with Trimethyl-ammoniun Exchanger | 0.19 meq/gm | 100 Å | 79823 | 79584 | | 79585 | 79586 | | |
| PRP-X500 | Poly(methacryl-amidopropryl Trimethyl-ammonium chloride | 1.6 meq/gm | Superfi-cially porous | | | 79594 | | 79595 | 79596 | |
| PRP-X600 | Poly(dimethyl-amidopropyl-methacryl-amide) | 1.6 meq/gm | Superfi-cially porous | | | 79597 | | 79598 | 79599 | |
| **Cation Exchange Supports** | **Support Material** | **Exchange Capacity** | **Pore Size** | **3 µm** | **5 µm** | **7 µm** | **10 µm** | **12-20 µm** | **30-50 µm** | **50-75µm** |
| PRP-X200 | PSDVB* with Sulfonate Exchanger | 35 µeq/gm | 100 Å | | | | 79587 | 79588 | | |
| PRP-X400 | PSDVB* with Sulfonate Exchanger | 2.5 meq/gm | N/A | | | 79591 | | 79592 | 79593 | |

* PSDVB is Poly(styrene-divinylbenzene)
Bulk resin is sold by the gram.

# Reversed Phase HPLC Columns

## PRP®-1

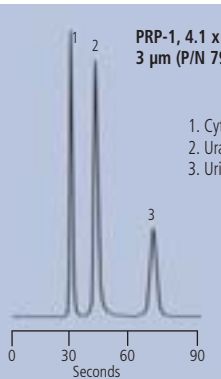
**Polymeric 100 Å columns for general reversed phase separations.**

- **pH stable from 0 to 14.**
- **Better sample recovery than silica-based columns (there are no silanol groups).**
- **Excellent durability (stable to any concentration of water or organic solvent).**




- Five particle sizes: 3, 5, 7, 10 and 12-20 µm.
- Eleven column internal diameters: 1.0 to 101.6 mm.
- Two column materials: 316 stainless steel and PEEK.
- Analytical and semiprep/preparative guard columns.

### Small Molecules

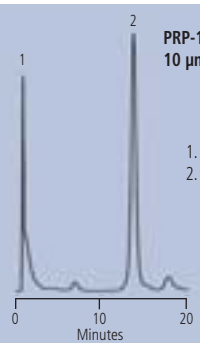



**PRP-1, 4.1 x 50 mm, 3 µm (P/N 79804)**

1. Cytosine
2. Uracil
3. Uridine

**Conditions:** 0.05M Citric Acid pH 4.2. Isocratic. Ambient. 1 mL/min. 10 µL, UV 254 nm.

### DNA with Secondary Structure

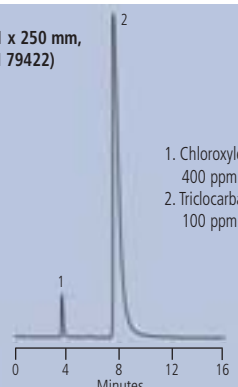



**PRP-1, 4.1 x 150 mm, 10 µm (P/N 79425)**

1. Failure Sequences
2. 5'-DMT 36mer

**Conditions:** A) 50mM Sodium Hydroxide pH 12.7; B) 1:1 50mM Sodium Hydroxide : Acetonitrile. Linear Gradient 0% B (0-2 min), 0-50% B (2-25 min). 60°C. 2 mL/min. UV 260nm.

### Biocides found in Soap




**PRP-1, 4.1 x 250 mm, 7 µm (P/N 79422)**

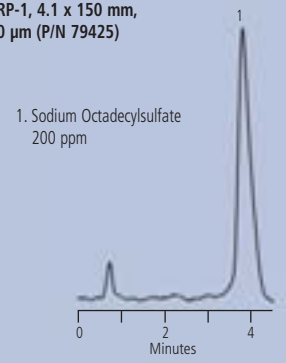
1. Chloroxylenol 400 ppm
2. Triclocarban 100 ppm

**Conditions:** 4:1 Acetonitrile : Water. Isocratic. Ambient. 1 mL/min. 10 µL, UV 254 nm.

# PRP-1 Reversed Phase HPLC Columns

## Surfactant

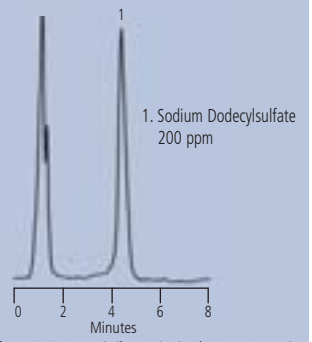
**PRP-1, 4.1 x 150 mm, 10 µm (P/N 79425)**




**Conditions:** 4.5:5.5 Acetonitrile : Deionized Water. Isocratic. Ambient. 1 mL/min. 10 µL, Conductivity.

## Surfactant

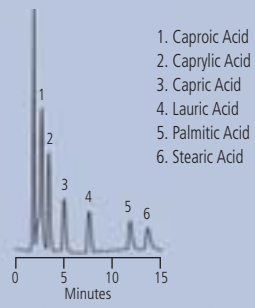
**PRP-1, 4.1 x 150 mm, 10 µm (P/N 79425)**




**Conditions:** 3:7 Acetonitrile : Deionized Water. Isocratic. Ambient. 1 mL/min. 10 µL, Conductivity

## Fatty Acids

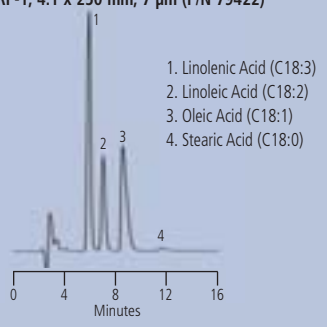
**PRP-1, 4.1 x 100 mm, 3 µm (P/N 79805)**




**Conditions:** A) 3:1 Acetonitrile : Water; B) Acetonitrile. Linear Gradient 0-100% B in 2 min. Hold for 15 min. Ambient. 0.5 mL/min. 50 µL, UV 254 nm.

## Isomeric C18 Fatty Acids

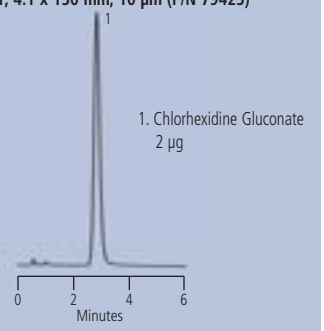
**PRP-1, 4.1 x 250 mm, 7 µm (P/N 79422)**




**Conditions:** 0.1% Trifluoroacetic Acid in 9:1 Acetonitrile : Water. Isocratic. Ambient. 0.8 mL/min. 100 µL, UV 210 nm.

## Chlorhexidine Gluconate

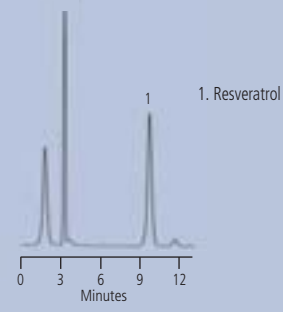
**PRP-1, 4.1 x 150 mm, 10 µm (P/N 79425)**




**Conditions:** 1:30:69 Trifluoroacetic Acid : Acetonitrile : Deionized Water. Isocratic. Ambient. 2 mL/min. 1 µL, UV 254 nm.

## Resveratrol

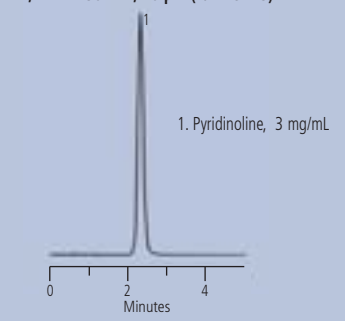
**PRP-1, 4.1 x 250 mm, 7 µm (P/N 79422)**




**Conditions:** 3:7 Acetonitrile : 0.1M Sodium Dihydrogen Phosphate pH 11.1. Isocratic. Ambient. 1 mL/min. 10 µL, UV 280 nm.

## Pyridinoline

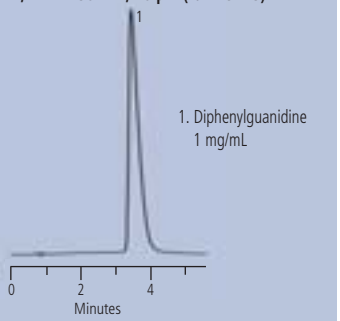
**PRP-1, 4.1 x 150 mm, 10 µm (P/N 79425)**




**Conditions:** 1:9 Acetonitrile : Deionized Water with 0.1% Heptafluorobutyric Acid. Isocratic. Ambient. 2 mL/min. 3 µL, UV 280 nm.

## Diphenylguanidine

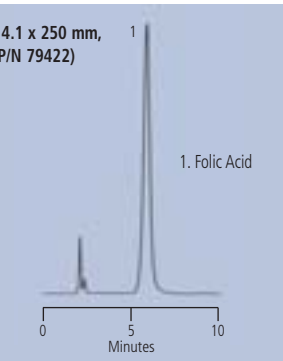
**PRP-1, 4.1 x 150 mm, 10 µm (P/N 79425)**




**Conditions:** 2:8 Acetonitrile : Deionized Water with 0.1 % Trifluoroacetic Acid. Isocratic. Ambient. 2 mL/min. 10 µL, UV 280 nm.

## Folic Acid

**PRP-1, 4.1 x 250 mm, 7 µm (P/N 79422)**

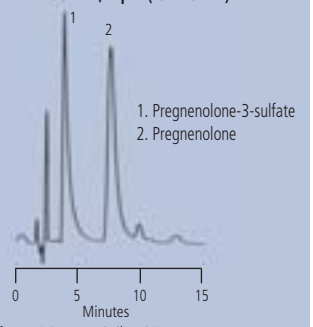



**Conditions:** 97.5:2.5 20mM Sodium Phosphate pH 6.2 : Acetonitrile. Isocratic Ambient. 1 mL/min. 5 µL, UV 280 nm.

# PRP-1 Reversed Phase HPLC Columns

### Pregnenolone and Pregnenolone-3-sulfate

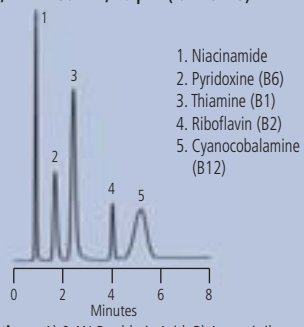
**PRP-1, 4.1 x 250 mm, 7 µm (P/N 79422)**




**Conditions:** 7:3 Acetonitrile : 25mM Tetrabutylammonium Hydrogensulfate. Isocratic. Ambient. 1 mL/min. 10 µL, UV 210 nm.

### Water Soluble Vitamins

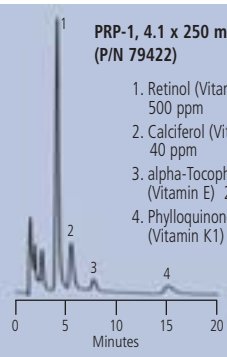
**PRP-1, 4.1 x 150 mm, 10 µm (P/N 79425)**




**Conditions:** A) 0.1N Perchloric Acid; B) Acetonitrile. Linear Gradient 5-50%B in 10 min. Ambient. 2 mL/min. 10 µL, UV 210 nm.

### Fat Soluble Vitamins

**PRP-1, 4.1 x 250 mm, 7 µm, (P/N 79422)**




**Conditions:** 20:70:10 Tetrahydrofuran : Acetonitrile : Water. Isocratic. Ambient. 1.5 mL/min. 100 µL, UV 280 nm.

## Ordering Information

**HPLC Columns**

| I.D. x Length | 3 µm | 5 µm | 7 µm | 10 µm | 12-20 µm |
|---|---|---|---|---|---|
| 1.0 x 50 mm | | 79751 | 79755 | 79759 | |
| 1.0 x 100 mm | 79169 | 79752 | 79756 | 79760 | |
| 1.0 x 150 mm | 79847 | 79753 | 79757 | 79761 | |
| 1.0 x 250 mm | | 79754 | 79758 | 79762 | |
| 2.1 x 50 mm | 79854 | 79195 | 79554 | | |
| 2.1 x 100 mm | 79844 | 79790 | | | |
| 2.1 x 150 mm | 79845 | 79366 | | 79480 | |
| 2.1 x 150 mm* | | 79796 | | | |
| 2.1 x 250 mm | | | 79390 | 79391 | |
| 2.3 x 25 mm | | 79789** | | | |
| 4.1 x 50 mm | 79804 | 79443 | | | |
| 4.1 x 100 mm | 79805 | 79479 | | 79565 | |
| 4.1 x 150 mm | 79806 | 79444 | 79529 | 79425 | 79714 |
| 4.1 x 250 mm | | 79820 | 79422 | 79427 | 79358 |
| 4.6 x 50 mm* | | 79850 | | | 79874 |
| 4.6 x 100 mm* | | 79558 | | | |
| 4.6 x 150 mm* | | 79423 | | 79351 | |

| I.D. x Length | 3 µm | 5 µm | 7 µm | 10 µm | 12-20 µm |
|---|---|---|---|---|---|
| 4.6 x 250 mm* | | 79571 | 79380 | 79381 | |
| 7.0 x 100 mm | | | | 79495 | 79713 |
| 7.0 x 300 mm | | | | | 79719 |
| 7.0 x 305 mm | | 79795 | 79545 | 79426 | |
| 10.0 x 50 mm | | | 79367 | | |
| 10.0 x 100 mm | | 79355 | | 79499 | |
| 10.0 x 150 mm | | 79204 | | 79349 | |
| 10.0 x 250 mm | | | 79531 | 79496 | |
| 21.5 x 100 mm | | | 79791 | | |
| 21.5 x 150 mm | | | | 79532 | 79497 |
| 21.5 x 250 mm | | | 79352 | 79478 | 79428 |
| 30.0 x 300 mm | | | | | 79718 |
| 50.8 x 100 mm | | | | | 79498 |
| 50.8 x 150 mm | | | | | 79716 |
| 50.8 x 250 mm | | | | 79567 | 79493 |
| 101.6 x 250 mm | | | | | 79525 |

* PEEK hardware

** Cartridge Column, Cartridge Holder P/N 32908 must be purchased separately.

| Analytical Guard Columns | For Steel Columns* | For PEEK Columns** |
|---|---|---|
| Starter Kits (1 holder, 2 cartridges) | 79447 | 79317 |
| Replacement Cartridges (5/pk) | 79445 | 79318 |

* Analytical guard column for steel columns is 2.3 x 20 mm

** Analytical guard column for PEEK columns is 3.0 x 8.0 mm

| Semiprep/Preparative Guard Column | For Steel Columns*** |
|---|---|
| Starter Kit (1 holder, 1 cartridge) | 79121 |
| Replacement Cartridges (2/pk) | 79122 |

*** Semiprep/preparative guard column for steel columns is 4.6 x 20 mm

Visit the HAMILTON Application Compound Index at **http://www.hamiltoncompany.com/product/hplc/myappindex.html** or e-mail **hplc@hamiltoncompany.com** for a complete list of compounds that have been separated.

# PRP-3 Reversed Phase HPLC Columns

**Polymeric 300 Å columns for protein separations.**

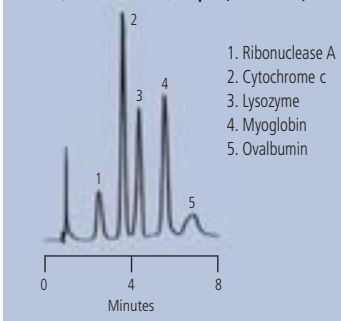
- **pH stable from 0 to 14.**
- **Better sample recovery than silica-based columns (there are no silanol groups).**
- **Excellent durability (the support can be cleaned with strong acid or base to remove any sample residue).**




- Three particle sizes: 3, 10 and 12-20 µm.
- Eight column internal diameters: 1.0 to 50.8 mm.
- Two column materials: 316 stainless steel and PEEK.
- Analytical and semiprep/preparative guard columns.

### Proteins

**PRP-3, 4.1 x 150 mm, 10 µm (P/N 79466)**

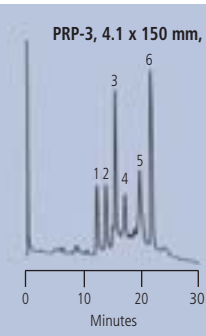



1. Ribonuclease A
2. Cytochrome c
3. Lysozyme
4. Myoglobin
5. Ovalbumin

**Conditions:** A) 0.1% TFA in Water pH 2.0; B) 0.1% TFA in Acetonitrile. Linear Gradient 25-50% B in 5 min. Hold 3 min. Ambient. 2 mL/min. 100 µL, UV 215 nm.

### Proteins at pH 12.2

**PRP-3, 4.1 x 150 mm, 10 µm (P/N 79466)**




1. Ribonuclease A 1.0 mg/mL
2. Insulin 1.0 mg/mL
3. Cytochrome c 1.0 mg/mL
4. Trypsin 1.0 mg/mL
5. Lysozyme 1.0 mg/mL
6. Pyruvate Dehydrogenase 0.5 mg/mL

**Conditions:** A) 0.1% TFA in 50mM Sodium Hydroxide pH 12.2; B) 0.1% TFA in Acetonitrile. Linear Gradient 0-60% B in 30 min. Ambient. 2 mL/min. 50 µL, UV 220 nm.

## Ordering Information

**HPLC Columns**

| I.D. x Length | 3 µm | 10 µm |
|---|---|---|
| 1.0 x 50 mm | | 79763 |
| 1.0 x 100 mm | | 79764 |
| 1.0 x 150 mm | | 79765 |
| 1.0 x 250 mm | | 79766 |
| 2.1 x 50 mm | 79858 | |
| 2.1 x 100 mm | 79196 | 79863 |
| 2.1 x 150 mm | 79846 | 79392 |
| 4.1 x 50 mm | 79807 | 79467 |
| 4.1 x 100 mm | 79808 | |

| I.D. x Length | 3 µm | 10 µm | 12-20 µm |
|---|---|---|---|
| 4.1 x 150 mm | 79809 | 79466 | |
| 4.1 x 250 mm | | 79794 | |
| 4.6 x 50 mm* | | 79539 | |
| 4.6 x 150mm* | | 79382 | |
| 4.6 x 250 mm* | | 79574 | |
| 7.0 x 305 mm | | 79468 | |
| 10.0 x 250 mm | | 79526 | |
| 21.5 x 250 mm | | | 79469 |
| 50.8 x 250 mm | | | 79875 |

* PEEK hardware

| Analytical Guard Columns | For Steel Columns* | For PEEK Columns** |
|---|---|---|
| Starter Kits (1 holder, 2 cartridges) | 79461 | 79393 |
| Replacement Cartridges (5/pk) | 79454 | 79395 |

* Analytical guard column for steel columns is 2.3 x 20 mm
** Analytical guard column for PEEK columns is 3.0 x 8.0 mm

| Semiprep/Preparative Guard Column | For Steel Columns* |
|---|---|
| Starter Kit (1 holder, 1 cartridge) | 79123 |
| Replacement Cartridges (2/pk) | 79124 |

* Semiprep/preparative guard column for steel columns is 4.6 x 20 mm

# PRP-Infinity Reversed Phase HPLC Columns

**Polymeric nonporous packing for fast gradient separation of large proteins.**

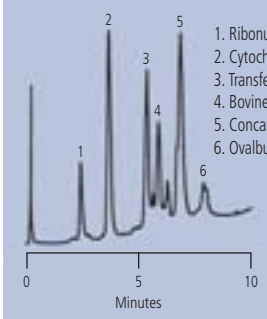
- **pH stable from 0 to 14.**
- **Better sample recovery than silica-based columns (there are no silanol groups).**
- **Excellent durability (the support can be cleaned with strong acid or base to remove any sample residue).**




- One particle size: 4 µm.
- Three column internal diameters: 2.1 to 10.0 mm.
- One column material: 316 stainless steel.

**Proteins**

**PRP-Infinity, 4.1 x 33 mm, 4 µm (P/N 79470)**

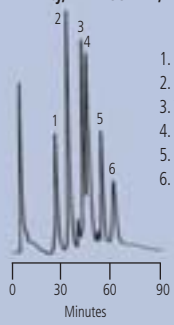



1. Ribonuclease A
2. Cytochrome c
3. Transferrin
4. Bovine Serum Albumin
5. Concanavalin A
6. Ovalbumin

**Conditions:** A) 0.1% TFA in Water pH 2.0; B) 0.1% TFA in Acetonitrile. Linear Gradient 20-60% B in 10 min. Ambient. 2 mL/min. 20 µL, UV 215 nm.

**Proteins**

**PRP-Infinity, 4.1 x 33 mm, 4 µm (P/N 79470)**




1. Ribonuclease A
2. Cytochrome c
3. Transferrin
4. Bovine Serum Albumin
5. Concanavalin A
6. Ovalbumin

**Conditions:** A) 0.1% TFA in Water pH 2.0; B) 0.1% TFA in Acetonitrile. Linear Gradient 21-60% B at 0.6% per second. Ambient. 2 mL/min. 20 µL, UV 215 nm.

## Ordering Information

| HPLC Columns I.D. x Length | 4 µm |
|---|---|
| 2.1 x 33 mm | 79576 |
| 2.1 x 100 mm | 79748 |
| 4.1 x 33 mm | 79470 |
| 4.1 x 50 mm | 79533 |
| 10.0 x 60 mm | 79527 |

For PRP-Infinity columns an in-line filter is recommended as a guard column is not available.

Visit the HAMILTON Application Compound Index at **http://www.hamiltoncompany.com/product/hplc/myappindex.html** or e-mail **hplc@hamiltoncompany.com** for a complete list of compounds that have been separated.

# HxSil C8 & C18 Reversed Phase HPLC Columns

**Silica-based 100 Å columns for general reversed phase separations.**

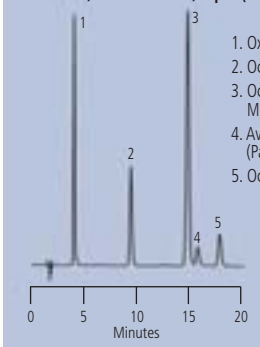
- **Separation of closely related PAHs.**
- **Better retention of poorly retained compounds.**
- **Separation of neutral, acidic and basic compounds without tailing (tailing factor of less than 2.0).**




- Two particle sizes: 3 and 5 µm.
- Five column internal diameters: 2.1 to 21.5 mm.
- Analytical and semiprep/preparative guard columns in 316 stainless steel.

### Sunscreens in Lip Balm

**HxSil C18, 4.6 x 150 mm, 5 µm (P/N 79868)**

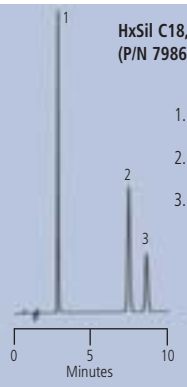



1. Oxybenzone
2. Octocrylene
3. Octyl Methoxycinnamate
4. Avobenzone (Parsol 1789)
5. Octyl Salicylate

**Conditions:** 85:15 Methanol : Water. Isocratic. Ambient. 1 mL/min. 5 uL, UV 308 nm.

### Sunscreen Compounds

**HxSil C18, 4.6 x 150 mm, 5 µm (P/N 79868)**

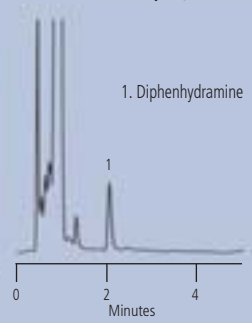



1. 2-Hydroxy-4-methoxybenzophenone
2. 2-Ethylhexyl trans-4-methoxycinnamate
3. 2-Ethylhexylsalicylate

**Conditions:** 7:1 Acetonitrile : Water. Isocratic. Ambient. 1 mL/min. 10 µL, UV 254 nm.

### Diphenhydramine in Itch Relief Gel

**HxSil C18, 4.6 x 150 mm, 5 µm (P/N 79868)**

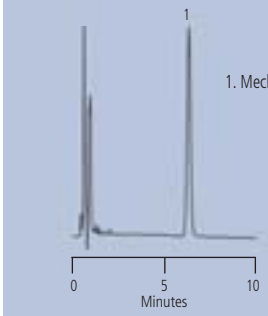



1. Diphenhydramine 10 ppm

**Conditions:** 9:1 Methanol : 20mM Potassium Hydrogen Phosphate pH 7.0. Isocratic. Ambient. 2 mL/min. 5 µL, UV 254 nm.

### Meclizine in Tablets

**HxSil C18, 4.6 x 150 mm, 5 µm (P/N 79868)**

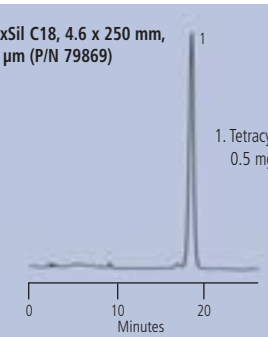



1. Meclizine 1 mg/mL

**Conditions:** 9:1 Methanol : 20mM Potassium Hydrogen Phosphate pH 7.0. Isocratic. Ambient. 2 mL/min. 5 µL, UV 254 nm.

### Tetracycline by USP Method

**HxSil C18, 4.6 x 250 mm, 5 µm (P/N 79869)**

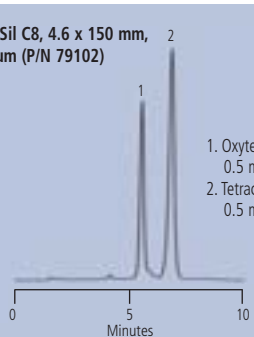



1. Tetracycline 0.5 mg/mL

**Conditions:** 680 mL 0.1N Ammonium Oxalate, 270 mL Dimethylformamide, 50 mL 0.2M Dibasic Ammonium Phosphate pH 7.6. Isocratic. Ambient. 1 mL/min. 10 µL, UV 280 nm.

### Oxytetracycline and Tetracycline

**HxSil C8, 4.6 x 150 mm, 5 µm (P/N 79102)**



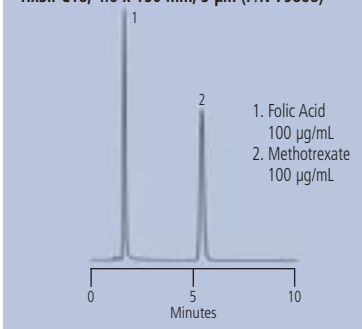

1. Oxytetracycline 0.5 mg/mL
2. Tetracycline 0.5 mg/mL

**Conditions:** 680 mL 0.1N Ammonium Oxalate, 270 mL Dimethylformamide, 50 mL 0.2M Dibasic Ammonium Phosphate pH 7.6. Isocratic. Ambient. 1 mL/min. 20 µL, UV 280 nm.

# HxSil C8 & C18 Reversed Phase HPLC Columns

### Folic Acid, Methotrexate by USP Method

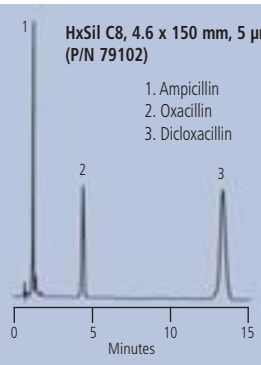
**HxSil C18, 4.6 x 150 mm, 5 µm (P/N 79868)**




**Conditions:** 9:1 0.126M Sodium Phosphate, Dibasic, 0.037M Citric Acid pH 6.0 : Acetonitrile. Isocratic. Ambient. 1.2 mL/min. 10 µL, UV 302 nm.

### Antibiotics

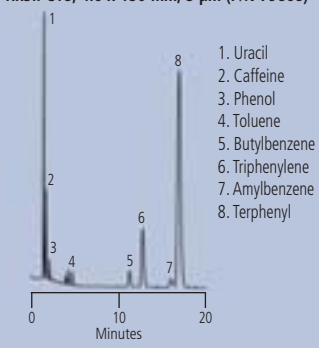
**HxSil C8, 4.6 x 150 mm, 5 µm (P/N 79102)**




**Conditions:** 3:1 0.05M Potassium Phosphate pH 7 : Acetonitrile. Isocratic. Ambient. 2 mL/min. 5 µL, UV 254 nm.

### Small Molecules

**HxSil C18, 4.6 x 150 mm, 5 µm (P/N 79868)**




**Conditions:** 7:3 Acetonitrile : Water. Isocratic. Ambient. 1 mL/min. 50 µL, UV 254 nm.

## HxSil C8 Ordering Information

**HPLC Columns**

| I.D. x Length | 3 µm | 5 µm |
|---|---|---|
| 2.1 x 33 mm | 79116 | |
| 2.1 x 50 mm | 79117 | 79107 |
| 2.1 x 75 mm | 79118 | 79108 |
| 2.1 x 100 mm | 79119 | 79109 |
| 2.1 x 150 mm | 79120 | 79110 |
| 2.1 x 250 mm | | 79111 |
| 4.6 x 33 mm | 79112 | |

| I.D. x Length | 3 µm | 5 µm |
|---|---|---|
| 4.6 x 50 mm | 79113 | 79100 |
| 4.6 x 100 mm | 79114 | 79101 |
| 4.6 x 150 mm | 79115 | 79102 |
| 4.6 x 250 mm | | 79103 |
| 7.0 x 250 mm | | 79104 |
| 10.0 x 250 mm | | 79105 |
| 21.5 x 250 mm | | 79106 |

| Analytical Guard Column | For Steel Columns* |
|---|---|
| Starter Kit (1 holder, 2 cartridges) | 79458 |
| Replacement Cartridges (5/pk) | 79451 |

* Analytical guard column for steel columns is 2.3 x 20 mm

| Semiprep/Preparative Guard Column | For Steel Columns* |
|---|---|
| Starter Kit (1 holder, 1 cartridge) | 79135 |
| Replacement Cartridges (2/pk) | 79136 |

* Semiprep/preparative guard column for steel columns is 4.6 x 20 mm

## HxSil C18 Ordering Information

**HPLC Columns**

| I.D. x Length | 3 µm | 5 µm |
|---|---|---|
| 2.1 x 33 mm | 79888 | |
| 2.1 x 50 mm | 79889 | 79881 |
| 2.1 x 75 mm | 79890 | 79882 |
| 2.1 x 100 mm | 79891 | 79883 |
| 2.1 x 150 mm | 79892 | 79884 |
| 2.1 x 250 mm | | 79885 |
| 4.6 x 33 mm | 79886 | |

| I.D. x Length | 3 µm | 5 µm |
|---|---|---|
| 4.6 x 50 mm | 79872 | 79867 |
| 4.6 x 100 mm | 79887 | 79879 |
| 4.6 x 150 mm | 79873 | 79868 |
| 4.6 x 250 mm | | 79869 |
| 7.0 x 250 mm | | 79880 |
| 10.0 x 250 mm | | 79870 |
| 21.5 x 250 mm | | 79871 |

| Analytical Guard Column | For Steel Columns* |
|---|---|
| Starter Kit (1 holder, 2 cartridges) | 79459 |
| Replacement Cartridges (5/pk) | 79452 |

* Analytical guard column for steel columns is 2.3 x 20 mm

| miprep/Preparative Guard Column | For Steel Columns* |
|---|---|
| Starter Kit (1 holder, 1 cartridge) | 79137 |
| Replacement Cartridges (2/pk) | 79138 |

* Semiprep/preparative guard column for steel columns is 4.6 x 20 mm

Visit the HAMILTON Application Compound Index at **http://www.hamiltoncompany.com/product/hplc/myappindex.html** or e-mail **hplc@hamiltoncompany.com** for a complete list of compounds that have been separated.

# Anion Exchange HPLC Columns

## PRP-X100

**Polymeric anion exchange packings for separation of inorganic and organic anions.**

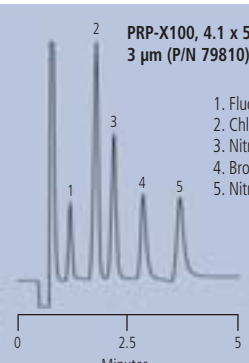
- **Easily separate the eight common anions (fluoride through sulfate).**
- **Good separation of fluoride from the water dip.**
- **Use with organic solvent from 0 to 100 % for elution of hydrophobic anions or column cleaning.**
- **pH stable from 0 to 14.**
- **Use conductivity or UV detection.**




- Four particle sizes: 3, 5, 10 and 12-20 µm.
- Eight column internal diameters: 1.0 to 50.8 mm.
- Two column materials: 316 stainless steel and PEEK.
- Analytical and semiprep/preparative guard columns.

### Common Anions

**PRP-X100, 4.1 x 50 mm, 3 µm (P/N 79810)**

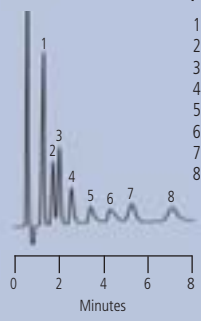



1. Fluoride
2. Chloride
3. Nitrite
4. Bromide
5. Nitrate

**Conditions:** 4mM p-Hydroxybenzoic Acid pH 8.5 w/2.5% Methanol 1 mL/min. 100 µL, Conductivity.

### Anions by Indirect UV Detection

**PRP-X100, 4.1 x 150 mm, 10 µm (P/N 79434)**




1. Fluoride 10 ppm
2. Carbonate 10 ppm
3. Chloride 10 ppm
4. Nitrite 10 ppm
5. Bromide 10 ppm
6. Nitrate 10 ppm
7. Phosphate 10 ppm
8. Sulfate 10 ppm

**Conditions:** 4mM p-Hydroxybenzoic Acid pH 8.9 with 2.5 % Methanol. Isocratic. Ambient. 2 mL/min. 100 µL, Indirect UV 310 nm.

### EDTA

**PRP-X100, 4.6 x 150 mm, 10 µm (P/N 79354)**



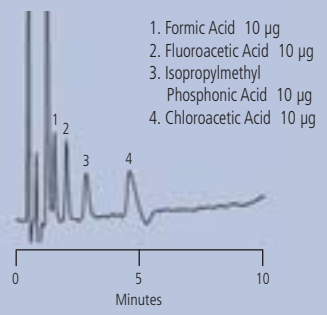

1. Copper EDTA 10 ppm

**Conditions:** 3mM Sulfuric Acid. Isocratic. Ambient. 2 mL/min. 100 uL, UV 254 nm.

# PRP-X100 Anion Exchange HPLC Columns

## Organic Acids

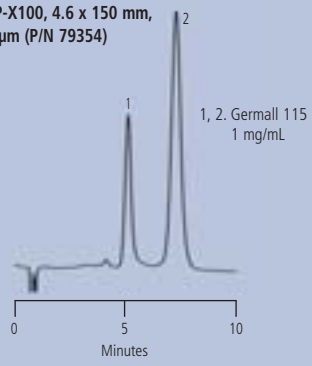
**PRP-X100, 4.1 x 150 mm, 10 µm (P/N 79434)**




Conditions: 0.1M Sodium Hydroxide in 5:95 Acetonitrile : Deionized Water. Isocratic. Ambient. 2 mL/min. 10 µL, Conductivity.

## Germall 115

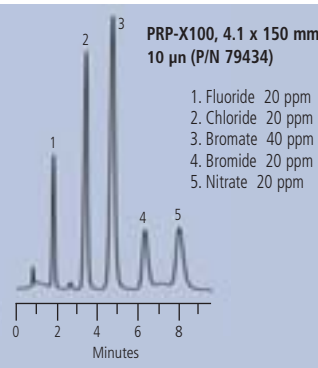
**PRP-X100, 4.6 x 150 mm, 10 µm (P/N 79354)**




**Conditions:** 7:3 20mM Sodium Hydroxide : Methanol. Isocratic. Ambient. 2 mL/min. 50 µL, UV 220 nm.

## Bromate and Other Anions

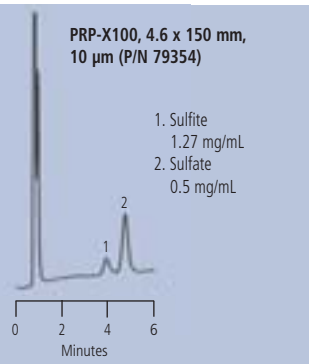
**PRP-X100, 4.1 x 150 mm, 10 µm (P/N 79434)**




**Conditions:** 1.7mM Sodium Bicarbonate, 1.8mM Sodium Carbonate, 0.1mM Sodium Thiocyanate. Isocratic. Ambient. 2 mL/min. 10 µL, Suppressed Conductivity.

## Sulfite and Sulfate

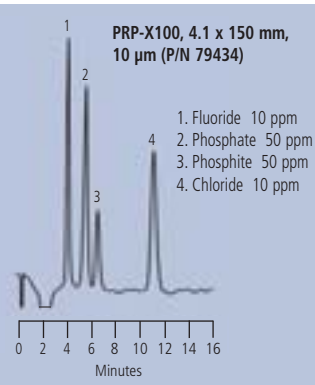
**PRP-X100, 4.6 x 150 mm, 10 µm (P/N 79354)**




**Conditions:** 80:20 8mM p-Hydroxybenzoic Acid pH 10.0 : Methanol. Isocratic. Ambient. 2 mL/min. 10 µL, Conductivity.

## Phosphate and Phosphite

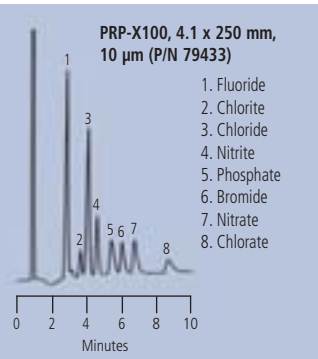
**PRP-X100, 4.1 x 150 mm, 10 µm (P/N 79434)**




**Conditions:** 20mM Succinic Acid pH 2.9. Isocratic. Ambient. 2 mL/min. 100 µL Conductivity.

## Chlorite and Chlorate

**PRP-X100, 4.1 x 250 mm, 10 µm (P/N 79433)**




**Conditions:** 4.0mM 4-Amino-2-Hydroxybenzoic Acid pH 5.8. Isocratic. Ambient. 2 mL/min.100 µL, Indirect UV 310 nm.

## Ordering Information

**HPLC Columns**

| I.D. x Length | 3 µm | 5 µm | 10 µm |
|---|---|---|---|
| 1.0 x 50 mm | | 79767 | 79771 |
| 1.0 x 100 mm | | 79768 | 79772 |
| 1.0 x 150 mm | 79878 | 79769 | 79773 |
| 1.0 x 250 mm | | 79770 | 79774 |
| 2.1 x 50 mm | | 79150 | 79749 |
| 2.1 x 150 mm | 79146 | | 79421 |
| 2.1 x 150 mm* | | 79852 | 79853 |
| 2.1 x 250 mm | | 79190 | 79346 |
| 4.1 x 50 mm | 79810 | | 79365 |
| 4.1 x 100 mm | 79811 | 79538 | 79439 |
| 4.1 x 150 mm | 79812 | | 79434 |

| I.D. x Length | 5 µm | 10 µm | 12-20 µm |
|---|---|---|---|
| 4.1 x 250 mm | | 79433 | 79359 |
| 4.6 x 150 mm* | 79174 | 79354 | |
| 4.6 x 250 mm* | 79181 | 79455 | |
| 7.0 x 305 mm | | 79364 | |
| 10.0 x 150 mm | | 79715 | |
| 10.0 x 250 mm | | 79534 | |
| 21.5 x 100 mm | | | 79543 |
| 21.5 x 150 mm | | | 79542 |
| 21.5 x 250 mm | | 79535 | 79353 |
| 50.8 x 150 mm | | | 79551 |
| 50.8 x 250 mm | | | 79550 |

* PEEK hardware

| Analytical Guard Columns | For Steel Columns** | For PEEK Columns*** |
|---|---|---|
| Starter Kits (1 holder, 2 cartridges) | 79448 | 79383 |
| Replacement Cartridges (5/pk) | 79446 | 79385 |

** Analytical guard column for steel columns is 2.3 x 20 mm
*** Analytical guard column for PEEK columns is 3.0 x 8.0 mm

| Semiprep/Preparative Guard Column | For Steel Columns**** |
|---|---|
| Starter Kit (1 holder, 1 cartridge) | 79125 |
| Replacement Cartridges (2/pk) | 79126 |

**** Semiprep/preparative guard column for steel columns is 4.6 x 20 mm

# PRP-X110 Anion Exchange HPLC Columns

**Polymeric anion exchange packings for separation of inorganic and organic anions from 20 ppb to 20 ppm.**

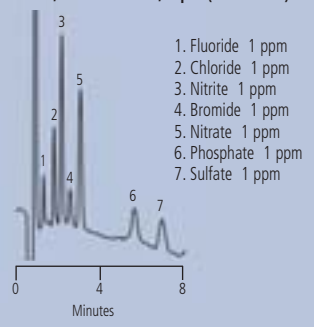
- **Good separation of fluoride from the water dip.**
- **Compatible with conductivity or UV detectors.**
- **Use with organic solvent up to 100%**
- **pH stable from 0 to 14.**




- Two particle sizes: 3 and 7 µm.
- Four column internal diameters: 1.0 to 4.6 mm.
- Two column materials: 316 stainless steel and PEEK.
- Analytical guard columns.

### Anions

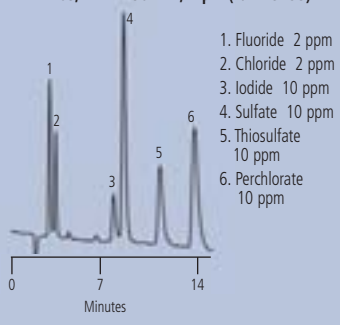
**PRP-X110, 4.1 x 150 mm, 7 µm (P/N 79732)**




**Conditions:** 2.0mM p-Hydroxybenzoic Acid pH 9.3. Isocratic. Ambient. 2 mL/min. 100 µL, Non-Suppressed Conductivity.

### Polarizable Anions

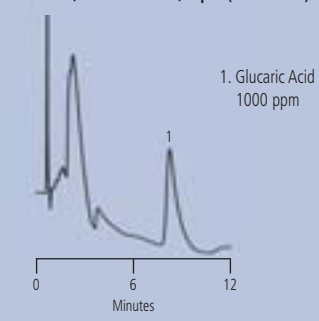
**PRP-X110S, 4.1 x 250 mm, 7 µm (P/N 79735)**




**Conditions:** 5mM Sodium Hydroxide with 5mM Phenol, 0.05mM Sodium Thiocyanate. Ambient. 1.5 mL/min. 30 µL, Suppressed Conductivity.

### Glucaric Acid

**PRP-X110, 4.1 x 150 mm, 7 µm (P/N 79732)**




**Conditions:** 3:7 Acetonitrile : 20mM Potassium Phosphate, pH 6.2. Isocratic. Ambient. 1.5 mL/min. 20 µL, UV 210 nm.

## Ordering Information

| HPLC Columns I.D. x Length | PRP-X110 3 µm | PRP-X110 7 µm | PRP-X110S 7 µm |
|---|---|---|---|
| 1.0 x 50 mm | | 79775 | |
| 1.0 x 100 mm | | 79776 | |
| 1.0 x 150 mm | | 79777 | |
| 1.0 x 250 mm | | 79778 | |
| 2.1 x 100 mm* | | 79742 | 79743 |
| 2.1 x 150 mm* | | 79744 | 79745 |
| 2.1 x 250 mm* | | 79746 | 79747 |
| 4.1 x 100 mm | 79814 | 79730 | 79731 |
| 4.1 x 150 mm | 79815 | 79732 | 79733 |
| 4.1 x 250 mm | | 79734 | 79735 |

| I.D. x Length | PRP-X110 7 µm | PRP-X110S 7 µm |
|---|---|---|
| 4.6 x 100 mm* | 79736 | 79737 |
| 4.6 x 150 mm* | 79738 | 79739 |
| 4.6 x 250 mm* | 79740 | 79741 |

* PEEK hardware

| Analytical Guard Columns | For Steel Columns* | For PEEK Columns** |
|---|---|---|
| Starter Kits (1 holder, 2 cartridges) | 79726 | 79727 |
| Replacement Cartridges (5/pk) | 79728 | 79729 |

* Analytical guard column for steel columns is 2.3 x 20 mm
** Analytical guard column for PEEK columns is 3.0 x 8.0 mm

# PRP-X500 Anion Exchange HPLC Columns

**Polymeric strong-base anion exchange packing with limited porosity for separation of proteins.**

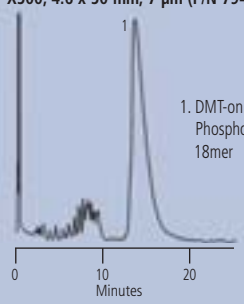
- **Fast separation of large proteins.**
- **pH stable from 0 to 9.**




- One particle size: 7 µm.
- Three column internal diameters: 2.1 to 10.0 mm.
- Two column materials: 316 stainless steel and PEEK.
- Higher sample capacity than nonporous supports.

**DMT-on Antisense Phosphorothioate 18mer**

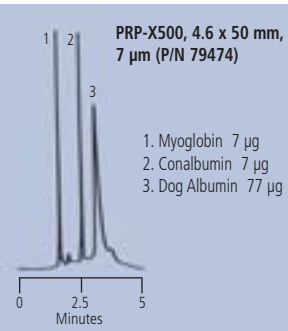
**PRP-X500, 4.6 x 50 mm, 7 µm (P/N 79474)**




**Conditions:** A) 85:15 100mM TRIS pH 8.0 : Acetonitrile; B) 85:15 100mM TRIS pH 4.0, 2.5M Lithium Chloride : Acetonitrile. Linear Gradient 0-100% B in 10 min. 2 mL/min. 100 µL of a 1 mg/ml solution, UV 260nm.

**Proteins**

**PRP-X500, 4.6 x 50 mm, 7 µm (P/N 79474)**




**Conditions:** A) 10mM Tris pH 9.0; B) 10mM Tris pH 9.0, 0.5N Sodium Chloride. Linear Gradient 0-50% B in 2.5 min. Hold for 2.5 min. Ambient. 2 mL/min. 30 µL, UV 254 nm.

## Ordering Information

| HPLC Columns I.D. x Length | 7 µm |
|---|---|
| 2.1 x 50 mm* | 79864 |
| 2.1 x 250 mm | 79555 |
| 4.6 x 50 mm* | 79474 |
| 4.6 x 150 mm* | 79573 |
| 10.0 x 100 mm | 79348 |

* PEEK hardware

| Analytical Guard Column | For PEEK Columns* |
|---|---|
| Starter Kit (1 holder, 2 cartridges) | 79319 |
| Replacement Cartridges (5/pk) | 79320 |

* Analytical guard column for PEEK columns is 3.0 x 8.0 mm

# PRP-X600 Anion Exchange HPLC Columns

**Polymeric weak-base anion exchange packing for gradient separation of proteins and DNA oligomers.**

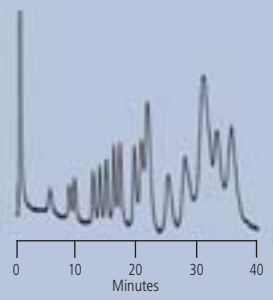
- **Limited porosity allows separation of large DNA fragments.**
- **pH stable from 0 to 14.**




- Particle size: 7 µm.
- Column material: PEEK.
- Guard column in PEEK.
- Higher sample capacity than nonporous supports

### Separation of DNA Fragments

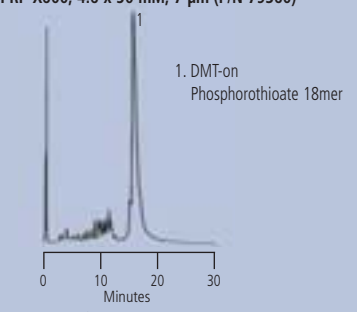
**PRP-X600, 4.6 x 50 mm, 7 µm (P/N 79360)**




**Conditions:** A) 10mM TRIS, 1mM EDTA pH 9.0; B) 1N NaCl in A, Linear Gradient 60-67.5% B in 15 min. 67.5%-75% B (15-45 min.). Ambient. 1 mL/min. 5 µL, UV 260 nm.

### DMT-on Phosphorothioate 18mer

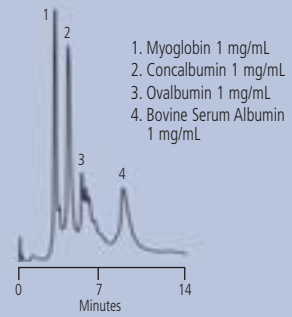
**PRP-X600, 4.6 x 50 mM, 7 µm (P/N 79360)**




Conditions: A) 85:15 100mM TRIS pH 8.0 : Acetonitrile; B) 85:15 100mM TRIS pH 4.0, 2.5M Lithium Chloride : Acetonitrile. Linear Gradient 0-100% B in 10 min. 2 mL/min. UV 260 nm.

### Proteins

**PRP-X600, 4.6 x 50 mm, 7 µm (P/N 79360)**




**Conditions:** A) 20mM TRIS pH 9.0; B) 20mM TRIS, pH 9.0, 1.0M Sodium Chloride. Linear Gradient 0 to 15%B in 10 min. Hold 2 min. 2 mL/min. UV 220nm.

## Ordering Information

**HPLC Columns**

| I.D. x Length | 7 µm |
|---|---|
| 4.6 x 50 mm* | 79360 |
| 4.6 x 100 mm* | 79187 |
| 4.6 x 150 mm* | 79188 |
| 4.6 x 250 mm* | 79189 |

* PEEK hardware

| Analytical Guard Column | For PEEK Columns* |
|---|---|
| Starter Kit (1 holder, 2 cartridges) | 79361 |
| Replacement Cartridges (5/pk) | 79362 |

* Analytical guard column for PEEK columns is 3.0 x 8.0 mm

Visit the HAMILTON Application Compound Index at **http://www.hamiltoncompany.com/product/hplc/myappindex.html** or e-mail **hplc@hamiltoncompany.com** for a complete list of compounds that have been separated.

# RCX-10 Anion Exchange HPLC Columns

**Polymeric anion exchange packing for isocratic or gradient separation of carbohydrates.**

- **pH stable from 0 to 14.**
- **Isocratic separation of mono and disaccharides.**
- **Gradient separation of oligomers up to DP8.**
- **Compatible with PAD, conductivity and RI detectors.**




- Particle size: 7 µm.
- Three column internal diameters: 2.1 to 4.6 mm.
- Two column materials: 316 stainless steel and PEEK.
- Guard columns in stainless steel and PEEK.

### Glycols in Water

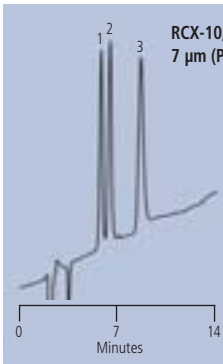



**RCX-10, 4.1 x 250 mm, 7 µm (P/N 79440)**

1. Ethylene Glycol 100 ppb
2. Propylene Glycol 100 ppb

**Conditions:** 10mN Sodium Hydroxide. Isocratic. Ambient. 1 mL/min. 50 µL, Pulsed Amperometric, Dual Gold Electrode.
E1=650 mV T1=166 msec
E2=900 mV T2=166 msec
E3=-800 mV T3=500 msec

### Acetyl Glucosamine

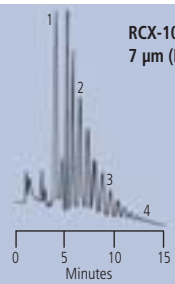



**RCX-10, 4.1 x 250 mm, 7 µm (P/N 79440)**

1. Galactosamine 100 ppm
2. Glucosamine 100 ppm
3. Acetyl-Glucosamine 100 ppm

**Conditions:** 10mN Sodium Hydroxide (purged with Helium during the run) Isocratic. Ambient. 1 mL/min. 50 µL, Refractive Index.

### Artichoke Tubers




**RCX-10, 4.1 x 250 mm, 7 µm (P/N 79440)**

1. DP2
2. DP5
3. DP10
4. DP15

**Conditions:** A) 60mM Sodium Hydroxide; B) 60mM Sodium Hydroxide with 500mM Sodium Acetate. Gradient: 0-100%B in 10 min. 2 mL/min. 20 µL, Pulsed Amperometric, Dual Gold Electrode
E1=500 mV T1=333 msec
E2=800 mV T2=166 msec
E3=-600 mV T3=499 msec

## Ordering Information

**HPLC Columns**

| I.D. x Length | 7 µm |
|---|---|
| 2.1 x 250 mm | 79399 |
| 4.1 x 250 mm | 79440 |
| 4.6 x 250 mm* | 79388 |

* PEEK hardware

| Analytical Guard Columns | For Steel Columns* | For PEEK Columns** |
|---|---|---|
| Starter Kits (1 holder, 2 cartridges) | 79462 | 79378 |
| Replacement Cartridges (5/pk) | 79463 | 79379 |

* Analytical guard column for steel columns is 2.3 x 20 mm
** Analytical guard column for PEEK columns is 3.0 x 8.0 mm

# RCX-30 Anion Exchange HPLC Columns

**Polymeric anion exchange packing for isocratic or gradient separation of complex carbohydrates.**

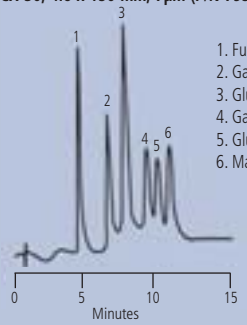
- **pH stable from 0 to 14.**
- **Isocratic or gradient modes.**
- **Higher ion exchange capacity support for separation of closely related carbohydrates.**
- **Compatible with PAD and RI detectors.**




- Particle size: 7 µm.
- Two column internal diameters: 4.1 to 4.6 mm.
- Two column materials: Stainless steel and PEEK.
- Guard column in PEEK.

## Glycoprotein Monosaccharides

**RCX-30, 4.6 x 150 mm, 7µm (P/N 79370)**

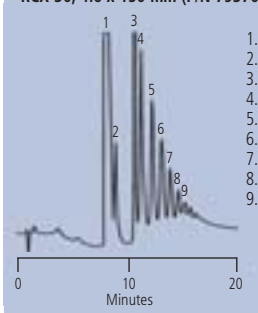



1. Fucose
2. Galactosamine
3. Glucosamine
4. Galactose
5. Glucose
6. Mannose

**Conditions:** 16mN Sodium Hydroxide. Isocratic. Ambient. 2 mL/min. 15 µL, Pulsed Amperometric 5 µAFS Dual Gold Electrode
E1=600 mV T1=166 msec
E2=600 mV T2=166 msec
E3=-800 mV T3=249 msec

## Corn Syrup

**RCX-30, 4.6 x 150 mm (P/N 79370)**

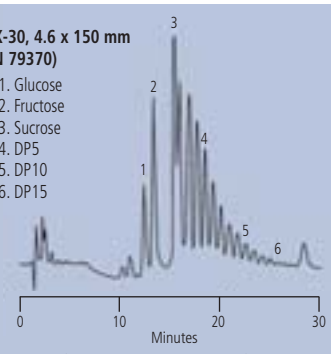



1. Glucose
2. Fructose
3. Maltose
4. Maltotriose
5. Maltotetraose
6. Maltopentaose
7. Maltohexaose
8. Maltoheptaose
9. Maltooctaose

**Conditions:** A) 60mM Sodium Hydroxide; B) 500mM Sodium Acetate in A. Linear Gradient 100% A for 4 min., then 0-100% B (4-15 min.) Ambient. 2 mL/min. 50 µL. Pulsed Amperometric Dual Gold Electrode.
E1=350 mV T1=166 msec
E2=900 mV T2=166 msec
E3=-850 mV T3=500 msec

## Artichoke Tubers

**RCX-30, 4.6 x 150 mm (P/N 79370)**




1. Glucose
2. Fructose
3. Sucrose
4. DP5
5. DP10
6. DP15

**Conditions:** A) 60mM Sodium Hydroxide; B) 500mM Sodium Acetate in A. Linear Gradient: 0-50% B in 10 min., then 50-100% B (10-20 min.). Ambient. 1 mL/min. 50 µL, Pulsed Amperometric Dual Gold Electrode.
E1=350 mV T1=166 msec
E2=900 mV T2=166 msec
E3=-800 mV T3=500 msec

## Ordering Information

| HPLC Columns I.D. x Length | 7 µm |
|---|---|
| 2.1 x 250 mm | 79170 |
| 4.1 x 250 mm | 79803 |
| 4.6 x 150 mm* | 79370 |
| 4.6 x 250 mm* | 79877 |

* PEEK hardware

| Analytical Guard Column | For PEEK Columns* |
|---|---|
| Starter Kit (1 holder, 2 cartridges) | 79371 |
| Replacement Cartridges (5/pk) | 79372 |

* Analytical guard column for PEEK columns is 3.0 x 8.0 mm

Visit the HAMILTON Application Compound Index at **http://www.hamiltoncompany.com/product/hplc/myappindex.html** or e-mail **hplc@hamiltoncompany.com** for a complete list of compounds that have been separated.

# Cation Exchange HPLC Columns

## PRP-X200

**Polymeric cation exchange packing for separation of inorganic cations and organic cations.**

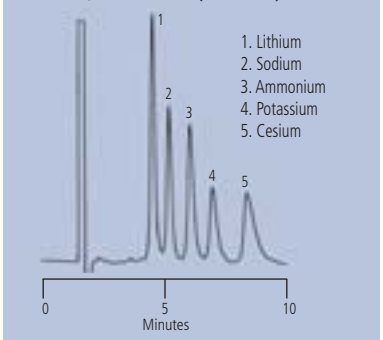
- **Easily separate mono or divalent cations.**
- **pH stable from 0 to 14.**
- **Use with organic solvent up to 100% for elution of hydrophobic cations and column cleaning.**
- **Compatible with conductivity and UV detectors.**




- Particle size: 10 µm.
- Six column internal diameters: 1.0 to 10.0 mm.
- Two column materials: 316 stainless steel and PEEK.
- Analytical and semiprep/preparative guard columns.

### Monovalent Cations

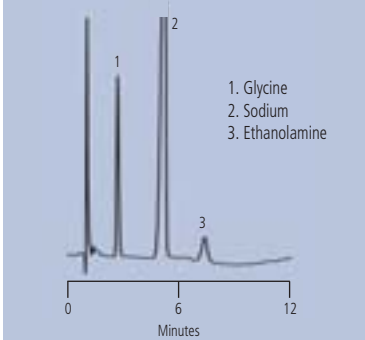
**PRP-X200, 4.1 x 150 mm (P/N 79441)**




**Conditions:** 2.3:1 4mM Nitric Acid: Methanol. Isocratic. Ambient. 2 mL/min. 100 µL, Conductivity.

### Glycine and Ethanolamine

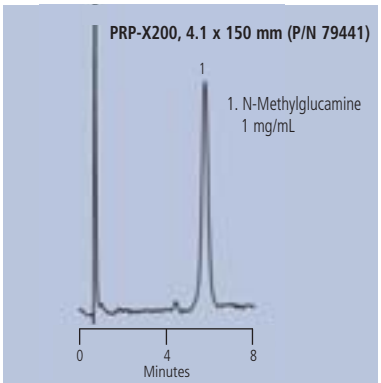
**PRP-X200, 4.1 x 250 mm (P/N 79442)**




**Conditions:** 2mN Nitric Acid. Ambient. Isocratic. 2 mL/min. 20 µL, Conductivity.

### N-Methylglucamine

**PRP-X200, 4.1 x 150 mm (P/N 79441)**




**Conditions:** 2mN Nitric Acid. Isocratic. Ambient. 2 mL/min. 3 µL, Conductivity.

## Ordering Information

**HPLC Columns**

| I.D. x Length | 10 µm | I.D. x Length | 10 µm |
|---|---|---|---|
| 1.0 x 50 mm | 79779 | 4.1 x 150 mm | 79441 |
| 1.0 x 100 mm | 79780 | 4.1 x 250 mm | 79442 |
| 1.0 x 150 mm | 79781 | 4.6 x 50 mm* | 79153 |
| 1.0 x 250 mm | 79782 | 4.6 x 150 mm* | 79384 |
| 2.1 x 150 mm | 79394 | 4.6 x 250 mm* | 79357 |
| 2.1 x 250 mm | 79347 | 7.0 x 305 mm | 79489 |
| 4.1 x 100 mm | 79363 | 10.0 x 250 mm | 79549 |

* PEEK hardware

| Analytical Guard Columns | For Steel Columns* | For PEEK Columns** |
|---|---|---|
| Starter Kits (1 holder, 2 cartridges) | 79456 | 79368 |
| Replacement Cartridges (5/pk) | 79449 | 79369 |

| Semiprep/Preparative Guard Column | For Steel Columns*** |
|---|---|
| Starter Kits (1 holder, 1 cartridge) | 79127 |
| Replacement Cartridges (2/pk) | 79128 |

* Analytical guard column for steel columns is 2.3 x 20 mm
** Analytical guard column for PEEK columns is 3.0 x 8.0 m
*** Semiprep/preparative guard column for steel columns is 4.6 x 20 mm

# PRP-X400 Cation Exchange HPLC Columns

**Polymeric cation exchange packing for separation of glyphosate and its metabolite in drinking water.**

- **Faster analysis when compared to competitor's columns.**
- **Detection levels of less than 10 ppb when using the post column, OPA derivatization technique.**
- **Applicable to other separations, such as inositol and sugar alcohols.**

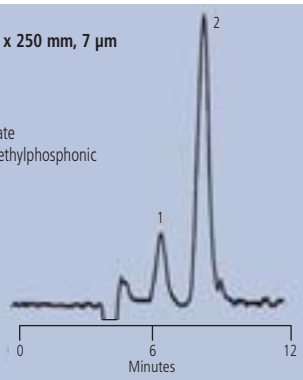



- Two particle sizes: 7 and 12-20 µm.
- Five column internal diameters: 2.1 to 21.5 mm.
- Two column materials: 316 stainless steel and PEEK.
- Analytical and semiprep/preparative guard columns.

### Glyphosate and Metabolite

**PRP-X400, 4.1 x 250 mm, 7 µm (P/N 79473)**

1. Glyphosate
2. Aminomethylphosphonic Acid

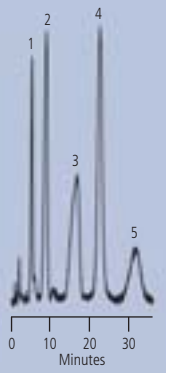



**Conditions:** 0.005M Monobasic Potassium Phosphate. Isocratic. Ambient. 0.5 mL/min. 200 µL, Excitation wavelength 338 nm. Emission wavelength 455 nm. Post Column Conditions: Oxidation Solution Flow Rate: 0.20 mL/min; Reaction Coil: 1 mL (0.05 cm ID X 5 m); Reaction Time: 1.4 min; Temp: 38°C Derivatization Solution: 0.30 mL/min; Reaction Coil: 0.20 mL (0.05 cm ID X 1 m), Ambient.

### Inositol in Vitamin Matrix

**PRP-X400, 4.1 x 250 mm, 7 µm (P/N 79473)**

1, 2, 3, and 5. Unknown
4. Inositol

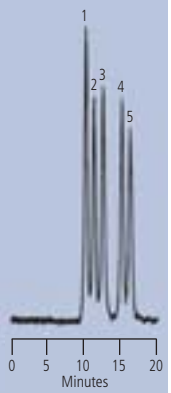



**Conditions:** 85:15 Acetonitrile : 10mN Sodium Hydroxide. Isocratic. Ambient. 2 mL/min. 100 µL, Pulsed Amperometric Dual Gold Electrode. E1=100 mV T1=716 msec E2=1000 mV T2=166 msec E3=-800 mV T3=299 msec Post Column Conditions: 0.1N Sodium Hydroxide solution at 2 mL/min.

### Sugar Alcohols

**PRP-X400, 4.1 x 250 mm, 7 µm (P/N 79473)**

1. Adonitol 200 ppm
2. Arabitol 200 ppm
3. Xylitol 200 ppm
4. Mannitol 200 ppm
5. Sorbitol 200 ppm




**Conditions:** A) Acetonitrile; B) Water. Linear Gradient 10-30% B in 30 min. Ambient. 2 mL/min. 5 µL, Pulsed Amperometric Dual Gold Electrode; delay 510 msec E1=100mV T1=720msec E2=1000mV T2=120msec E3=-800mV T3=300msec Post Column Conditions: 0.1N Sodium Hydroxide at 2 mL/min.

## Ordering Information

| HPLC Columns | | |
|---|---|---|
| **I.D. x Length** | **7 µm** | **12-20 µm** |
| 2.1 x 250 mm | 79398 | |
| 4.1 x 50 mm | 79893 | |
| 4.1 x 150 mm | 79717 | |
| 4.1 x 250 mm | 79473 | 79563 |
| 4.6 x 250 mm* | 79387 | |
| 10.0 x 250 mm | | 79575 |
| 21.5 x 250 mm | | 79553 |

* PEEK hardware

| **Analytical Guard Column** | **For PEEK Columns*** |
|---|---|
| Starter Kit (1 holder, 2 cartridges) | 79376 |
| Replacement Cartridges (5/pk) | 79377 |
| **C18 Guard Column for EPA Glyphosate Application** | **For Steel Columns**** |
| Starter Kit (1 holder, 2 cartridges) | 79459 |
| Replacement Cartridges (5/pk) | 79452 |
| **PRP-X400 Semiprep/Preparative Guard Column** | **For Steel Columns***** |
| Starter Kit (1 holder, 1 cartridge) | 79131 |
| Replacement Cartridges (2/pk) | 79132 |

* Analytical guard column for PEEK columns is 3.0 x 8.0 m
** Analytical guard column for steel columns is 2.3 x 20 mm
*** Semiprep/preparative guard column for steel columns is 4.6 x 20 mm

# PRP-X800 Cation Exchange HPLC Columns

**Polymeric cation exchange columns for the isocratic separation of mono and divalent cations.**

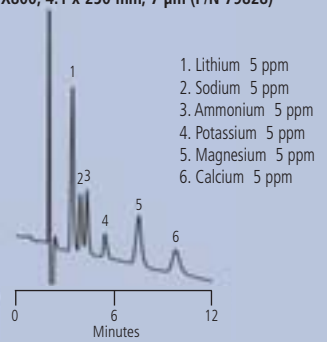
- **Isocratic separation of lithium, sodium, ammonium, potassium, magnesium and calcium.**
- **Gradient separation of transition metals.**
- **Excellent durability (stable to any concentration of water or organic solvent).**




- Particle size: 7 µm.
- Two column internal diameters: 4.1 to 4.6 mm.
- Two column materials: 316 stainless steel and PEEK.
- Guard columns in 316 stainless steel and PEEK.

## Mono and Divalent Cations

**PRP-X800, 4.1 x 250 mm, 7 µm (P/N 79828)**

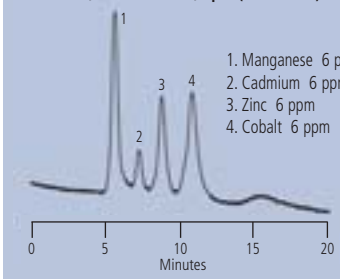



1. Lithium 5 ppm
2. Sodium 5 ppm
3. Ammonium 5 ppm
4. Potassium 5 ppm
5. Magnesium 5 ppm
6. Calcium 5 ppm

**Conditions:** 2mM Cupric Sulfate. Isocratic. Ambient. 0.8 mL/min. 10 µL, Indirect UV 220 nm.

## Transition Metals

**PRP-X800, 4.1 x 150 mm, 7µm (P/N 79855)**

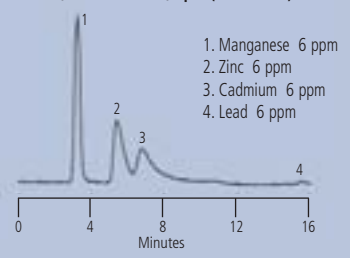



1. Manganese 6 ppm
2. Cadmium 6 ppm
3. Zinc 6 ppm
4. Cobalt 6 ppm

**Conditions: A**) 10mM Ammonium Acetate. pH 3.4; B) Trifluoroacetic Acid in Water pH 1.5. Linear Gradient 15-35% B in 20 min. 1 mL/min. 100 µL, Post Column Reaction: 0.0125% 4-(2-pyridylazo)resorcinol in 5M Ammonium Hydroxide 0.5 mL/min. Visible 540 nm.

## Transition Metals

**PRP-X800, 4.1 x 150 mm, 7µm (P/N 79855)**




1. Manganese 6 ppm
2. Zinc 6 ppm
3. Cadmium 6 ppm
4. Lead 6 ppm

**Conditions:** A). 2mM Ethylenediamine pH 3.2; B) 100mM Ethylenediamine pH 1.73. Linear Gradient 100% A (0-5 min.), 0-100% B in (5-20 min.) 1 mL/min, 100 µL, Post Column Reaction: 0.0125% 4-(2-pyridylazo) resorcinol (PAR) in 5M Ammonium Hydroxide, 0.5 mL/min. Visible 540 nm.

## Ordering Information

| HPLC Columns I.D. x Length | 7 µm |
|---|---|
| 4.1 x 150 mm | 79855 |
| 4.1 x 250 mm | 79828 |
| 4.6 x 150 mm* | 79851 |
| 4.6 x 250 mm* | 79829 |

* PEEK hardware

| Analytical Guard Columns | For Steel Columns* | For PEEK Columns** |
|---|---|---|
| Starter Kits (1 holder, 2 cartridges) | 79830 | 79831 |
| Replacement Cartridges (5/pk) | 79832 | 79833 |

* Analytical guard column for steel columns is 2.3 x 20 mm
** Analytical guard column for PEEK columns is 3.0 x 8.0 mm

Visit the HAMILTON Application Compound Index at **http://www.hamiltoncompany.com/product/hplc/myappindex.html** or e-mail **hplc@hamiltoncompany.com** for a complete list of compounds that have been separated.

# HC-40 Cation Exchange HPLC Columns

**Polymeric 4% cross-linked soft-gel column for cation, ligand exchange separation of carbohydrates.**

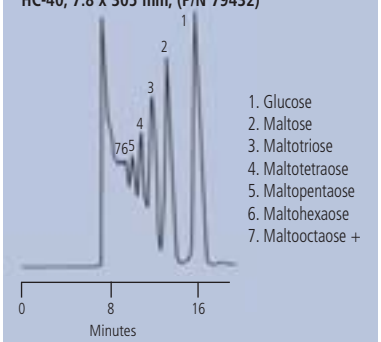
- **Separate oligosaccharides up to DP8.**
- **Water mobile phase.**
- **Compatible with RI detectors.**




- Particle size: 10 - 15 µm.
- One column internal diameter: 7.8 mm.
- One column material: 316 stainless steel.

### Corn Syrup

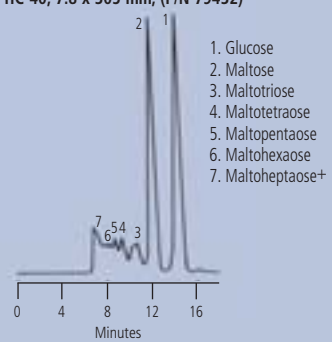
**HC-40, 7.8 x 305 mm, (P/N 79432)**




**Conditions:** Water. Isocratic. 80°C. 0.6 mL/min. 12 µL, Refractive Index.

### High Conversion Corn Syrup

**HC-40, 7.8 x 305 mm, (P/N 79432)**




Conditions: Deionized Water. Isocratic. 80°C. 0.6 mL/min. 20 µL, Refractive Index.

## Ordering Information

| Gel-Type Cation Exchange Column<br>I.D. x Length | 10 - 15 µm |
|---|---|
| 7.8 x 305 mm | 79432 |

| Guard Columns | For Steel Columns* |
|---|---|
| Hydrogen Form Cation Exchange Starter Kit (1 holder, 1 cartridge) | 79133 |
| Hydrogen Form Cation Exchange Replacement Cartridges (2/pk) | 79134 |
| Carbonate Form Anion Exchange Starter Kit (1 holder, 1 cartridge) | 79866 |
| Carbonate Form Anion Exchange Replacement Cartridges (2/pk) | 79865 |

* HC-40 guard column for steel columns is 4.6 x 20 mm

# HC-75 Cation Exchange HPLC Columns

**Polymeric 7.5% cross-linked soft-gel columns for cation, ligand exchange separations of carbohydrates.**

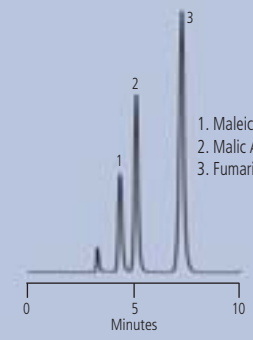
- **Compatible with UV and RI detectors.**
- **Hydrogen form columns for USP L17 applications.**
- **Calcium form columns for USP L19 applications.**
- **Lead form columns for USP L34 applications.**




- Particle size: 9 µm.
- Three column internal diameters: 4.1, 7.8 and 10.0 mm.
- One column material: 316 stainless steel.
- Three forms: calcium, lead and hydrogen.

### Malic Acid

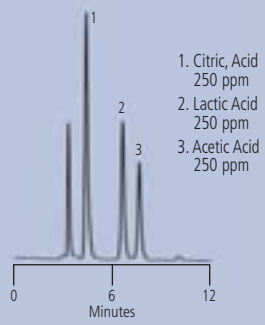
**HC-75, 4.1 x 250 mm $H^+$ (P/N 79476)**




**Conditions:** 0.01N Sulfuric Acid. Isocratic. 60°C. 0.35 mL/min. 10 µL, UV 210 nm.

### Citric, Lactic and Acetic Acids

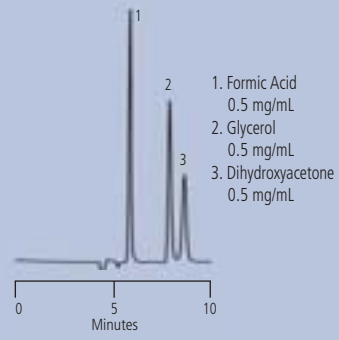
**HC-75, 4.1 x 250 mm $H^+$ (P/N 79476)**




**Conditions:** 0.01N Sulfuric Acid. Isocratic. 60°C. 0.35 mL/min. 10 µL, UV 210 nm.

### Dihydroxyacetone

**HC-75, 7.8 x 305 mm $Ca^{+2}$ (P/N 79436)**




**Conditions:** 0.01M Calcium Chloride. Isocratic. 90°C. 0.6 mL/min. 5uL, Refractive Index.

## Ordering Information

**Gel-Type Cation Exchange Columns**

| I.D. x Length | 9 µm, Calcium | 9 µm, Lead | 9 µm, Hydrogen |
|---|---|---|---|
| 4.1 x 250 mm | 79431 | | 79476 |
| 7.8 x 100 mm | | | 79547 |
| 7.8 x 305 mm | 79436 | 79438 | 79544 |
| 10.0 x 250 mm | 79528 | | |

Visit the HAMILTON Application Compound Index at **http://www.hamiltoncompany.com/product/hplc/myappindex.html** or e-mail **hplc@hamiltoncompany.com** for a complete list of compounds that have been separated.

| Guard Columns | For Steel Columns* |
|---|---|
| Hydrogen Form Cation Exchange Starter Kit (1 holder, 1 cartridge) | 79133 |
| Hydrogen Form Cation Exchange Replacement Cartridges (2/pk) | 79134 |
| Carbonate Form Anion Exchange Starter Kit (1 holder, 1 cartridge) | 79866 |
| Carbonate Form Anion Exchange Replacement Cartridges (2/pk) | 79865 |

* HC-75 guard column for steel columns is 4.6 x 20 mm

# Ion Exclusion HPLC Columns

## PRP-X300

**Polymeric ion exclusion packing for separation of alcohols and organic acids.**

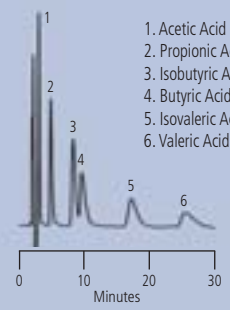
- **Separate structurally similar alcohols.**
- **Separate similar organic acids.**
- **Use with organic solvent from 0 to 100% for elution of highly retained compounds.**




- Two particle sizes: 3 and 7 µm.
- Five column internal diameters: 1.0 to 10.0 mm.
- Two column materials: 316 stainless steel and PEEK.
- Analytical and semiprep/preparative guard columns.

### Fatty Acids

**PRP-X300, 4.1 x 250 mm (P/N 79465)**

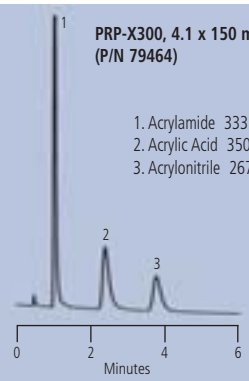



1. Acetic Acid 500 ppm
2. Propionic Acid 500 ppm
3. Isobutyric Acid 500 ppm
4. Butyric Acid 500 ppm
5. Isovaleric Acid 500 ppm
6. Valeric Acid 500 ppm

**Conditions:** 20:80 t-Butyl Alcohol : 10mM Potassium Phosphate Monobasic pH 2.5. Isocratic. Ambient. 1 mL/min. 100 µL, UV 215 nm

### Acrylamide and Acrylic Acid

**PRP-X300, 4.1 x 150 mm (P/N 79464)**

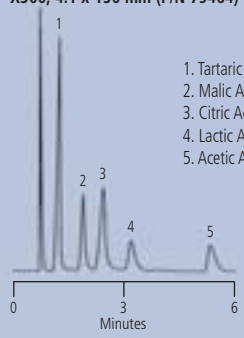



1. Acrylamide 333 ppm
2. Acrylic Acid 350 ppm
3. Acrylonitrile 267 ppm

**Conditions:** 95:5 1mN Sulfuric Acid : Acetonitrile. Isocratic. Ambient. 2 mL/min. 5 µL, UV 210 nm.

### Organic Acids

**PRP-X300, 4.1 x 150 mm (P/N 79464)**




1. Tartaric Acid
2. Malic Acid
3. Citric Acid
4. Lactic Acid
5. Acetic Acid

**Conditions:** 1mN Sulfuric Acid. Isocratic. Ambient. 1 mL/min. 20 uL, UV 210 nm.

## Ordering Information

**HPLC Columns**

| I.D. x Length | 3 µm | 7 µm |
|---|---|---|
| 1.0 x 50 mm | | 79783 |
| 1.0 x 100 mm | | 79784 |
| 1.0 x 150 mm | | 79785 |
| 1.0 x 250 mm | | 79786 |
| 2.1 x 150 mm | | 79396 |
| 2.1 x 250 mm | | 79397 |
| 4.1 x 33 mm | 79817 | 79536 |
| 4.1 x 50 mm | 79818 | 79356 |
| 4.1 x 150 mm | 79819 | 79464 |
| 4.1 x 250 mm | | 79465 |
| 4.6 x 150 mm* | | 79475 |
| 4.6 x 250 mm* | | 79386 |
| 10.0 x 250 mm | | 79572 |

* PEEK hardware

| Analytical Guard Columns | For Steel Columns* | For PEEK Columns** |
|---|---|---|
| Starter Kits (1 holder, 2 cartridges) | 79460 | 79373 |
| Replacement Cartridges (5/pk) | 79453 | 79374 |

* Analytical guard column for steel columns is 2.3 x 20 mm
** Analytical guard column for PEEK columns is 3.0 x 8.0 mm

| Semiprep/Preparative Guard Column | For Steel Columns* |
|---|---|
| Starter Kit (1 holder, 1 cartridge) | 79129 |
| Replacement Cartridges (2/pk) | 79130 |

* Semiprep/preparative guard column for steel columns is 4.6 x 20 mm

# Amino HPLC Columns

## PRP-X700

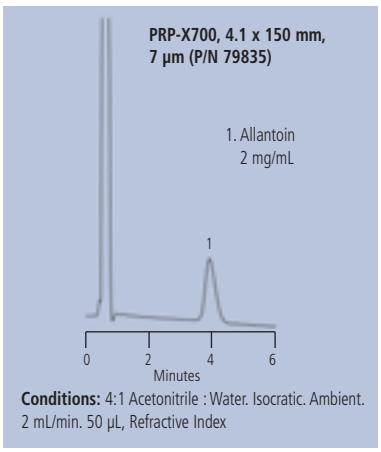
**Polymeric normal phase, columns for separation of carbohydrates.**

- **pH stable from 0 to 14.**
- **7 minute separation of fructose, glucose, sucrose and maltose.**



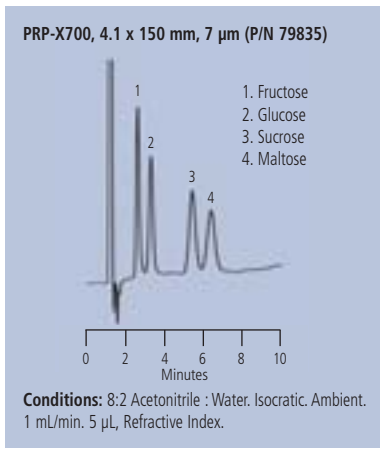

- Two particle sizes: 5 and 7 µm.
- Three column internal diameters: 2.1, 4.1 and 4.6 mm.
- Two column materials: 316 stainless steel and PEEK.
- Guard columns in 316 stainless steel and PEEK.

### Allantoin




**Conditions:** 4:1 Acetonitrile : Water. Isocratic. Ambient. 2 mL/min. 50 µL, Refractive Index

### Mono and Disaccharides




**Conditions:** 8:2 Acetonitrile : Water. Isocratic. Ambient. 1 mL/min. 5 µL, Refractive Index.

## Ordering Information

| HPLC Columns I.D. x Length | 5 µm | 7 µm |
|---|---|---|
| 2.1 x 250 mm | 79173 | |
| 4.1 x 150 mm | 79834 | 79835 |
| 4.1 x 250 mm | | 79836 |
| 4.6 x 150 mm* | 79837 | 79838 |
| 4.6 x 250 mm* | | 79839 |

* PEEK hardware

| Analytical Guard Columns | For Steel Columns* | For PEEK Columns** |
|---|---|---|
| Starter Kit (1 holder, 2 cartridges) | 79840 | 79841 |
| Replacement Cartridges (5/pk) | 79842 | 79843 |

* Analytical guard column for steel columns is 2.3 x 20 mm
** Analytical guard column for PEEK columns is 3.0 x 8.0 mm

Visit the HAMILTON Application Compound Index at **http://www.hamiltoncompany.com/product/hplc/myappindex.html** or e-mail **hplc@hamiltoncompany.com** for a complete list of compounds that have been separated.

# General Ordering Information

HAMILTON
THE MEASURE OF EXCELLENCE™

**Office Hours:**

Weekdays 7 am – 5 pm Pacific Standard Time

Toll Free 1-800-648-5950 or 1-775-858-3000
Fax: 1-775-856-7259

**Toll Free Order Hotline:**

**1-888-525-2123**
For your convenience, please have your account number and your purchase order number ready when placing an order.

Major Credit Cards Accepted

VISA MasterCard AMERICAN EXPRESS

**Order Online:**
**Via Email:**

www.hamiltoncompany.com
sales@hamiltoncompany.com

**Terms:**

After credit responsibility has been established with Hamilton Company, terms are net 30 days from the date of invoice. A finance charge will be applied to all invoices not paid within 30 days. Unestablished accounts can place an order with a credit card.

**Shipping:**

All domestic shipments are FOB Reno, Nevada, U.S.A., by United Parcel Service unless otherwise specified. All international shipments are FOB Reno, Nevada, U.S.A., to be shipped as specified by purchaser.

**Warranty:**

All Hamilton products are unconditionally guaranteed to be free of defects in materials and workmanship for one year (12 months) from date of purchase.

**Returned Goods/ Restocking Charges:**

Any product returned to Hamilton Company for repair, evaluation, or exchange must be accompanied by an assigned Returned Goods Authorization (RGA) tracking number. Unauthorized returns will be refused.

Products returned for credit must also have an assigned RGA tracking number and are subject to a 20% restocking fee. All returns must be sent to the following address:

Hamilton Company
4990 Energy Way
Reno, Nevada 89502

# Standard Conditions of Sales

**STANDARD CONDITIONS OF SALE (of Hamilton Company, "The Company")**

**1. GENERAL**

All orders are accepted and executed on the understanding that the Purchaser is bound by the following Standard Conditions of Sale. Where there is any inconsistency between these Standard Conditions of Sale and any conditions which the Purchaser seeks to impose, these Standard Conditions of Sale shall prevail.

Any deviations from these Standard Conditions of Sale shall only be binding upon the Company if the latter has expressly agreed thereto in writing.

**2. VALIDITY OF QUOTATIONS**

The Company reserves the right to refuse the Purchaser's acceptance of a quotation unless such quotation is stated to be open for a specific period and is not withdrawn in such period.

**3. PRICES AND DISCOUNTS**

The published prices of the Company's Products are those ruling on the date of publication and are subject to alteration without notice. Prices and currency transactions are in U.S.A. dollars.

**4. PAYMENT**

Unless otherwise agreed by the Company in writing, the goods shall be paid for in cash within 30 days following the date of the relevant invoice. The Company's prices are net and are not subject to any settlement terms.

The Purchaser may not claim any set-off against the Company. In the event of a delay in payment, the Company shall be entitled to claim, without any notice of default being required and without prejudice to any further rights it may have, interest at a rate of one and a half percent (11/2%) per month or at the legal interest rate, whichever is the higher value. All costs of collection shall be fully for the Purchaser's account; extrajudicial costs shall be fixed at ten percent (10%) of the amount owed by the Purchaser and shall be at least fifteen hundred U.S. dollars (USD 1,500.00).

In the event that any payment in respect of Products supplied becomes overdue, the Company may immediately terminate the Purchaser's power of sale under clause 14 of this document and may without prior notice to the Purchaser enter upon the premises of the Purchaser to repossess unpaid goods.

**5. NEW ACCOUNTS**

Where a credit account is desired, a bank and as many as five trade references may be required. The Company reserves the right not to grant credit to any Purchaser for any reason whatsoever.

**6. CARRIAGE**

Unless otherwise agreed by the parties, goods are delivered by the Company FOB Reno, Nevada, U.S.A. to the Purchaser's registered office exclusive of duty, insurance, taxes, and VAT. When special delivery arrangements are requested, special rates will be charged.

All delivery times shall be approximate, except if a fixed time of delivery has been specifically agreed to in writing by the Company, in which case a delay in the delivery shall solely entitle the Purchaser to cancel, without costs, the order for the goods not delivered.

**7. PACKING**

A charge is made when it is necessary to dispatch goods in crates or cases, but this amount will be credited in full on the return, within one month, of the crates or cases in good condition carriage paid. No charge is made for any other form of packing and no credit will be allowed for its return.

**8. LOSS OR DAMAGE IN TRANSIT**

Clear receipts should be given only if goods have been examined, as an unqualified signature may react to the disadvantage of the Purchaser if the consignment should become the subject of a claim. In the event of short delivery or damage in transit, it is essential that the Company's dispatching depot be advised within two days of receipt of goods.

The following details should be sent in writing to the Company:

a. Advice note number
b. Carrier's name
c. Condition of package
d. Date of consignment received
e. Extent of damage or shortage

In the event of non-delivery, the Company's dispatching depot should be advised within seven (7) days of the date of invoice. The Company will not be responsible for goods lost or damaged in transit unless the above conditions are observed.

**9. DELIVERY**

The Purchaser shall be obliged to cooperate in the delivery of the Products and to take receipt of same. The Company may keep any goods refused or not accepted by the Purchaser at the latter party's disposal for account and at the risk of the Purchaser.

**10. LIABILITY FOR DELAY**

Any times quoted for dispatch, delivery, repair, or replacement are to be treated as estimates only and the Company shall not be liable for failure to dispatch, deliver, repair, or replace within such time unless the Purchaser has suffered loss thereby and the amount payable in respect thereof shall have been agreed in writing as liquidated damages, in which case the Company's liability shall be limited to the amount so agreed to be paid.

In all cases, whether a time for dispatch, delivery, repair, or replacement be quoted or not, the time for dispatch, delivery, repair, or replacement shall be extended by a reasonable period if delay in dispatch, delivery, repair, or replacement is caused by instructions or lack of instructions from the Purchaser or by industrial dispute or by any cause whatsoever beyond the Company's reasonable control.

**11. DEFAULT**

The Company shall have the right to discontinue delivery and also at its discretion to terminate any agreement in respect of any undelivered goods if the Purchaser defaults in payment as stated under clause 4 of this document or in respect of its other obligations to the Company.

**12. DEFECTS AFTER DELIVERY**

The Company will make good, by repair at the Company's option, or by the supply of replacement, defects, which under proper use, appear in the goods within a period of 12 calendar months after the goods have been delivered and arise solely from faulty design, materials or workmanship; provided that no complaints shall be admissible unless submitted in writing to the Company within five (5) days after the time of discovery of the defect or after the time the defect should have been discovered, whichever time comes first, it being understood that the Purchaser shall take reasonable care to discover any defect of whatever nature as soon as possible after taking delivery.

Provided further that in respect of parts or components not of the Company's manufacture, the Company will give the Purchaser a guarantee equivalent to the guarantee (if any) that the Company may have received from the supplier of such parts or components in respect thereof but not so as to impose on the Company in respect of such parts or components a liability greater than that imposed on it by the aforesaid period of this clause.

Save as aforesaid and as provided in clauses 8 and 10, the Company shall not be under any liability in respect of defects in goods delivered or for any injury, damage, or loss resulting from such defects or from any work done in connection therewith and its liability under this clause shall be in lieu of any warranty or condition implied by law as to the quality of fitness for any particular purpose of such goods.

**13. SPECIAL ORDERS**

All orders for non-standard products or package quantities not included in current Company catalogues and literature, are considered to be special orders and will be dealt with at the discretion of the Company.

**14. RESERVATION OF OWNERSHIP/PASSING OF RISK**

Products supplied to the Purchaser by way of sale shall remain the property of the Company until payment in full of all its claims on the Purchaser on whatsoever account has been received by the Company but risk in the same shall pass upon delivery.

The Purchaser acting as bailee shall deal with the goods separately and store according to the agreed methods of storage so that the goods not paid for may be clearly identified and shall not be mixed with other goods.

The Purchaser shall be entitled to pass ownership in unpaid goods to third parties provided that all sums received shall be held for the account of the Company.

**15. RETURN OF GOODS**

The Company does not accept the return of goods for credit unless it is a justified warranty claim. All returns must be authorized in advance. Unauthorized returns will be refused. In no circumstances may goods supplied against a firm order be returned without the Purchaser having first applied for and obtained both written consent and a Returned Goods Authorization (RGA) number from the Company.

The Company reserves the right to refuse the return of any Product that has been used with infectious, microbiological, or radioactive substances or other materials that may be deemed hazardous to the employees of the Company.

A handling charge amounting to not more than 20 percent of the invoice value of the returned goods may be deducted from any credit allowed where it is established that the reason for their return is not subject to the provision of clause 8 or 12 hereof or through any error on the part of the Company.

Goods approved for return must be received by the Company within 30 (thirty) days of the Company's written consent.

**16. DESCRIPTIVE MATTER AND ILLUSTRATIONS**

All descriptive and forwarding specifications, drawings, and particulars of weights and dimensions issued by the Company are approximate only, and are intended only to present a general idea of the goods to which they refer and shall not form part of a contract.

**17. FORCE MAJEURE**

Any party will be excused from performing under a sale agreement or any other agreement of which these Standard Conditions of Sale are part if prevented by an event of force majeure including strike, lockout, or other major trouble affecting labor relations.

If any such event of force majeure should last for more than two (2) consecutive months, any party may elect to terminate this Agreement immediately upon giving a written notice to the other party.

**18. PATENTS**

In the event of any claim being made or action being brought against the Purchaser in respect of infringement of local patents by the user or sale of goods supplied hereunder, the Purchaser is to notify the Company immediately, and the Company shall be at liberty with the Purchaser's assistance if required, but at the Company's expense, to conduct through the Company's own lawyers and experts all negotiations for the settlement of the same or any litigation that may arise therefrom; subject to such notifications and provided that no such goods, or any part thereof, shall be used for any purpose other than that for which the Company supply them, the Company will indemnify the Purchaser in respect of any such claims.

**19. TRADEMARKS**

a. The only Hamilton trademarks that the Purchaser may display to advertise and sell the Products shall be those trademarks under which the Products are sold by the Company to the Purchaser hereunder or such other trademarks expressly authorized by the Company (hereinafter called "the said trademarks") and the Purchaser shall comply with the Company's instructions as to the manner and context in which the said trademarks and the statements to accompany them are displayed.
b. No trademarks of the Products shall be undertaken by the Purchaser or any person on the Purchaser's behalf without the Company's prior written consent nor will the Purchaser alter, obliterate, add to, or otherwise interfere with the said trademarks.

**20. LEGAL CONSTRUCTION**

These Standard Conditions of Sale and all sale contracts to which the same apply shall be construed in accordance with the laws of the State of Nevada, U.S.A, and the authoritative text shall be that in the English language set out herein. Any disputes arising in connection with these Standard Conditions of Sale and all sale contracts to which the same apply shall be finally settled by arbitration in accordance with the laws and rules of the State of Nevada and such proceedings held and located in Reno, Nevada, U.S.A.



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**Hamilton Company**
4970 Energy Way
Reno, Nevada 89520 USA
Toll-Free: 800-648-5950
Telephone: +1-775-858-3000
Fax: +1-775-856-7259
sales@hamiltoncompany.com

**Hamilton Bonaduz AG**
Via Crusch 8
CH-7402 Bonaduz
Switzerland
Telephone: +41-(0)81-660-60-60
Fax: +41-(0)81-660-60-70
info.service@hamilton.ch

**Hamilton Deutschland GmbH**
Fraunhoferster. 17
D-82152 Martinsried
Germany
Telephone: +49-(0)89-552-649-0
Fax: +49-(0)89-552-649-10
info.de@hamiltonrobotics.com

**Hamilton Great Britain Ltd.**
Unit 2, Enterprise Way
Aston Science Park
Birmingham, B7 4BH, UK
Telephone: +44-(0)121-260-0301
Fax: +44-(0)121-260-0302
info.gb@hamiltonrobotics.com

**Hamilton France S.A.R.L.**
Parc du Moulin de Massy
37 rue du Saule Trapu
91300 MASSY/France
Telephone: +33-(0)1-69-75-16-16
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**DURATEC Analysentechnik GmbH**
**Rheinauer Strasse 4**
**DE-68766 Hockenheim**
**GERMANY**

**Tel. +49-6205-9450-0**
**Fax.+49-6205-9450-33**
**info@duratec.de**

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