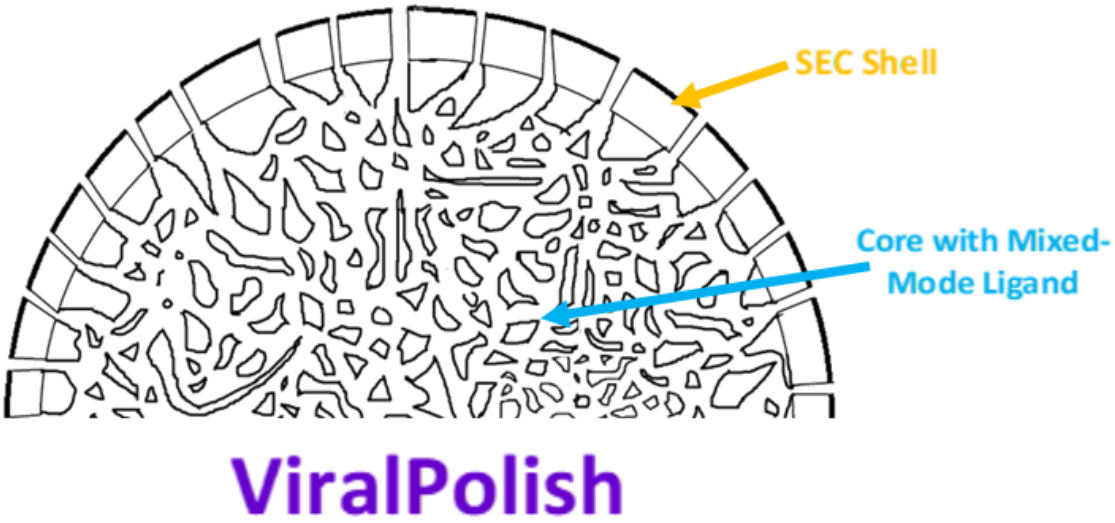
ViralPolish Data Sheet

ViralPolish®

BioToolomics developed ViralPolish® chromatography media specifically for purification of viruses and other nano-structures such as exosomes and nucleic acids etc. It is a class of dual layer polymer beads possessing an inert external shell with tightly controlled pore size and internal polyfunctional ligands for rapid high capacity binding of impurities.



Large particles, such as viruses, are excluded from the beads. The beads can be packed in a column where viruses will pass through the column bed and collected in flow through fraction, whilst impurities will be captured within the beads. This affords a very gentle purification process resulting in efficient clean up and high recovery of active virus particles.

ViralPolish® is available in a range of outer shells (i.e. different pore sizes), and two different impurity binding chemistries (see table below).

1. Properties

ViralPolish range of chromatography media has a thin porous inert out-layer that excludes larger molecules. Molecules smaller than the designated size-exclusion level (depending on operational conditions such as flow velocity) can penetrate the outer layer and are adsorbed by the mixed-mode ligands in the core.

The base matrix is a composite of polysaccharides that have been highly cross-linked. The media is stable in most of the chemical conditions experienced in bioprocessing industry.

Selection Guide

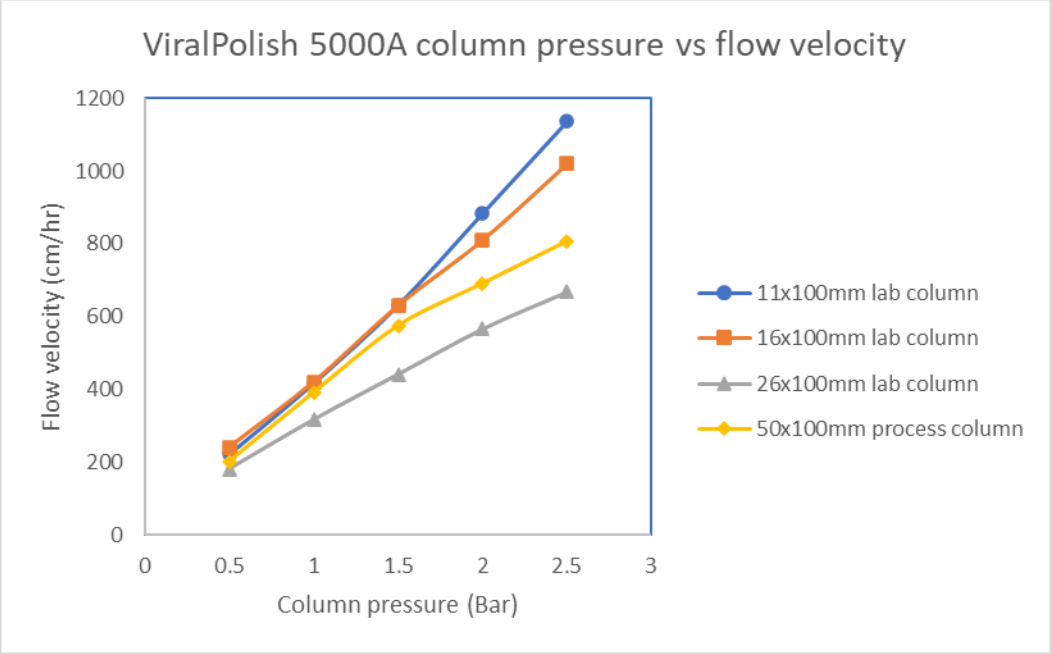
Shelled Mixed-Mode Resin	Application Guide	Key Features
ViralPolish™ 5000A ViralPolish™ 5000B	Good for small viruses such as small size AAVs etc. The pore size on the shell is similar or slightly smaller than that of Capto core 400.	"A": Mixed-mode anion-exchange ligand with mild hydrophobicity; can be easily re-generated and re-used; but its binding capacity may be compromised. "B": Mixed-mode anion-exchange ligand with strong hydrophobicity; have higher loading capacity but is less easy to re-generate.
ViralPolish™ 6000A ViralPolish™ 6000B ViralPolish™ 7000A ViralPolish™ 7000B	Good for larger AAVs, medium to large size viruses and VLPs, exosomes, DNA clearance etc. The pore size on the shell of 7000 range is similar to that of Capto core 700. The pore size of 6000 range sits between 5000 range and 7000 range.	
ViralPolish™ 8000A ViralPolish™ 8000B ViralPolish™ 9000A ViralPolish™ 9000B ViralPolish™ 10000A ViralPolish™ 10000B	Good for even larger size viruses and VLPs, exosomes, DNA (>1kb) clearance etc, where impure species are very big.	

Product characteristics

Ligand	Mixed-mode
Ligand density	> 50 μmol / ml resin (for 5000 to 7000 range)
Protein binding capacity	Depends on the type of proteins and binding conditions; could be > 40 mg / ml resin for 5000 to 7000 range
Operational pressure	Depends on the type of resin
Flow velocity	Up to 500 cm/hr
Chemical stability	Stable in most common aqueous buffers
pH stability	2-14 (<2 h) 3-12 (long term)
Storage	20% ethanol at 4°C to 30°C

Column pressure property

The base matrix of ViralPoish media is well cross-linked showing decent pressure flow property for process scale use.



2. Applications

This chromatography media is ideal for rapid clean-up, either as a first step or as a second step, to purify virus particles, exosomes etc. The beads can also be used in batch mode; when added to a flask of virus containing media the beads will selectively allow small molecules to enter and be retained, whilst the virus is excluded and remains in the external media.

A typical purification strategy for viruses would be to use ViralPolish® as an initial step, to clean up the sample, prior to binding and elution, typically from an anion exchange media designed for virus purification.

Alternatively, very dilute samples can be purified by first passing through a ion exchange column to concentrate followed by passing through ViralPolish column to remove residual impurities.

3. Method optimization

We recommend scouting for optimal binding pH, ionic strength and flow velocity (i.e. residence time). We recommend special attention be paid to optimising the flow velocity to balance product yield and product purity. The overall effectiveness of molecular weight cut-off greatly depends on the contact time of loaded sample. Reduced flow velocity will increase the contact time for some large impurities to diffuse through the shell to be captured. If faster loading is required, a resin with higher molecular weight cut-off can be chosen. The information below shows the relative impact of flow velocity to protein removal.

Comparison of protein binding performance at different loading flowrate (i.e. different residence time): 1 ml pre-packed column, 0.1 ml of 1 mg/ml protein in PBS buffer injected at variable flowrates, breakthrough protein signal in OD280 (mAU) monitored. The lower the value in the table below, the higher amount of protein bound. It shows that ViralPolish 7000B could bind most injected proteins than ViralPolish 5000B at short residence time.

	Residence time (min)	Protein breakthrough signal in OD280 (mAU)	
		ViralPolish 7000B	ViralPolish 5000B
Ferritin (MW 440K Dalton)	4	0.7	5.4
	2	1	13
	1	3.6	15
Thyroglobulin (MW 690K Dalton)	4	0	7.2
	2	0.4	10
	1	2.5	21

In general, balancing product recovery against process throughput is the major consideration when optimizing a method. However, for the purification of shear-force sensitive molecules, the operational flow velocity needs to be optimised to minimise possible damage to the target molecule.

Tips:

- If unexpectedly high loss of product is noticed, consider using increased flow rates and/or increased ionic strength, or to adjust the pH to lower the charge of the target product.
- If too high level of impurities remains in flow-through mode, another medium with higher size-exclusion level may be tested at increased flow velocity. For example, ViralPolish 7000 may be used instead of ViralPolish 6000.

- For AAV viruses, the first choice is ViralPolish 5000 and 6000. For larger viruses, ViralPolish 7000 is the first choice.

4. Column packing

ViralPolish media can be easily packed in any type of chromatography columns at any possible packing mode. The typical compression factor is 15% and packing pressure is 1 to 3 bars. 0.15 M NaCl is recommended as the packing solution. Before packing, the resin need be washed by at least 3CV of the packing solution.

Packing large-scale columns – General recommendations

Columns can be packed in different ways depending on the type of column and equipment used. Please refer to the relevant column instruction manual carefully.

Note: As the columns increase in diameter the packing flow rate decreases, at packing flow rates below 150cmhr^{-1} there is generally little impact, at higher flow rates a 3 fold increase in column diameter can increased packing pressure approximately 2 fold.

In general there are following suitable types of packing methods:

- Pressure packing (for columns with moveable adaptors).
- Combined pressure/suction packing (for medium sized columns with fixed bed heights).
- Suction packing (for large columns with fixed bed heights).
- Hydraulic pressure packing.

How well the column is packed will have a major effect on the performance of the resin and the purity and yield of the purification process. Guidelines are given for determining the optimal packing flow rates for different column designs columns with specific design features like adaptors and fixed bed heights.

Determining the optimal packing pressure

The optimal packing pressure/flow rate is dependent on column size, type, desired bed height, packing solution and temperature. The optimal packing flow rate must therefore be determined empirically for each individual system. Generically this is done as follows:

1. Calculate the exact amount of resin needed for the slurry (this is especially important for columns with fixed bed heights). Extra resin is required to allow for settling of the bed, e.g. allow approximately 1.15L of resin per 1 liter of packed bed.
2. Prepare the column per the column instructions.
3. Begin packing the column at a low flow rate (e.g. 30% of the expected max process flow rate), record the flow rate and back pressure when the bed is completely packed and the pressure has stabilized.
4. Increase flow rate recording both flow rate and pressure drop in a stepwise manner always allowing the pressure to stabilize at each step.
5. Continue recording flow and pressure until the maximum process flow rate has been reached. This reached when the pressure flow curve levels off or the maximum column pressure is reached.
6. Plot pressure against flow rate.

The optimal packing pressure is about 70% of the maximum pressure. From the packing pressure point on the curve, draw a straight line to zero. The maximum operational pressure should be <70% of the packing pressure. From the straight line, the maximum operational flow rate can be found.

Pressure Packing – typically for columns supplied with a movable top flow plate (e.g., GE BPG™; Millipore Vantage™ and Quicksale™) are packed by conventional pressure packing where packing solution is pumped through the settling chromatographic bed at a constant back pressure. Specific packing instructions and pressure flow curves are generally provided by the column manufacturers and can be matched with each resin pressure flow properties to develop a robust packing protocol for each column/resin combination. Generically the steps are as follows:

1. Make sure no air is trapped under the bottom bed support by pumping packing buffer through it from below. Excess liquid in the column can be removed by connecting tubing to the suction side of a pump. Leave about 2 cm of liquid in the column.

2. Mix the packing buffer with the medium to form a 50% slurry (settled bed volume/slurry volume = 0.5). Pour the slurry into the column. Insert top distributor plate the adaptor and lower to the surface of the slurry, making sure no air is trapped under the plate and secure in place.
3. Fill the adaptor inlet with packing solution.
4. Connect a pump and a pressure meter; apply a flow at 120 – 150 cm/hr. When the bed has settled, run for a few minutes, close the valve and stop the pump. Lower the plate down to the top of the bed.
5. Start the pump and apply a flow that gives the desired packing pressure. Keep the pressure constant during packing and check the pressure at the column inlet. **Never** exceed the pressure limit for column or medium. Run for at least 15 min.
6. When the bed has stabilized, mark the bed height, close the valve and stop the pump.
7. Disconnect the column inlet tubing and replace it with tubing leading to waste, push the top plate adaptor down to approximately 3 mm below the mark on the column tube. The packing solution will flush the adaptor inlet. Remove any trapped air by pumping liquid from the bottom (after the inlet tubing and the bottom valve have been properly filled).

Combined pressure/suction packing- typically these columns have a fixed bed height. It is packed by a combined pressure/suction technique. Follow the column manufacturer's instructions, which generically include:

1. Fitting an extra column section on top of the column tube as a packing reservoir.
2. Pour water or packing buffer into the column making sure that there is no air trapped under the bottom bed support. Leave about 2 cm of liquid in the column.
3. Pour the slurry into the column. Stir gently to give an homogeneous slurry. Add buffer until level with the upper rim and secure the lid in place.
4. Connect a pump and a pressure meter and start packing at the predetermined packing flow rate (or pressure). Keep the flow rate (or pressure) constant during packing and check the pressure at the column inlet. Never exceed the pressure limit for the column or medium.
5. When the bed has stabilized, the top of the bed should be exactly level with the top of the column tube. Switching the valve takes the buffer tank off line the inlet pump is now connected to the outflow side of the column. The packing buffer is re-circulated in the system. If, when stabilized, the packed bed is not exactly level with the top of the column, add or remove slurry.
6. Keep the pump running, disconnect the column inlet and direct it to waste. The packing solution in the packing section is removed by suction through the bed.
7. Remove the packing reservoir section.
8. When the packing solution is within 5-8 mm of the bed surface stop the pump. This final operation should be completed as quickly to prevent bed expansion.
9. Start pumping buffer with upward flow through the column to remove any air bubbles.

Suction Packing – typically for columns with fixed end pieces. These columns are packed by suction, i.e. by sucking packing solution through the chromatographic bed at a constant flow rate.

1. Fit a packing device on top of the column tube.
2. Pour water or packing buffer into the column making sure that there is no air trapped under the bottom bed support. Leave about 2 cm of liquid in the column.
3. Mix the packing buffer with the medium to form a 50% slurry (settled bed volume/slurry = 0.5). Pour the slurry into the column.
4. Connect the column outlet valve to the suction side of a pump and start packing the bed by suction through the bed at the predetermined flow rate. Keep the flow rate constant during packing.
5. When the bed has stabilized, the top of the bed should be just below the junction between the column and the packing device.
6. Just before the last of the packing solution enters the packed bed, stop the pump and quickly remove the packing device and replace it with the lid. This final operation should be completed quickly to prevent bed expansion when the flow stops.
7. Start pumping buffer with upward flow through the column to remove any air bubbles trapped under the lid.

Hydraulic Packing- is for columns supplied with a hydraulic function GE INdEX™ and FineLine™; Novasep Prochrom® DAC. In these systems and automated hydraulic systems controls packing as the adaptor is lowered into position at the correct pressure. The adaptor is pushed down by a constant hydraulic pressure, forcing packing buffer through the slurry and compressing it so that a packed bed is gradually built up.

The quantity of medium required when packing our resin by hydraulic pressure is approximately 1.15L of resin slurry per 1 liter of packed bed. Generically packing is completed as follows:

1. Make sure that there is no air trapped under the bottom bed support, by pumping packing buffer through it from below. Leave about 2 cm of liquid in the column.
2. Pour the slurry into the column. Fill the column with packing solution up to the top of the tube allowing the medium bed to settle just below the top of the column tube.
3. Put the adaptor in a resting position in the column tube and lower the lid and secure it in place.
4. Connect a pump to the inlet, to start the packing, applying a predefined constant hydraulic packing pressure. When packing IPA 400HC in this type of column pack the bed to less than the recommended operational pressure.
5. When the adaptor has reached the surface of the settled bed, continue to run the pump until the adaptor has been lowered fractionally into the packed bed (depending on the column manufacturer's instructions)

Packing Efficiency Assessment

To check the quality of the packing and to monitor this during the working life of the column, column efficiency should be tested directly after packing, prior to re-use and if there is an observed deterioration in separation performance. The efficiency of a packed column is expressed in terms of the height equivalent to a theoretical plate (HETP) and the asymmetry factor (As). These values are easily determined by applying a sample such as 1% CV of 1 M NaCl solution to the column and using 0.15 M NaCl as eluent. It is

important that conditions and equipment are kept constant so that results are comparable. Changes in solute, solvent, eluent, sample volume, flow rate, liquid pathway, temperature, etc., will influence the results. A sample volume of less than 2.5% of the column volume and the flow velocity of 30 cm/h can be used. Higher flow velocity can be used for the test though the value of plate number will decrease.

Important: For best results avoid sample dilution by applying it as close to the column inlet as possible, and placing the conductivity detector as close to the column outlet as possible.

For most applications, Number of theoretical plates / metre > 1,000 and Peak asymmetry 0.8-2 is acceptable.

5. Process scale-up

ViralPolish range of media is designed for bioprocessing use with full regulatory support files. Please contact us for further information.

6. Leachable and stability data

ViralPolish range of media is made of highly cross-linked polysaccharides with stable chemical linker to ligands via epoxy activation. This type of media is very stable over a wide range of pH conditions. The leachable level measured by total organic carbon (TOC), as shown in the table below using ViralPolish 5000A as an example, is extremely low.

pH	***30 mins incubation***	***Overnight incubation***	***1 week incubation***
	TOC (ppm)	TOC (ppm)	TOC (ppm)
1	13.93	17.21	21.74
3	6.47	10.74	10.75
7	6.01	10.47	5.31
10	11.09	8.09	7.15
13	11.29	21.75	4.74

7. Maintenance

Depending on individual applications, please see the following recommendations.

Note: when sodium hydroxide solution or organic solvent (e.g. 20% ethanol etc) is used, the flowrate must be less than 50% of the normal operational flowrate, because the column pressure will increase under these chemical conditions.

Cleaning-in-place (CIP)

CIP is a procedure that removes strongly bound materials such as lipids, endotoxins and denatured proteins that remain in the column after regeneration. Regular CIP prevents the build up of contaminants in the packed bed and helps to maintain the column performance.

A specific CIP protocol should be developed for each process according to the type of contaminants present. The frequency of CIP depends on the nature of individual applications.

The following information works as a general guidance.

The contaminants bound hydrophobically can be removed by using the following reagents: 1 M NaOH, low percentage non-ionic detergents (e.g. 0.1 – 2%), 30% isopropanol in basic or acidic conditions (e.g. in the presence of acetic acid or phosphoric acid). A combination of the above reagents can be explored as well. In general, the incubation time should be longer (e.g. from 30 minutes to 2 hours) to ensure full dissociation of the contaminants.
Note: Long contact times should be avoided when using alcohols in acrylic columns.

Sanitization
Sanitization using 0.5-1.0 M NaOH with a contact time of 30 mins is recommended.

8. Storage

The loose media or column should be stored in 20% ethanol to prevent microbial growth. Store the column at a temperature of +2ºC to +8ºC. After storage, equilibrate the column with at least 5 bed volumes of running buffer before use.

9. Order information

Product	Quantity	Product code
ViralPolish 5000A	25 ml	270501-25ML
ViralPolish 5000A	100 ml	270501-100ML
ViralPolish 5000A	1 litre	270501-1L
ViralPolish 5000A	5 litre	270501-5L
ViralPolish 5000A	10 litre	270501-10L
ViralPolish 5000A 5 x 1 ml column	1	270501-5x1ML
ViralPolish 5000A 5 x 5 ml column	1	270501-5x5ML
ViralPolish 5000A 7/10 Optio column, 7 x 100 mm, 3.8 ml	1	270501-7x100
ViralPolish 5000A 11/10 Optio column, 11 x 100 mm, 10 ml	1	270501-11x100
ViralPolish 5000A 16/10 Optio column, 16 x 100 mm, 20 ml	1	270501-16x100
ViralPolish 5000A 26/10 Optio column, 26 x 100 mm, 53 ml	1	270501-26x100
ViralPolish 5000B	25 ml	270502-25ML
ViralPolish 5000B	100 ml	270502-100ML
ViralPolish 5000B	1 litre	270502-1L
ViralPolish 5000B	5 litre	270502-5L
ViralPolish 5000B	10 litre	270502-10L
ViralPolish 5000B 5 x 1 ml column	1	270502-5x1ML
ViralPolish 5000B 5 x 5 ml column	1	270502-5x5ML
ViralPolish 5000B 7/10 Optio column, 7 x 100 mm, 3.8 ml	1	270502-7x100
ViralPolish 5000B 11/10 Optio column, 11 x 100 mm, 10 ml	1	270502-11x100
ViralPolish 5000B 16/10 Optio column, 16 x 100 mm, 20 ml	1	270502-16x100

ViralPolish 5000B 26/10 Optio column, 26 x 100 mm, 53 ml	1	270502-26x100
ViralPolish 6000A	25 ml	270801-25ML
ViralPolish 6000A	100 ml	270801-100ML
ViralPolish 6000A	1 litre	270801-1L
ViralPolish 6000A	5 litre	270801-5L
ViralPolish 6000A	10 litre	270801-10L
ViralPolish 6000A 5 x 1 ml column	1	270801-5x1ML
ViralPolish 6000A 5 x 5 ml column	1	270801-5x5ML
ViralPolish 6000A 7/10 Optio column, 7 x 100 mm, 3.8 ml	1	270801-7x100
ViralPolish 6000A 11/10 Optio column, 11 x 100 mm, 10 ml	1	270801-11x100
ViralPolish 6000A 16/10 Optio column, 16 x 100 mm, 20 ml	1	270801-16x100
ViralPolish 6000A 26/10 Optio column, 26 x 100 mm, 53 ml	1	270801-26x100
ViralPolish 6000B	25 ml	270802-25ML
ViralPolish 6000B	100 ml	270802-100ML
ViralPolish 6000B	1 litre	270802-1L
ViralPolish 6000B	5 litre	270802-5L
ViralPolish 6000B	10 litre	270802-10L
ViralPolish 6000B 5 x 1 ml column	1	270802-5x1ML
ViralPolish 6000B 5 x 5 ml column	1	270802-5x5ML
ViralPolish 6000B 7/10 Optio column, 7 x 100 mm, 3.8 ml	1	270802-7x100
ViralPolish 6000B 11/10 Optio column, 11 x 100 mm, 10 ml	1	270802-11x100
ViralPolish 6000B 16/10 Optio column, 16 x 100 mm, 20 ml	1	270802-16x100
ViralPolish 6000B 26/10 Optio column, 26 x 100 mm, 53 ml	1	270802-26x100
ViralPolish 7000A	25 ml	270701-25ML
ViralPolish 7000A	100 ml	270701-100ML
ViralPolish 7000A	1 litre	270701-1L
ViralPolish 7000A	5 litre	270701-5L
ViralPolish 7000A	10 litre	270701-10L
ViralPolish 7000A 5 x 1 ml column	1	270701-5x1ML
ViralPolish 7000A 5 x 5 ml column	1	270701-5x5ML
ViralPolish 7000A 7/10 Optio column, 7 x 100 mm, 3.8 ml	1	270701-7x100
ViralPolish 7000A 11/10 Optio column, 11 x 100 mm, 10 ml	1	270701-11x100
ViralPolish 7000A 16/10 Optio column, 16 x 100 mm, 20 ml	1	270701-16x100
ViralPolish 7000A 26/10 Optio column, 26 x 100 mm, 53 ml	1	270701-26x100
ViralPolish 7000B	25 ml	270702-25ML
ViralPolish 7000B	100 ml	270702-100ML
ViralPolish 7000B	1 litre	270702-1L
ViralPolish 7000B	5 litre	270702-5L
ViralPolish 7000B	10 litre	270702-10L
ViralPolish 7000B 5 x 1 ml column	1	270702-5x1ML
ViralPolish 7000B 5 x 5 ml column	1	270702-5x5ML
ViralPolish 7000B 7/10 Optio column, 7 x 100 mm, 3.8 ml	1	270702-7x100
ViralPolish 7000B 11/10 Optio column, 11 x 100 mm, 10 ml	1	270702-11x100
ViralPolish 7000B 16/10 Optio column, 16 x 100 mm, 20 ml	1	270702-16x100
ViralPolish 7000B 26/10 Optio column, 26 x 100 mm, 53 ml	1	270702-26x100
ViralPolish 8000A	25 ml	270901-25ML

ViralPolish 8000A	100 ml	270901-100ML
ViralPolish 8000A	1 litre	270901-1L
ViralPolish 8000A	5 litre	270901-5L
ViralPolish 8000A	10 litre	270901-10L
ViralPolish 8000A 5 x 1 ml column	1	270901-5x1ML
ViralPolish 8000A 5 x 5 ml column	1	270901-5x5ML
ViralPolish 8000A 7/10 Optio column, 7 x 100 mm, 3.8 ml	1	270901-7x100
ViralPolish 8000A 11/10 Optio column, 11 x 100 mm, 10 ml	1	270901-11x100
ViralPolish 8000A 16/10 Optio column, 16 x 100 mm, 20 ml	1	270901-16x100
ViralPolish 8000A 26/10 Optio column, 26 x 100 mm, 53 ml	1	270901-26x100
ViralPolish 8000B	25 ml	270902-25ML
ViralPolish 8000B	100 ml	270902-100ML
ViralPolish 8000B	1 litre	270902-1L
ViralPolish 8000B	5 litre	270902-5L
ViralPolish 8000B	10 litre	270902-10L
ViralPolish 8000B 5 x 1 ml column	1	270902-5x1ML
ViralPolish 8000B 5 x 5 ml column	1	270902-5x5ML
ViralPolish 8000B 7/10 Optio column, 7 x 100 mm, 3.8 ml	1	270902-7x100
ViralPolish 8000B 11/10 Optio column, 11 x 100 mm, 10 ml	1	270902-11x100
ViralPolish 8000B 16/10 Optio column, 16 x 100 mm, 20 ml	1	270902-16x100
ViralPolish 8000B 26/10 Optio column, 26 x 100 mm, 53 ml	1	270902-26x100
ViralPolish 9000A	25 ml	271201-25ML
ViralPolish 9000A	100 ml	271201-100ML
ViralPolish 9000A	1 litre	271201-1L
ViralPolish 9000A	5 litre	271201-5L
ViralPolish 9000A	10 litre	271201-10L
ViralPolish 9000A 5 x 1 ml column	1	271201-5x1ML
ViralPolish 9000A 5 x 5 ml column	1	271201-5x5ML
ViralPolish 9000A 7/10 Optio column, 7 x 100 mm, 3.8 ml	1	271201-7x100
ViralPolish 9000A 11/10 Optio column, 11 x 100 mm, 10 ml	1	271201-11x100
ViralPolish 9000A 16/10 Optio column, 16 x 100 mm, 20 ml	1	271201-16x100
ViralPolish 9000A 26/10 Optio column, 26 x 100 mm, 53 ml	1	271201-26x100
ViralPolish 9000B	25 ml	271202-25ML
ViralPolish 9000B	100 ml	271202-100ML
ViralPolish 9000B	1 litre	271202-1L
ViralPolish 9000B	5 litre	271202-5L
ViralPolish 9000B	10 litre	271202-10L
ViralPolish 9000B 5 x 1 ml column	1	271202-5x1ML
ViralPolish 9000B 5 x 5 ml column	1	271202-5x5ML
ViralPolish 9000B 7/10 Optio column, 7 x 100 mm, 3.8 ml	1	271202-7x100
ViralPolish 9000B 11/10 Optio column, 11 x 100 mm, 10 ml	1	271202-11x100
ViralPolish 9000B 16/10 Optio column, 16 x 100 mm, 20 ml	1	271202-16x100
ViralPolish 9000B 26/10 Optio column, 26 x 100 mm, 53 ml	1	271202-26x100
ViralPolish 10000A	25 ml	271101-25ML
ViralPolish 10000A	100 ml	271101-100ML
ViralPolish 10000A	1 litre	271101-1L

ViralPolish 10000A	5 litre	271101-5L
ViralPolish 10000A	10 litre	271101-10L
ViralPolish 10000A 5 x 1 ml column	1	271101-5x1ML
ViralPolish 10000A 5 x 5 ml column	1	271101-5x5ML
ViralPolish 10000A 7/10 Optio column, 7 x 100 mm, 3.8 ml	1	271101-7x100
ViralPolish 10000A 11/10 Optio column, 11 x 100 mm, 10 ml	1	271101-11x100
ViralPolish 10000A 16/10 Optio column, 16 x 100 mm, 20 ml	1	271101-16x100
ViralPolish 10000A 26/10 Optio column, 26 x 100 mm, 53 ml	1	271101-26x100
ViralPolish 10000B	25 ml	271102-25ML
ViralPolish 10000B	100 ml	271102-100ML
ViralPolish 10000B	1 litre	271102-1L
ViralPolish 10000B	5 litre	271102-5L
ViralPolish 10000B	10 litre	271102-10L
ViralPolish 10000B 5 x 1 ml column	1	271102-5x1ML
ViralPolish 10000B 5 x 5 ml column	1	271102-5x5ML
ViralPolish 10000B 7/10 Optio column, 7 x 100 mm, 3.8 ml	1	271102-7x100
ViralPolish 10000B 11/10 Optio column, 11 x 100 mm, 10 ml	1	271102-11x100
ViralPolish 10000B 16/10 Optio column, 16 x 100 mm, 20 ml	1	271102-16x100
ViralPolish 10000B 26/10 Optio column, 26 x 100 mm, 53 ml	1	271102-26x100

Note: other column sizes (e.g. 11x100, 16x100, 26x100mm ID x BH or large process size columns) available on request

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