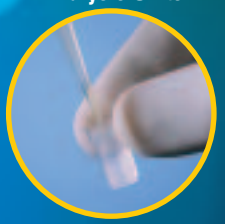
PIERCE

Slide-A-Lyzer®
Dialysis Cassettes

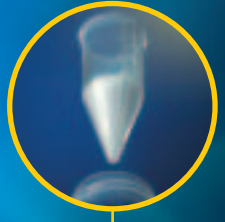
Desalting Columns

SnakeSkin®
Dialysis Tubing

Slide-A-Lyzer® MINI
Dialysis Units



iCON™ Protein
Concentrators



High-Performance Dialysis and Desalting

PIERCE

High-Performance Dialysis

1. Your MWCO

2,000 | 3,500 | 7,000 | 10,000

2. Use this Pierce High-Performance Dialysis Product

10-100 µl Slide-A-Lyzer® MINI Dialysis Unit
Page 4

0.1-30 ml Slide-A-Lyzer® Dialysis Cassette
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15-100 ml SnakeSkin® Dialysis Tubing
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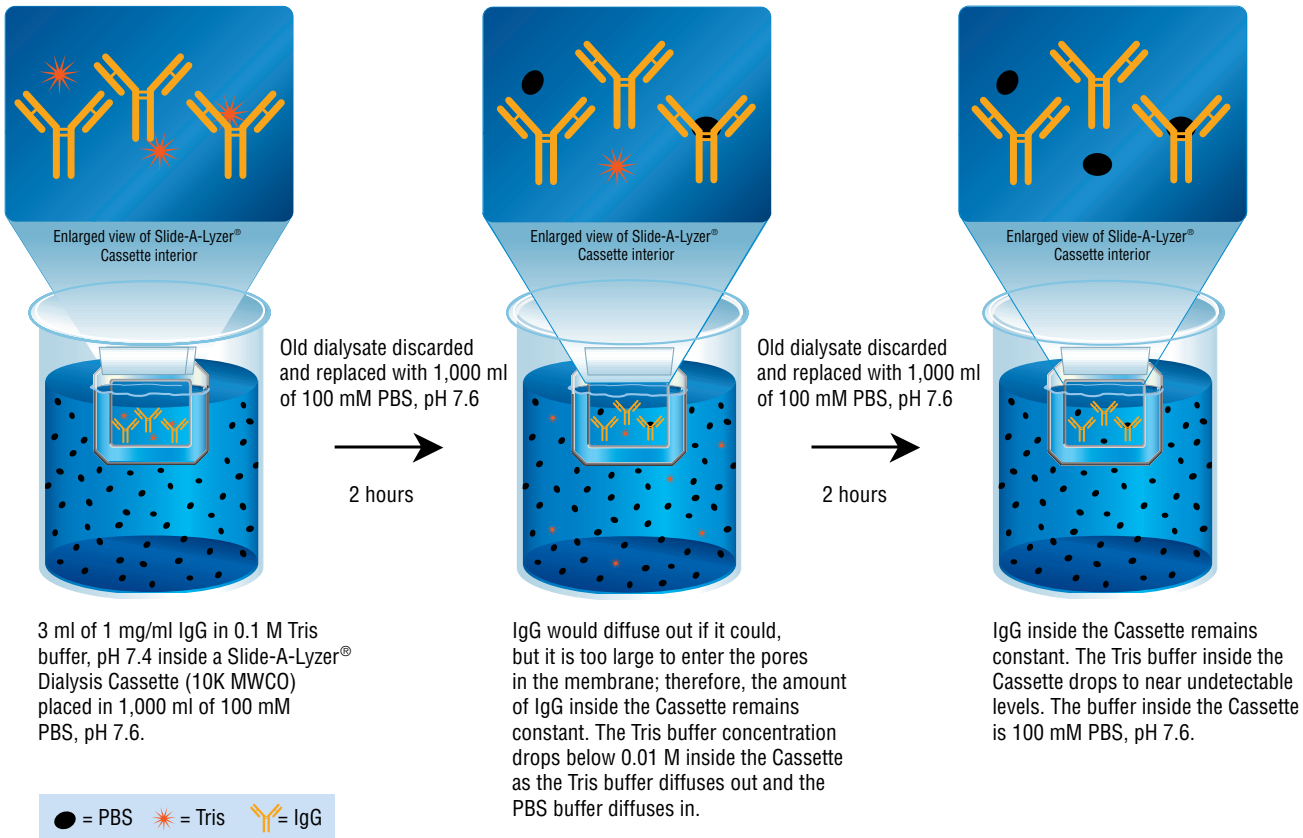
Contents

High-Performance Dialysis

Dialysis is a separation technique that gained popularity in life science laboratories during the 1950s. Research papers of that era described dialysis as a new, cutting-edge tool that scientists could use to unravel complex mixtures of biomacromolecules. Many of the dialysis theories established at that time are the cornerstones for contemporary products featured in this brochure. There are, however, two major differences between the dialysis tools of yesterday and today – preparation time and the amount of sample loss due to leaks. Early laboratory dialysis methods involved dedicating a significant amount of time to membrane preparation; Pierce dialysis products are essentially ready to use and resist sample leakage.

New developments in dialysis techniques were stagnant during the last few decades, while ultrafiltration systems flourished fueled by advances in non-cellulose membranes and accessibility of bench-top centrifuges. Ultrafiltration via centrifugation was the established convention until Pierce introduced the Slide-A-Lyzer® Dialysis Cassette in 1994.

See a product demonstration at www.piercenet.com/dialysis

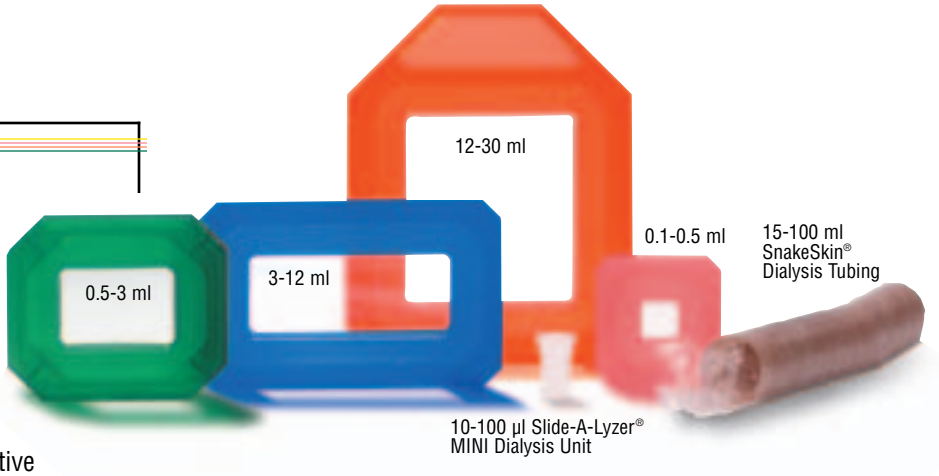


3 ml of 1 mg/ml IgG in 0.1 M Tris buffer, pH 7.4 inside a Slide-A-Lyzer® Dialysis Cassette (10K MWCO) placed in 1,000 ml of 100 mM PBS, pH 7.6.

IgG would diffuse out if it could, but it is too large to enter the pores in the membrane; therefore, the amount of IgG inside the Cassette remains constant. The Tris buffer concentration drops below 0.01 M inside the Cassette as the Tris buffer diffuses out and the PBS buffer diffuses in.

IgG inside the Cassette remains constant. The Tris buffer inside the Cassette drops to near undetectable levels. The buffer inside the Cassette is 100 mM PBS, pH 7.6.

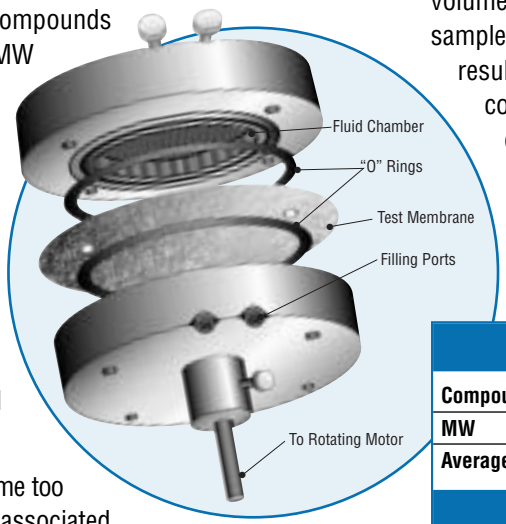
Dialysis: An Overview



Dialysis is the separation of small and large molecules in a solution by selective diffusion through a semi-permeable membrane. Typically a sample containing a protein or nucleic acid will contain unwanted small molecular weight (MW) compounds such as a buffer salt (Tris, PBS, etc.), a reducing agent [dithiothreitol (DTT), β-mercaptoethanol (BME), etc.] or a preservative (sodium azide, thimerosol, etc.).

The sample is contained inside the dialysis membrane. A dialysate 200 to 300 times the volume of the sample is outside the dialysis membrane, which creates and maintains a concentration differential across the membrane. Once the liquid-to-liquid interface (sample on one side of the membrane and dialysate on the other) is initiated, all molecules will try to diffuse in either direction across the membrane to reach equilibrium. Dialysis (diffusion) will stop when equilibrium is achieved. Generally the rate of dialysis slows as equilibrium approaches, requiring the dialysate be changed after several hours to re-create the concentration differential that drives the dialysis process.

The membrane is the key to dialysis. The semipermeable membrane contains pores of a known size range that are large enough to let small MW compounds pass through, but restrict large MW compounds (e.g., proteins and nucleic acids). The ideal membrane is thin, has numerous pores of uniform diameter, and does not bind proteins and nucleic acids. Unfortunately, the ideal membrane does not exist. What scientists have been using for decades is an extruded regenerated cellulose membrane that is close to an ideal membrane.



However, most scientists often assume too much chromatographic resolution associated with the membrane's molecular weight cutoff (MWCO).

Pierce determines the MWCO of its dialysis membrane by using the rotating batch dialysis cell (see diagram[1] above). In the rotating cell, the membrane to be tested is held in place between two circular cavities of equal size. One side of the cell is partially filled with a solution containing a molecule of known MW. The other side is filled with an equal volume of buffer or saline. The solutions are mixed and kept in contact with the membrane by rotating the cell at a constant speed. The MW standard concentration in each half of the cell is measured after a fixed period of time and the percent retention is calculated. This type of system provides a more accurate MWCO determination than using ultrafiltration methods that measure hydraulic permeability or volumetric flux vs. pressure using saline or buffer alone.

Other important variables are sample and dialysate volume. The ideal scenario is to have a small sample volume and a large dialysate volume to maximize the concentration differential. The sample volume is important because subsequent applications have certain minimum volume requirements. However, after the minimum volume requirements are met, it is not advantageous to dialyze more sample than is needed. Depending on the surface area of a given sample, a small volume sample will dialyze much faster than a large volume sample. Not only is expending additional time wasteful, it can result in sample loss because the longer a sample is in contact with solid-phase surfaces, the more likely proteins or nucleic acids will nonspecifically bind or denature.

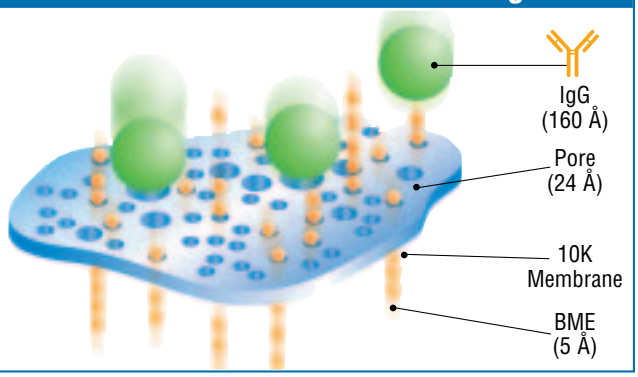
Reference

1. Klein, E., *et al.* DHEW Publication No. **77-1294,** p. 17.

How *We* See Things

Compound	Y: Immunoglobulin G (IgG)	●: $HS-CH_2-CH_2-OH$ (BME)
MW	150,000	78
Average Diameter	160 Å	5 Å

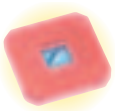
How a *Membrane* Sees Things



Frequently Asked Questions

About Dialysis and Pierce Dialysis Products

1) How precise is the MWCO?



The MWCO is reproducible, but not very precise. When choosing which MWCO membrane to use, it is advisable to have *both* the high MW compounds, which you want to retain, and the low MW compounds, which you want to diffuse out, as far removed from the membrane's MWCO as possible. This is why products with the 10K MWCO membrane are the most popular of Pierce's product offering.

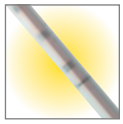
Pierce dialysis products are available with 2K, 3.5K, 7K and 10K MWCO membranes. The retention profile exhibited is clearly distinct and reproducible for each MWCO membrane when testing compounds of known MW. Pierce does not sell products with regenerated cellulose membranes with MWCOs below 2K and above 10K because they cannot be manufactured to our high-quality standards at this time.

2) Is stirring necessary?

Yes, stirring does significantly decrease the dialysis time.

The regenerated cellulose membranes used in Pierce dialysis products vary in thickness from 10 to 30 microns. All membranes possess an inner skin, an interior which experts have described as "seaweed-like," and an outer skin. There are no channels of a fixed diameter extending from the sample side through to the dialysate side. Instead, low MW compounds from the sample diffuse into the inner skin pores then through the membrane interior. These low MW compounds exit through a pore in the outer skin of the membrane, to a micro-environment called the Nernst layer. In this layer, which is approximately 200-300 molecules thick, low MW compounds are at a higher concentration in relation to the rest of the dialysate. Stirring, which efficiently breaks up the macro-environment outside the Nernst layer, quickly restores the concentration differential needed to drive the diffusion process.

3) Is temperature important?



Temperature is somewhat important because molecules move and diffuse faster at higher temperatures. However, maintaining the viability of your sample is the higher priority, so the normal temperature range for dialysis is typically from ambient temperature down to cold room temperatures.

4) When is my dialysis finished?

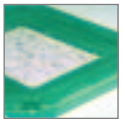
The answer is very subjective because there is no easily measured endpoint. The goal is to reduce the concentration of low MW compounds to a level that will not interfere with subsequent steps in your experiment.

Standard practice has been as follows:

1) Dialyze for 2 hours at room temperature (RT),
2) Change the dialysate before dialyzing for another 2 hours at RT, and
3) Change the dialysate again for overnight dialysis in the cold room.

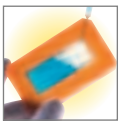
The Pierce high-performance dialysis products make the dialysis process faster than ever. The basic principle of the Slide-A-Lyzer® MINI Dialysis Unit is to deposit a 10 µl sample (essentially a monolayer) on a dialysis membrane in contact with a dialysate that is 100,000 times larger than the sample volume. Small MW compounds have an extremely short (<1 mm) migratory distance to exit the membrane. Also, with a gigantic concentration differential, the rate of dialysis is so fast it is often difficult to measure.

5) Is membrane pretreatment necessary?



A short hydration is necessary for some MWCO membranes in the Slide-A-Lyzer® Dialysis Cassette product line. Otherwise, the regenerated cellulose membranes are very clean and require no pretreatment. A very small amount of either glycerine or sulfur may be present. These low MW compounds will diffuse out of the membrane and into the dialysate during the normal dialysis process. If necessary, these compounds may be dialyzed ahead of time but, in the vast majority of cases, this is an unnecessary step.

6) When sample is injected into the Slide-A-Lyzer® Dialysis Cassette, the membrane sometimes folds. What causes this?

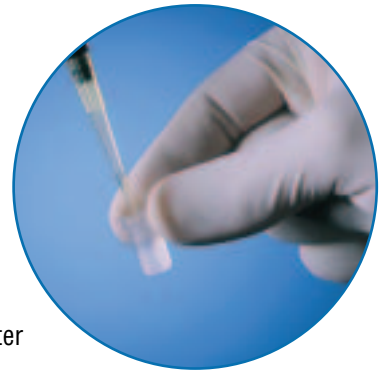


Because the dialysis membrane is manufactured as a tube, the regenerated cellulose polymer has "memory" and wants to return to that shape even though the tube was cut into a flat membrane. Therefore, when a membrane is hydrated and the Cassette is filled, the membrane will stretch or pull differently with respect to the X-axis or Y-axis. Although this does have minor implications relative to surface area, these Slide-A-Lyzer® Dialysis Cassettes will function just fine.

Slide-A-Lyzer® MINI Dialysis Units

For sample volumes as small as 10 µl.

Highlights:

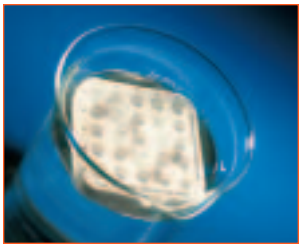


- **100% leak-tested**
  Patented design does not permit "wicking" that can occur in homemade devices
- **Very affordable**
- **Excellent sample recoveries**
  The Slide-A-Lyzer® MINI Dialysis Unit generally recovers 9-10 µl after dialysis of a 10 µl sample
- **Time of dialysis drastically reduced**
  Converts 100 µl of pH 2.8 buffer to pH 9.4 dialyzing against 1 L bicarbonate buffer, pH 9.4 in less than 10 minutes

The Slide-A-Lyzer® MINI Dialysis Unit is a small disposable cup made of polypropylene and regenerated cellulose. Sample is added and removed easily using a standard laboratory pipette. A float (sold separately) holds the Slide-A-Lyzer® MINI Dialysis Unit upright, floating on the dialysate surface with the membrane in contact with the dialysate. Although the device's patented design is very simple, the easy-to-use Slide-A-Lyzer® MINI Dialysis Unit is an invaluable tool for applications for which only 10-100 µl samples are available.

1. Apply sample with a pipette.

2. Place the Slide-A-Lyzer® MINI Dialysis Unit into the float.



3. Insert the float into the beaker containing the dialysate.

4. Recover sample.

See ordering information on pages 8-10.

Dialysis Rate and Sample Recovery

The 3.5K Slide-A-Lyzer® MINI Dialysis Unit was used for salt reduction analysis. Sample volumes in the range of 5-100 µl of 1 M NaCl were placed in the Slide-A-Lyzer® MINI Dialysis Unit and dialyzed against 1 L of water for 10 minutes. To recover the smallest (5 µl and 10 µl) volumes from the Slide-A-Lyzer® MINI Dialysis Unit, the device was tilted and gently tapped on the bottom edge to pool the sample. NaCl standards and samples were diluted in 50 ml ultrapure water and read with a conductivity meter (Cole-Parmer). The Slide-A-Lyzer® MINI Dialysis Unit dialyzes efficiently (Figure 1). Dialysis rate of 100 µl of 5 M NaCl was also analyzed by conductivity (Figure 2). In a third experiment, the rate of pH exchange in the Slide-A-Lyzer® MINI Dialysis Unit was determined and is also very rapid. In less than 10 minutes, 100 µl of ImmunoPure® IgG Elution Buffer, pH 2.8 is converted to pH 9.4 by dialysis against 1 L of BupH™ Carbonate-Bicarbonate Buffer, pH 9.4 (data not shown).

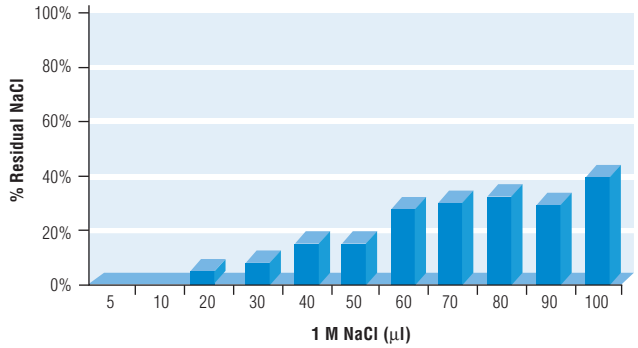


Figure 1. Dialysis efficiency in a Slide-A-Lyzer® MINI Dialysis Unit. After dialysis against water for 10 minutes, the residual NaCl is 0% for 5-10 µl samples, <20% for 20-50 µl samples and <40% for 60-100 µl samples, as measured with a conductivity meter.

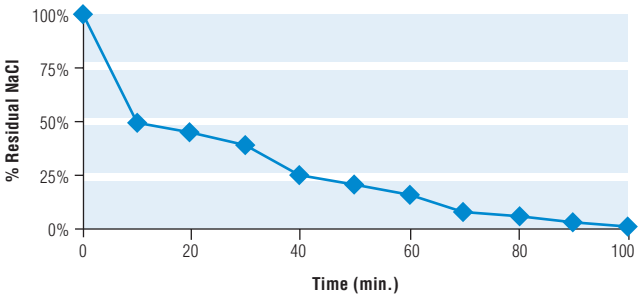


Figure 2. Dialysis time course in a Slide-A-Lyzer® MINI Dialysis Unit. 100 µl of 5 M NaCl was dialyzed for up to 100 minutes in a Slide-A-Lyzer® MINI Dialysis Unit against 1 L of water. Within 10 minutes, only 50% of the NaCl remained; by 100 minutes, no NaCl remained.

Slide-A-Lyzer® Dialysis Cassettes

Require just half the time of dialysis tubing!

Highlights:

- **>95% sample recovery**
  Sample volume remains visible throughout dialysis
- **No knots or clamps to loosen and leak**
  Secure design prevents sample loss due to leaks
- **Rigid frame permits smooth sample withdrawal**
  Removing every last drop is easy – even for scientists who have never before performed dialysis
- **High surface area/sample volume ratio will dialyze twice as fast as dialysis via conventional tubing**
  Patented Cassette design spreads the sample over a large surface area and the double membrane promotes fast dialysis

1. Remove a Cassette from the protective pouch. Fill the Cassette cavity with your sample through one of the guide inlets in the corner of the cassette. With the syringe still inserted into the cavity, draw up on the syringe to remove air.

2. Attach a flotation buoy and dialyze. Each buoy serves as an effective flotation device and also as a convenient bench-top stand for the Cassette. There is no need to worry about suspension of the dialysis bag.

3. Inject the Cassette chamber with air and withdraw your dialyzed sample from the Cassette.

The Slide-A-Lyzer® Dialysis Cassette is the product of choice for rapidly dialyzing sample volumes from 100 µl to 30 ml. The Cassette's patented design, which provides a maximum surface area/sample volume ratio, allows for excellent sample recoveries. Unlike standard flat tubing, the innovative Cassette does not require the use of knots or clips that can lead to leaking and sample loss.

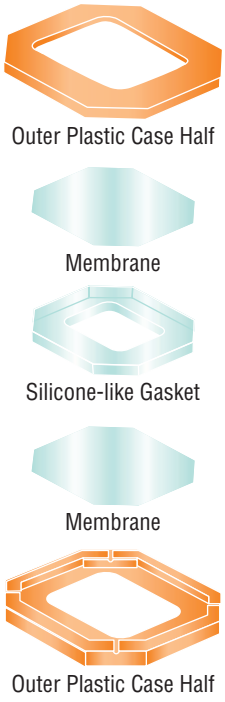
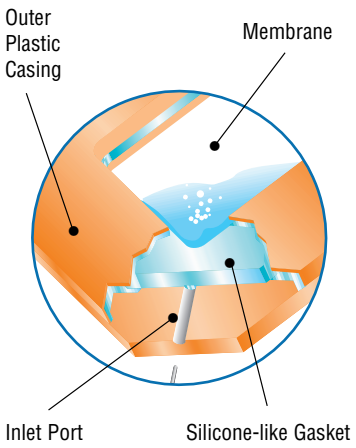


Figure 1



A silicone-like gasket, which is almost totally hidden from view after the Cassette has been assembled, prevents the Slide-A-Lyzer® Dialysis Cassette from leaking.

Figure 2

The Slide-A-Lyzer® Dialysis Cassette (exploded view) looks like a sandwich (Figure 1). When all of the pieces are compressed together (Figure 2), the outer plastic case halves are welded together sonically, hermetically sealing an inner chamber that can be accessed only via a syringe needle inserted through the gasket. Because the inert gasket is 10 mm wide, the needle path is sealed completely and tightly when the syringe is withdrawn.

Quantitative Sample Recovery

Three sample volume batches of water (0.5 ml, 1.7 ml and 3.0 ml) were loaded and recovered per the respective manufacturer's instructions in a Slide-A-Lyzer® Dialysis Cassette and conventional dialysis tubing to determine the volumes of recovery. Water volume recovered was determined gravimetrically. The following table summarizes the results:

Average Sample Volume Recovery

Sample Volume Loaded	Slide-A-Lyzer® Dialysis Cassette % Volume Recovery	Traditional Dialysis Tubing % Volume Recovery
3.0 ml	99.47	92.32
1.7 ml	99.30	93.12
0.5 ml	98.76	87.51

See ordering information on pages 7-10.

SnakeSkin® Dialysis Tubing

Avoid the hassles of large-sample dialysis using flat tubing.

Tubing Specifications

Membrane Type: Regenerated cellulose

Glycerol Content: Varies with MWCO membrane

Sulfur Content: 0.1%-0.15%

Heavy Metals Content: Trace

Tubing Nominal Dry Thickness*

3.5K MWCO	1.0 mils
7K MWCO	1.2 mils
10K MWCO	0.9 mils

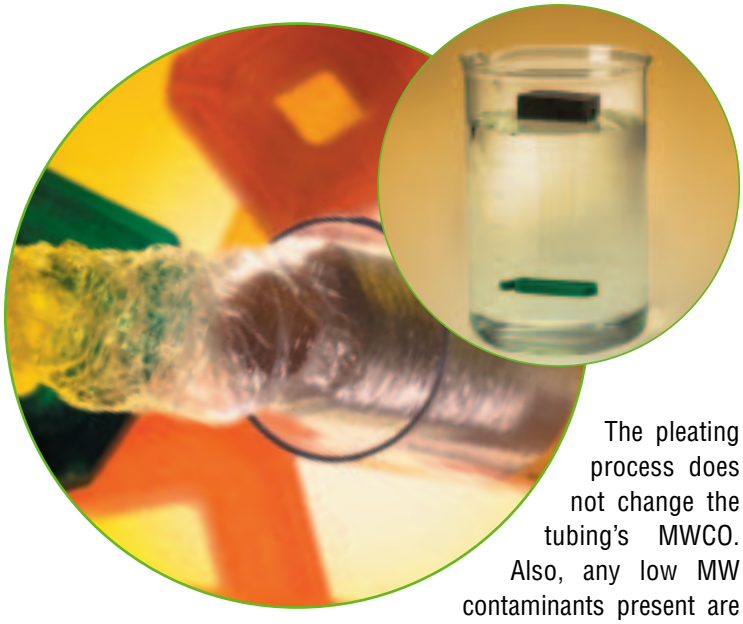
**1 mil = 25 microns*

Traditional flat dialysis tubing is difficult to open and often requires a presoak in water or buffer before it can be used. Handling the tubing after the presoak step can be messy and awkward. Pierce SnakeSkin® Dialysis Tubing was developed to simplify large-sample dialysis. SnakeSkin® Dialysis Tubing is open, regenerated cellulose dialysis tubing that is pleated (compressed) into a hollow stick. It is supplied in eight-inch sticks containing 35 feet of 22 mm internal diameter (I.D.) tubing, equivalent to 10.5 meters of 34 mm dry flat width tubing. SnakeSkin® Dialysis Tubing can be used for samples 15-100 ml in volume. The hydrated tubing will hold ~3.7 ml of sample per centimeter of length.

The pleated format of SnakeSkin® Dialysis Tubing makes it easy to open and ready to use, streamlining dialysis preparation. To use it, a researcher simply pulls out the required length of tubing, cuts it off and applies a closure. The sample is then added through the other end of the dry tubing and the second closure is applied.

Pierce recommends closure using SnakeSkin® Dialysis Tubing Clips (sold separately). To use the clips, cut the desired length of tubing, fold one end over twice and apply a clip. Add the sample through the second end of the tubing, fold over twice and attach the second clip.

As an alternative to these clips, SnakeSkin® Dialysis Tubing can also be closed with knots. Dip two to three inches of one end of the tubing into water or buffer and tie a knot in the wet membrane. (Dipping is required to assure a good seal at the knot point.) Add the sample to the open, dry end and tie a knot at this end. Because the sample quickly hydrates the membrane, there is no need to pre-wet the second end of the tubing.



The pleating process does not change the tubing's MWCO. Also, any low MW contaminants present are removed during the dialysis process. Because SnakeSkin® Dialysis Tubing is made from the same type of regenerated cellulose as flat tubing, its dialysis performance matches that of conventional tubing.

SnakeSkin® Dialysis Tubing is available in three MWCOs: 3.5K, 7K and 10K. Pierce recommends storing the product in its original packaging at room temperature, although refrigerated storage may also be used. Properly stored membrane is stable for at least one year.

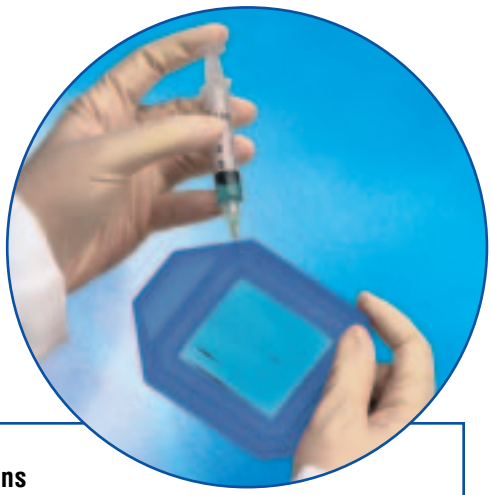
Ordering Information

Product #	Description	MWCO	Pkg. Size
68035	**SnakeSkin® Dialysis Tubing**	3.5K	22 mm dry I.D. x 35 feet*
68700	**SnakeSkin® Dialysis Tubing**	7K	22 mm dry I.D. x 35 feet*
68100	**SnakeSkin® Dialysis Tubing**	10K	22 mm dry I.D. x 35 feet*

**Equivalent to 10.5 meters of 34 mm dry flat width tubing.*

Accessory		
68011	**SnakeSkin® Dialysis Tubing Clips**	6/pkg.
66432	**Slide-A-Lyzer® Buoys for 12 ml Slide-A-Lyzer® Cassettes**	10/pkg.

2,000 MWCO Membrane Products



Specifications

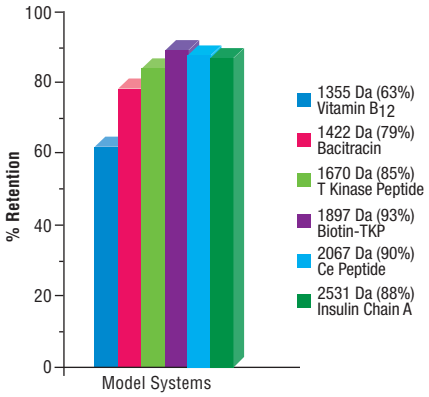
Membrane Composition:
Regenerated cellulose synthesized by the Viscose method

Hydration Required Before Use: 2 minutes

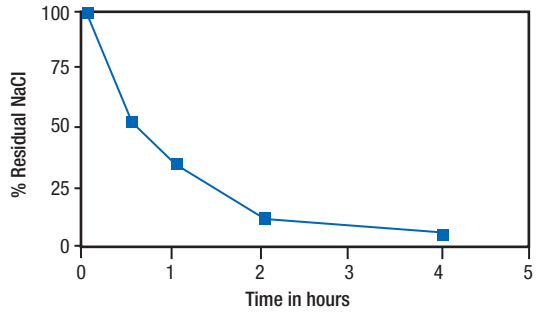
Glycerol Content: None

Sulfur Content: 0.169%

Heavy Metals Content: Trace



Characterization of membrane pore size. Vitamin B_{12}, bacitracin, tyrosine kinase peptide 1, biotin-TPKs substrate, protein kinase Ce (PKCe) peptide substrate and insulin chain A model systems (0.5-1 mg/ml) in either saline or 0.2 M carbonate bicarbonate buffer pH 9.4 were dialyzed overnight (17 hours) at 4°C. The amount of retentate was estimated using either the BCA™ Protein Assay or absorption at 360 nm (for vitamin B_{12}).



Desalting rate of the membrane for salts. Sodium chloride (1 M) in water was dialyzed at 4°C and the rate of removal of NaCl was determined by measuring the conductivity of the retentate at different time intervals.

Ordering Information

0.5 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66205	Slide-A-Lyzer® Dialysis Cassette	0.5 ml	10/pkg.

3 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66203	Slide-A-Lyzer® Dialysis Cassette	3 ml	10/pkg.

12 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66212	Slide-A-Lyzer® Dialysis Cassette	12 ml	8/pkg.

30 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66230	Slide-A-Lyzer® Dialysis Cassette	30 ml	6/pkg.

3,500 MWCO Membrane Products

Specifications

Membrane Composition:
Regenerated cellulose synthesized by the Viscose method

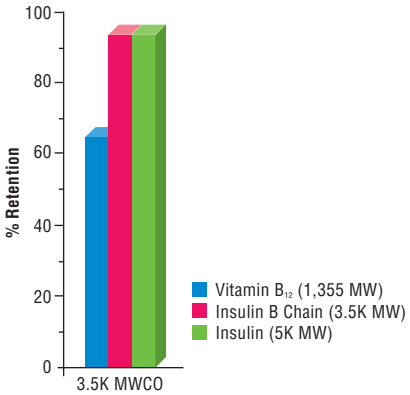
Membrane Thickness: 25 microns

Hydration Required Before Use: 30 seconds

Glycerol Content: Trace

Sulfur Content: 0.1%–0.15%

Heavy Metals Content: Trace



Sample retention by the 3.5K MWCO Slide-A-Lyzer® Dialysis Cassette membrane. Known MW standards were dissolved at a concentration of 1 mg/ml in either 0.15 M sodium chloride or 0.2 M carbonate-bicarbonate buffer, pH 9.4 (Product # 28382). Rotating cells were assembled with the nominal 3.5K MWCO membranes. One half of the cell was filled with MW standard solution and the other half was filled with an equal volume of the plain diluent. Cells were rotated overnight at 100 rpm.

Ordering Information

Slide-A-Lyzer® MINI Dialysis Units

Product #	Description	Capacity	Pkg. Size
69554	**Slide-A-Lyzer® MINI Dialysis Unit Plus Microtubes** *Sufficient caps are included.*	10-100 µl	10/pkg.
69558	**Slide-A-Lyzer® MINI Dialysis Units and Float** *Sufficient caps are included.*	10-100 µl	10/pkg.
69550	**Slide-A-Lyzer® MINI Dialysis Unit** *Sufficient caps are included.*	10-100 µl	50/pkg.
69552	**Slide-A-Lyzer® MINI Dialysis Unit** *Sufficient caps are included.*	10-100 µl	250/pkg.

0.5 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66333	**Slide-A-Lyzer® Dialysis Cassette**	0.1-0.5 ml	10/pkg.
66335	**Slide-A-Lyzer® Dialysis Cassette Kit** *Contains 10 cassettes, 10 buoys and 10 syringes.*	0.1-0.5 ml	Kit

3 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66330	**Slide-A-Lyzer® Dialysis Cassette**	0.5-3 ml	10/pkg.
66332	**Slide-A-Lyzer® Dialysis Cassette Kit** *Contains 10 cassettes, 10 buoys and 10 syringes.*	0.5-3 ml	Kit

12 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66110	**Slide-A-Lyzer® Dialysis Cassette**	3-12 ml	8/pkg.
66107	**Slide-A-Lyzer® Dialysis Cassette Kit** *Contains 8 cassettes, 8 buoys and 10 syringes.*	3-12 ml	Kit

30 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66130	**Slide-A-Lyzer® Dialysis Cassette**	12-30 ml	6/pkg.

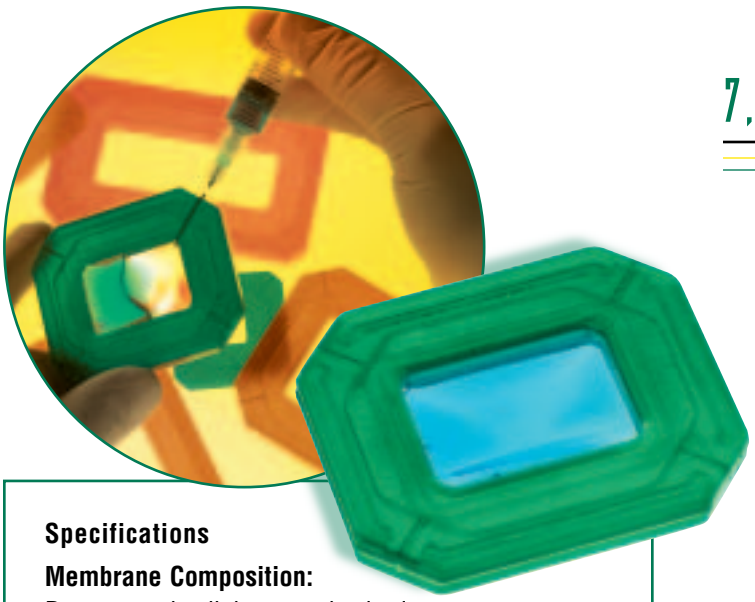
SnakeSkin® Dialysis Tubing

Product #	Description	Pkg. Size
68035	**SnakeSkin® Dialysis Tubing** *Equivalent to 10.5 meters of 34 mm dry width.*	22 mm dry I.D. x 35 ft

Product Accessories

Product #	Description	Pkg. Size
69588	**Slide-A-Lyzer® MINI Dialysis Unit Float** *Holds 25 MINI Dialysis Units*	4/pkg.
66430	**Slide-A-Lyzer® Buoys** *Holds one 0.1-0.5 ml or 0.5-3 ml cassette.*	10/pkg.
66431	**Slide-A-Lyzer® Carousel Buoy** *Holds ten 0.1-0.5 ml or 0.5-3 ml cassettes.*	1/pkg.
66432	**Slide-A-Lyzer® Buoys** *Holds one 3-12 ml cassette.*	8/pkg.
66494	**Slide-A-Lyzer® Syringe (1 ml)**	10/pkg.
66490	**Slide-A-Lyzer® Syringe (5 ml)**	10/pkg.
66493	**Slide-A-Lyzer® Syringe (20 ml)** *Each syringe comes with 18-gauge 1-inch beveled needles.*	10/pkg.
68011	**SnakeSkin® Dialysis Tubing Clips**	6/pkg.

7,000 MWCO Membrane Products



Specifications

Membrane Composition:
Regenerated cellulose synthesized by the Viscose method

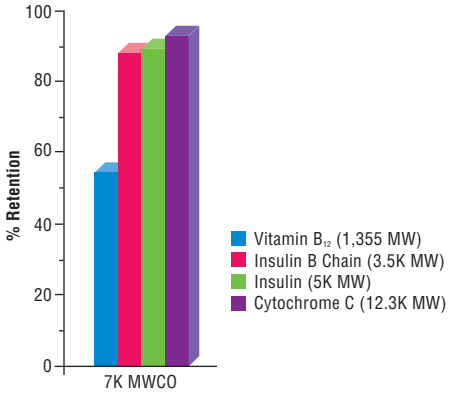
Membrane Thickness: 30 microns

Hydration Required Before Use: 30 seconds for low-volume samples

Glycerol Content: 13%

Sulfur Content: 0.1%–0.15%

Heavy Metals Content: Trace



Sample retention by the 7K MWCO Slide-A-Lyzer® Dialysis Cassette membrane. Known MW standards were dissolved at a concentration of 1 mg/ml in either 0.15 M sodium chloride or 0.2 M carbonate-bicarbonate buffer, pH 9.4 (Product # 28382). Rotating cells were assembled with the nominal 7K MWCO membranes. One half of the cell was filled with MW standard solution and the other half was filled with an equal volume of the plain diluent. Cells were rotated overnight at 100 rpm.

Ordering Information

Slide-A-Lyzer® MINI Dialysis Units

Product #	Description	Capacity	Pkg. Size
69560	**Slide-A-Lyzer® MINI Dialysis Unit** *Sufficient caps are included.*	10-100 µl	50/pkg.
69562	**Slide-A-Lyzer® MINI Dialysis Unit** *Sufficient caps are included.*	10-100 µl	250/pkg.

0.5 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66373	**Slide-A-Lyzer® Dialysis Cassette**	0.1-0.5 ml	10/pkg.
66375	**Slide-A-Lyzer® Dialysis Cassette Kit** *Contains 10 cassettes, 10 buoys and 10 syringes.*	0.1-0.5 ml	Kit

3 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66370	**Slide-A-Lyzer® Dialysis Cassette**	0.5-3 ml	10/pkg.
66372	**Slide-A-Lyzer® Dialysis Cassette Kit** *Contains 10 cassettes, 10 buoys and 10 syringes.*	0.5-3 ml	Kit

12 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66710	**Slide-A-Lyzer® Dialysis Cassette**	3-12 ml	8/pkg.
66707	**Slide-A-Lyzer® Dialysis Cassette Kit** *Contains 8 cassettes, 8 buoys and 10 syringes.*	3-12 ml	Kit

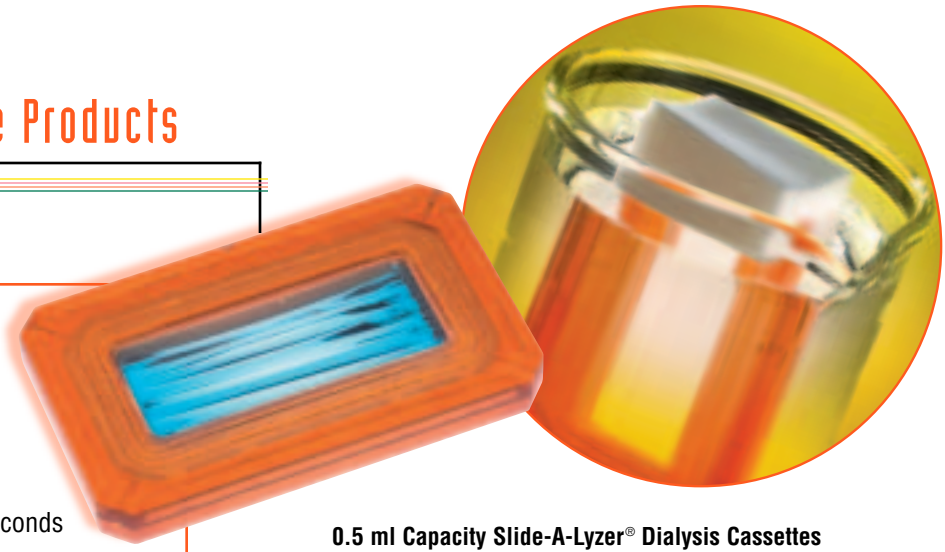
SnakeSkin® Dialysis Tubing

Product #	Description	Pkg. Size
68700	**SnakeSkin® Dialysis Tubing** *Equivalent to 10.5 meters of 34 mm dry width.*	22 mm dry I.D. x 35 ft

Product Accessories

Product #	Description	Pkg. Size
69588	**Slide-A-Lyzer® MINI Dialysis Unit Float** *Holds 25 MINI Dialysis Units*	4/pkg.
66430	**Slide-A-Lyzer® Buoys** *Each buoy holds one 0.1-0.5 ml or 0.5-3 ml cassette.*	10/pkg.
66431	**Slide-A-Lyzer® Carousel Buoy** *Each buoy holds ten 0.1-0.5 ml or 0.5-3 ml cassettes.*	1/pkg.
66432	**Slide-A-Lyzer® Buoys** *Each buoy holds one 3-12 ml cassette.*	8/pkg.
66494	**Slide-A-Lyzer® Syringe (1 ml capacity)**	10/pkg.
66490	**Slide-A-Lyzer® Syringe (5 ml capacity)**	10/pkg.
66493	**Slide-A-Lyzer® Syringe (20 ml capacity)** *Each syringe comes with 18-gauge 1-inch beveled needles.*	10/pkg.
68011	**SnakeSkin® Dialysis Tubing Clips**	6/pkg.

10,000 MWCO Membrane Products



Specifications

Membrane Composition:
Regenerated cellulose synthesized by the Viscose method

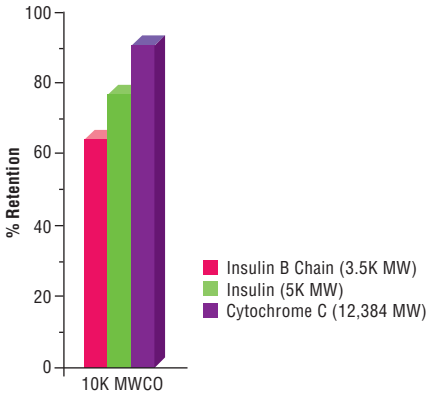
Membrane Thickness: 30 microns

Hydration Required Before Use: 30 seconds

Glycerol Content: 21%

Sulfur Content: 0.05%

Heavy Metals Content: Trace



Sample retention by the 10K MWCO Slide-A-Lyzer® Dialysis Cassette membrane. Known MW standards were dissolved at a concentration of 1 mg/ml in either 0.15 M sodium chloride or 0.2 M carbonate-bicarbonate buffer, pH 9.4 (Product # 28382). Rotating cells were assembled with the nominal 10K MWCO membranes. One half of the cell was filled with MW standard solution and the other half was filled with an equal volume of the plain diluent. Cells were rotated overnight at 100 rpm.

Ordering Information

Slide-A-Lyzer® MINI Dialysis Units

Product #	Description	Capacity	Pkg. Size
69574	**Slide-A-Lyzer® MINI Dialysis Unit Plus Microtubes** *Sufficient caps are included.*	10-100 µl	10/pkg.
69570	**Slide-A-Lyzer® MINI Dialysis Unit** *Sufficient caps are included.*	10-100 µl	50/pkg.
69572	**Slide-A-Lyzer® MINI Dialysis Unit** *Sufficient caps are included.*	10-100 µl	250/pkg.
69576	**Slide-A-Lyzer® MINI Dialysis Unit Plus Float** *Sufficient caps are included.*	10-100 µl	Kit/10 units

0.5 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66383	**Slide-A-Lyzer® Dialysis Cassette**	0.1-0.5 ml	10/pkg.
66385	**Slide-A-Lyzer® Dialysis Cassette Kit** *Contains 10 cassettes, 10 buoys and 10 syringes.*	0.1-0.5 ml	Kit

3 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66380	**Slide-A-Lyzer® Dialysis Cassette**	0.5-3 ml	10/pkg.
66382	**Slide-A-Lyzer® Dialysis Cassette Kit** *Contains 10 cassettes, 10 buoys and 10 syringes.*	0.5-3 ml	Kit

12 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66810	**Slide-A-Lyzer® Dialysis Cassette**	3-12 ml	8/pkg.
66807	**Slide-A-Lyzer® Dialysis Cassette Kit** *Contains 8 cassettes, 8 buoys and 10 syringes.*	3-12 ml	Kit

30 ml Capacity Slide-A-Lyzer® Dialysis Cassettes

Product #	Description	Capacity	Pkg. Size
66830	**Slide-A-Lyzer® Dialysis Cassette**	12-30 ml	6/pkg.

λ-Irradiated 10K MWCO Membrane

Product #	Description	Capacity	Pkg. Size
66454	**Slide-A-Lyzer® Dialysis Cassette**	0.1-0.5 ml	10/pkg.
66455	**Slide-A-Lyzer® Dialysis Cassette**	0.5-3 ml	10/pkg.
66453	**Slide-A-Lyzer® Dialysis Cassette**	3-12 ml	8/pkg.

SnakeSkin® Dialysis Tubing

Product #	Description	Pkg. Size
68100	**SnakeSkin® Dialysis Tubing** *Equivalent to 10.5 meters of 34 mm dry width.*	22 mm dry I.D. x 35 ft

Product Accessories

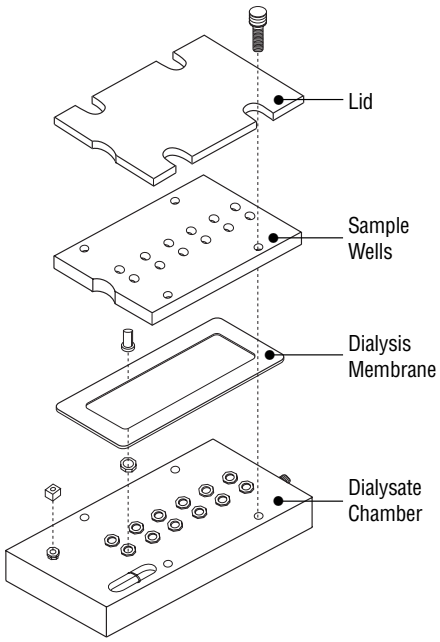
Product #	Description	Pkg. Size
69588	**Slide-A-Lyzer® MINI Dialysis Unit Float**	4/pkg.
66430	**Slide-A-Lyzer® Buoys** *Holds one 0.1-0.5 ml or 0.5-3 ml cassette.*	10/pkg.
66431	**Slide-A-Lyzer® Carousel Buoy** *Holds ten 0.1-0.5 ml or 0.5-3 ml cassettes.*	1/pkg.
66432	**Slide-A-Lyzer® Buoys** *Holds one 3-12 ml cassette.*	8/pkg.
66494	**Slide-A-Lyzer® Syringe (1 ml capacity)**	10/pkg.
66490	**Slide-A-Lyzer® Syringe (5 ml capacity)**	10/pkg.
66493	**Slide-A-Lyzer® Syringe (20 ml capacity)** *Each syringe comes with 18-gauge 1-inch beveled needles.*	10/pkg.
68011	**SnakeSkin® Dialysis Tubing Clips**	6/pkg.

Microdialyzer System

Allows you to simultaneously dialyze multiple small volume samples with minimal protein loss – in less than one hour!

Many dialysis methods are time-consuming and result in substantial sample loss – a critical concern when dealing with small sample volumes. The Pierce Microdialyzer System offers quick, simple methods for sample desalting or buffer exchange. These units require only about one hour to complete the dialysis procedure, and they minimize the loss or dilution of precious samples. They virtually eliminate the need for awkward, time-consuming dialysis procedures.

The Pierce Microdialyzer System is ideal for dialyzing small samples. Microdialyzer System 100 is designed for the simultaneous dialysis of twelve 20-100 µl sample volumes. The Microdialyzer System is equipped with a lid to prevent sample evaporation and a unique inlet/outlet system for easy buffer exchange.



The Pierce Microdialyzer System offers minimal protein loss and excellent sample recovery. In addition, Delrin® Well Plates are available for autoclaving applications with the System 100. Precut and pre-framed cellulose acetate membranes of varying MW cutoffs are also available for added convenience.

Highlights:

- Wide range of MWCOs available, 1K to 50K
- Handy lid to prevent evaporation
- Stir bar to increase dialysis efficiency
- Unique one-way valve system to provide more efficient regulation of buffer exchange
- Improved design allows access to dialysate chamber and channels "air bubbles" to a vent valve

Applications:

- Purifying membrane proteins
- Removing protein-modification reagents and cross-linkers
- Removing oligosaccharides from protein solutions
- Dialyzing prior to electrophoresis
- Exchanging, collecting and/or analyzing buffer during dialysis
- Blotting for immunochemistry

Ordering Information

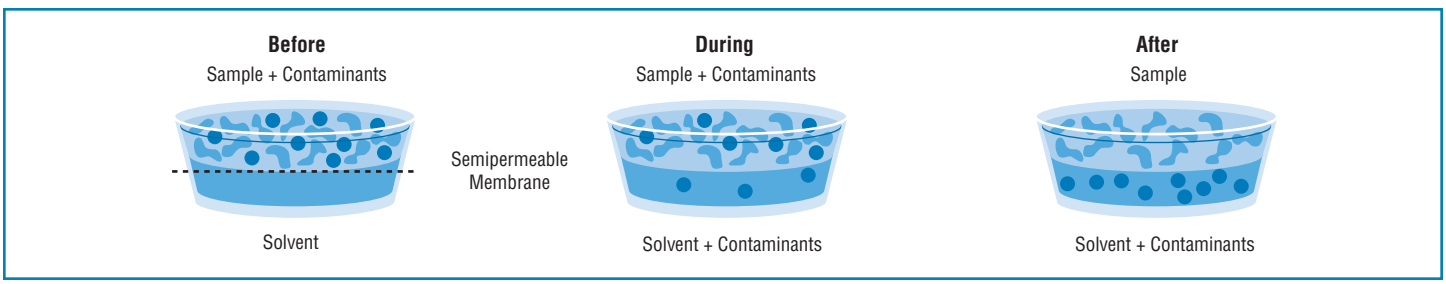
Product #	Description
66315	**Microdialyzer System 100** *For simultaneous dialysis of 12 x 20 µl-100 µl samples.*

Microdialyzer System Accessories

Product #	Description
66322	**Delrin® 2 Sample Well Plate For System 100** *For autoclaving applications with Microdialyzer System 100.*

Pre-Framed Dialysis Membranes

Product #	Description	MWCO	Pkg. Size
66306	**Pre-Framed Dialysis Membranes**	1K	10/pkg.
66307	**Pre-Framed Dialysis Membranes**	3K	10/pkg.
66310	**Pre-Framed Dialysis Membranes**	8K	10/pkg.
66312	**Pre-Framed Dialysis Membranes**	20K	10/pkg.
66313	**Pre-Framed Dialysis Membranes**	50K	10/pkg.

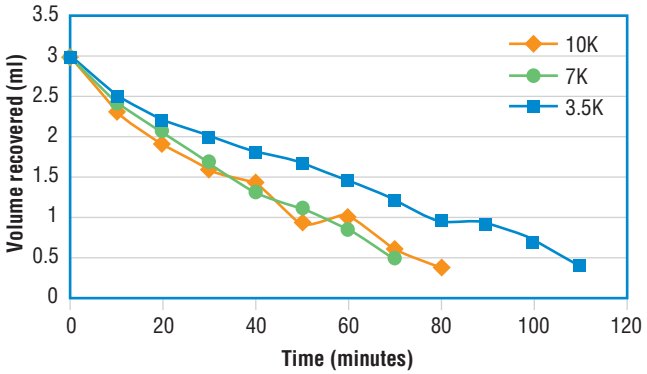


Slide-A-Lyzer® Concentrating Solution

Slide-A-Lyzer® Concentrating Solution is a proprietary, hygroscopic, high MW compound that pulls water through dialysis membrane quickly. With other solutions, dilute samples get concentrated and contaminated with a compound of similar MW that is difficult to remove by dialysis or other means. In addition, these contaminants absorb strongly at 280 nm, distorting protein measurements using the tyrosine absorption method. Slide-A-Lyzer® Concentrating Solution is specially formulated to remove low MW compounds that could cross the membrane to contaminate the sample.

Many samples will take on water or buffer during the dialysis process. When this occurs, it may be desirable to return the sample to its original concentration, or to concentrate it even further. Slide-A-Lyzer® Concentrating Solution is ideal for this application.

The solution inside a Slide-A-Lyzer® Dialysis Cassette contains sample, water and sometimes other small molecules. To concentrate the sample, the Slide-A-Lyzer® Dialysis Cassette containing the sample is placed in a small plastic bag containing the concentrating solution. By diffusion, the water and other small molecules are drawn out of the cassette, into the bag. The large molecular size of the concentrating solution prevents it from crossing the membrane and entering the cassette. Therefore, a one-way flow of water and other small molecules out of the Cassette results in a more concentrated sample.



The Slide-A-Lyzer® Concentrating Solution quickly reduces a starting volume of 3 ml of sample inside the Slide-A-Lyzer® Dialysis Cassette to 0.5 ml in about 50 minutes. This is comparable to other concentration methods such as centrifuge-driven membrane devices.

Highlights:

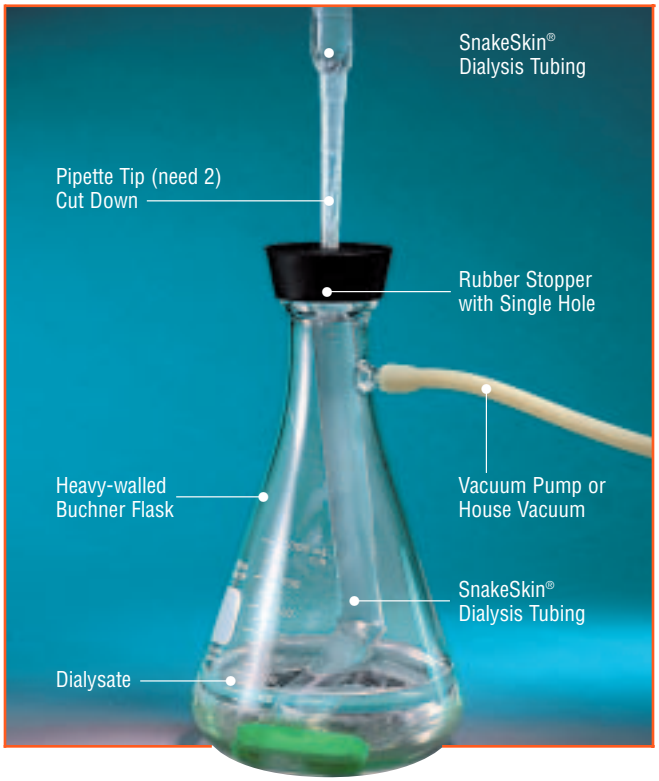
- **Dialysis and concentration occur in one device**
  Avoids further protein loss by using a second device for concentration
- **Faster concentration**
  A starting volume of 3 ml is reduced to 0.5 ml in about 75-80 minutes
- **Easy to use**
  Just pour the Slide-A-Lyzer® Concentrating Solution into the small plastic bag provided and drop in the Slide-A-Lyzer® Dialysis Cassette containing the sample
- **Improved formulation and protocols**
  Improved product makes concentration easier with rocking-platform protocols
- **The process can be monitored**
  Because both the concentrating solution and the bag are clear, the sample concentration can be easily monitored, something that is not possible with closed-system centrifuge-type devices

Ordering Information

Product #	Description	Pkg. Size
66528	**Slide-A-Lyzer® Concentrating Solution** *For use with 0.5-3 ml cassettes.*	200 ml
66529	**Slide-A-Lyzer® Concentrating Solution** *For use with 3-30 ml cassettes.*	500 ml
66530	**Slide-A-Lyzer® Concentrating Solution** *For use with Slide-A-Lyzer® MINI Dialysis Units.*	25 ml

Concentrating with the Slide-A-Lyzer® MINI Dialysis Unit

Slide-A-Lyzer® Concentrating Solution works on even very small samples using the Slide-A-Lyzer® MINI Dialysis Unit. Samples from 10 to 100 µl are placed in the Slide-A-Lyzer® MINI Dialysis Unit and then placed in a microcentrifuge tube that contains Slide-A-Lyzer® Concentrating Solution at a minimum ratio of 3:1 (Concentrating Solution to sample).



Small samples dialyze much faster than larger samples because the concentration differential is much higher and the migratory diffusion distance is shorter. With a 100 ml dilute sample, it is often prudent to concentrate down to 12 ml with forced dialysis using SnakeSkin® Tubing before dialysis in a Slide-A-Lyzer® Dialysis Cassette. The following forced dialysis SnakeSkin® Tubing application has been adapted from the method described in:

Doonan, S. (ed.) (1996). Protein Purification Protocols in *Methods in Molecular Biology,* **59,** 97-101.

Method

1) Cut off and discard the bottom of two pipette tips (2.5-5 ml) so SnakeSkin® Tubing easily fits through the pipette tip.
2) Insert one pipette through the rubber stopper.
3) Cut off the desired length of SnakeSkin® Dialysis Tubing (for larger volumes, the membrane will extend above the flask).
4) Thread the SnakeSkin® Dialysis Tubing (dry) through the rubber stopper containing the pipette tip.
5) Clip or tie several knots in the lower end of the SnakeSkin® Tubing.
6) Pour the sample to be concentrated through the top of the open end of the SnakeSkin® Tubing. (Before you completely fill the SnakeSkin® Tubing, place the second pipette tip inside the SnakeSkin® Tubing to create a secure seal between the SnakeSkin® Dialysis Tubing and the first pipette tip.) Fill with remaining sample.

Forced Dialysis for Sample Concentration

Concentrates 100 ml down to 12 ml in six hours.

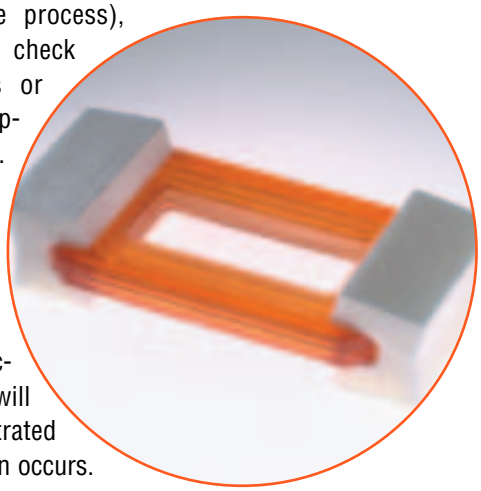
7) Place 3-4 cm of buffer in the flask.
NOTE: Most of the SnakeSkin® Tubing will not be exposed to buffer.
8) Clip or tie the open end of the SnakeSkin® Dialysis Tubing to ensure a closed vacuum system.
9) Connect the side arm to house vacuum.
10) Concentrate sample until desired volume is reached.

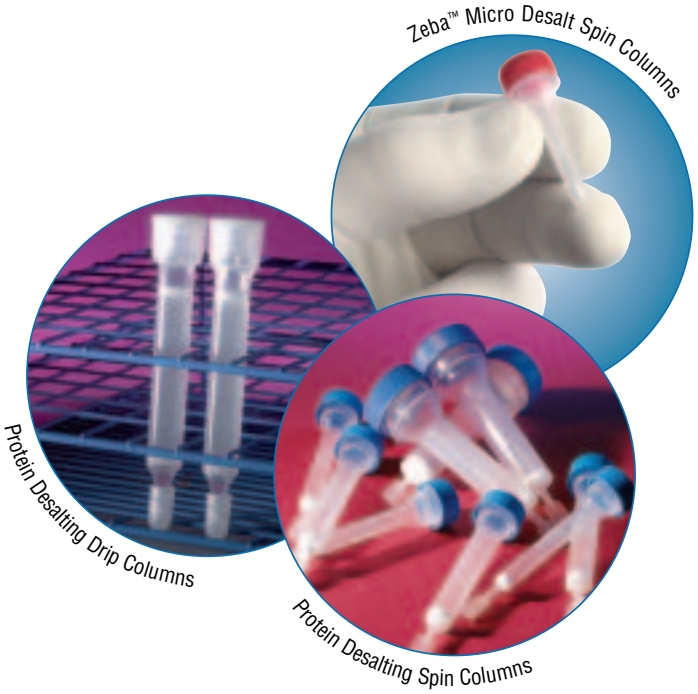
Sample Results

1) A 1 mg/ml solution of bovine serum albumin was prepared in phosphate buffered saline, pH 7.4.
2) Approximately 30 cm of SnakeSkin® Dialysis Tubing was used and assembled as described previously.
3) After six hours, the starting sample volume (100 ml) was concentrated to 12 ml with an estimated protein recovery of 65%.

Evaporation for Sample Concentration

Water inside a Slide-A-Lyzer® Dialysis Cassette will evaporate. The cassette is ideally suited for sample concentration via evaporation because of the dual membranes and high surface area. Place a sample in the cassette, then withdraw the air inside. Place two buoys on the cassette as shown below. Let your sample evaporate on the bench top (using a fan to increase airflow across the membrane will speed up the process), making sure to check every 10 minutes or less to prevent evaporation to dryness. When concentrating by evaporating the water from your sample, the small molecules (buffer salts, reducing agents, etc.) will also be concentrated because no diffusion occurs.





Gel Filtration

Gel filtration involves the chromatographic separation of molecules of different dimensions based on their relative abilities to penetrate into a suitable stationary phase. A chromatographic matrix, usually consisting of very small, uncharged porous particles in an aqueous solution, is packed into a column and then used for the separation. Different levels of separation can be achieved based on the pore size of the medium packed into the column. The medium can be chosen to totally exclude proteins or large molecules, while still including small solutes. Large molecules are excluded from the internal pores of the gel and emerge first from the column in the "void volume." The smaller molecules are able to penetrate the pores, then progress through the column at a slower rate. These smaller molecules then appear in the "elution volume."

Desalting and buffer exchange are two of the most widely used applications of gel filtration chromatography.

Desalting

Desalting involves the chromatographic separation of macromolecules in the void volume from smaller molecules that penetrate the gel bed.

Applications:

- Removing salts from protein solutions
- Removing phenol from nucleic acid preparations
- Separating excess cross-linker from conjugate preparations
- Removing excess derivatizing agents from modified proteins
- Removing unreacted dye from fluorescent antibodies
- Removing free radiolabel from labeled proteins

Buffer Exchange

Buffer exchange is used to place a protein solution into a more appropriate buffer prior to applications such as electrophoresis, ion exchange or affinity chromatography. In both desalting and buffer exchange, when the column is pre-equilibrated with the elution buffer, the macromolecular components will be recovered in equilibrium with the elution buffer. If water is used as the elution buffer, the components will be desalted. If another buffer is used, a buffer exchange will result.

D-Salt™ Columns are ready-to-use gel filtration columns with a unique stop-flow characteristic that prevents the gel from drying. The columns all work using gravity flow, so there is no need for a pump. A polyethylene disc has been inserted both above and below the column gel bed, so that when the buffer is applied, the meniscus will stop at the top disc. This allows control of the fraction collection time and fraction size, and it prevents sample loss.

Zeba™ Desalt Spin Columns

Highlights:

- Exceptional protein recovery
- Wide product offering accommodates your sample needs
- Easy-to-use with no cumbersome column preparation or equilibration
- No screening fractions for protein or waiting for protein to emerge by gravity flow
- Minimal sample dilution

Although numerous techniques and resins for desalting are available, most have many drawbacks, including significant sample loss, long processing times and the need to collect multiple fractions. Zeba™ Desalt Spin Columns provide excellent protein recovery without the limitations associated with other desalting methods. With the introduction of Zeba™ Desalt Spin Columns in 2, 5 and 10 ml formats to complement the Micro and 0.5 ml versions, the Zeba™ Desalt Spin Column family of products allows processing of samples volumes ranging from 2 µl to 4 ml (Table 1).

Table 1. Recommended sample volumes for Zeba™ Spin Columns.

Resin Bed	Sample Volume
75 µl (micro) column	2-12 µl
0.5 ml column	30-130 µl
2 ml column	200-700 µl
5 ml column	600-2,000 µl
10 ml column	1,500-4,000 µl

The easy-to-use Zeba™ Spin-Column Format dramatically improves results over standard drip-column methodologies, eliminating the need to wait for samples to emerge by gravity flow and the need to monitor fractions for protein recovery. Zeba™ Desalt Columns require no chromatographic system, cumbersome column preparation or equilibration and they can process multiple samples in ~8 minutes.

Zeba™ Desalt Spin Columns contain a proprietary high-performance desalting resin, exclusive to Pierce, that offers exceptional desalting and protein-recovery characteristics compared to other commercially available resins (Figure 1). Samples containing as low as 25 µg/ml of protein can be processed, providing exceptional protein recovery and ≥95% retention of salts and other small molecules (<1,000 MW).

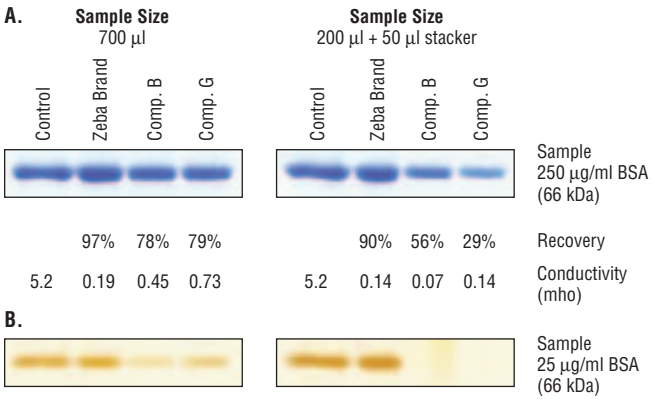


Figure 1. Increased protein recovery with Zeba™ Desalt Spin Columns. Samples of bovine serum albumin (BSA) at **Figure 1A**. 250 µg/ml and **Figure 1B**. 25 µg/ml in 1 M NaCl were desalted with the 2 ml Zeba™ Desalt Spin Columns and other commercial desalting resins using similar formats. A portion of the recovered sample (10 µl) was analyzed by SDS-PAGE. The remaining sample was used for conductivity measurements and BCA™ Protein Assay (Product # 23225) was performed to determine protein concentration. Zeba™ Desalt Resin provides significantly greater protein recovery under all conditions tested. Conductivity and protein recovery values after desalting are indicated for 250 µg/ml samples.

Ordering Information

Product #	Description	Pkg. Size
89877	Zeba™ Micro Desalt Spin Columns	25/pack
89878	Zeba™ Micro Desalt Spin Columns	50/pack
89882	Zeba™ Desalt Spin Columns, 0.5 ml	25/pack
89883	Zeba™ Desalt Spin Columns, 0.5 ml	50/pack
89889	Zeba™ Desalt Spin Columns, 2 ml	5/pack
89890	Zeba™ Desalt Spin Columns, 2 ml	25/pack
89891	Zeba™ Desalt Spin Columns, 5 ml	5/pack
89892	Zeba™ Desalt Spin Columns, 5 ml	25/pack
89893	Zeba™ Desalt Spin Columns, 10 ml	5/pack
89894	Zeba™ Desalt Spin Columns, 10 ml	25/pack
NEW! 89807	Zeba™ 96-well Desalt Plate Visit *www.piercenet.com* to download product instructions.	2 plates
NEW! 89808	Zeba™ 96-well Desalt Plate	4 plates

Handee™ Spin Columns

Product #	Description	Pkg. Size
89879	Handee™ Micro Spin Columns	50/pack
89896	Handee™ Spin Columns, 2 ml	25/pack
89897	Handee™ Spin Columns, 5 ml	25/pack
89898	Handee™ Spin Columns, 10 ml	25/pack

D-Salt™ Columns

Protein Desalting Spin Columns

Perform desalting or buffer exchange in less than five minutes.

Pierce Protein Desalting Spin Columns are designed to desalt or exchange buffer of protein samples with volumes from 30 to 120 µl. Protein Desalting Spin Columns have exceptional desalting characteristics with ≥95% retention of salts and small molecules while providing excellent recovery of proteins greater than 7,000 MW. Multiple samples can be processed in less than five minutes. No cumbersome column preparation steps are required.

Ordering Information

Product #	Description	Pkg. Size
89849	**Protein Desalting Spin Columns**	25/pkg.
89862	**Protein Desalting Spin Columns**	50/pkg.

D-Salt™ Excellulose™ Desalting Columns

Desalt proteins with excellent sample recoveries.

D-Salt™ Excellulose™ Desalting Columns are pre-packed with small, porous cellulose beads. These columns have a wet bead diameter of 100-200 µm and an exclusion limit of 5 kDa. Excellulose™ Gel is extremely stable to heat, freeze-thaw cycles, organic solvents and acidic or basic conditions. It also demonstrates excellent mechanical stability and offers excellent sample recoveries as a result of the slower flow rate.

D-Salt™ Dextran Desalting Columns

Pierce dextran gel exhibits excellent stability and flow properties.

D-Salt™ Dextran Desalting Columns (5K MWCO) are pre-packed with cross-linked dextran. The wet bead diameter is 50-150 µm. The gel has good rigidity for easy handling and excellent flow properties. The D-Salt™ Dextran Gel is stable in water, salt solutions, organic solvents and alkaline or weakly acidic solutions. It is heat-stable and can be autoclaved dry or in solution at a neutral pH for 30 minutes at 120°C without affecting its chromatographic properties.

D-Salt™ Polyacrylamide Desalting Columns

Eliminate the possibility of enzymatic degradation and microbial growth.

D-Salt™ Polyacrylamide Desalting Columns are prepacked with porous polyacrylamide beads. D-Salt™ 6K Columns have a wet bead diameter of 90-180 µm. D-Salt™ Polyacrylamide 1.8K Desalting Columns have a wet bead diameter of 45-90 µm. These columns are ideal for separating lower MW compounds with a fractionation range of 100-1,800. The D-Salt™ Polyacrylamide Gel is not subject to enzymatic degradation and will not serve as a nutrient for microbial growth. The gel is very hydrophilic, so there should be little interaction between the gel and sample molecules. Contamination with low MW sugars (which may occur with cross-linked dextran) is not a concern when using D-Salt™ Polyacrylamide Gel.

Oxidizing agents can be removed without destroying the support. This gel is susceptible to hydrolysis of amide groups under extreme pH conditions, so an operating pH of 2-10 is recommended at room temperature. The D-Salt™ Polyacrylamide Gel can also be autoclaved at pH 5.5-6.5 for 30 minutes at 120°C.

Ordering Information

D-Salt™ Excellulose™ Desalting Columns

Product #	Description	MWCO	Pkg. Size
20439	**D-Salt™ Excellulose™ Desalting Columns**	5K	5 x 2 ml
20449	**D-Salt™ Excellulose™ Desalting Columns**	5K	5 x 5 ml

D-Salt™ Dextran Desalting Columns

Product #	Description	MWCO	Pkg. Size
43230	**D-Salt™ Dextran Desalting Columns**	5K	5 x 5 ml
43233	**D-Salt™ Dextran Desalting Columns**	5K	5 x 10 ml

D-Salt™ Polyacrylamide Desalting Columns

Product #	Description	MWCO	Pkg. Size
43426	**D-Salt™ Polyacrylamide Desalting Columns**	1.8K	5 x 5 ml
43240	**D-Salt™ Polyacrylamide Desalting Columns**	6K	5 x 5 ml
43243	**D-Salt™ Polyacrylamide Desalting Columns**	6K	5 x 10 ml

Poppers™ Liquid Cell Lysis Reagents are pre-mixed and ready to use. They're the new wave of cell lysis! No hit-or-miss homemade recipes, no glass beads, no sonicators, no French presses, no freezing and no thawing! Just pour and explore!

Poppers™ Cell Lysis Products

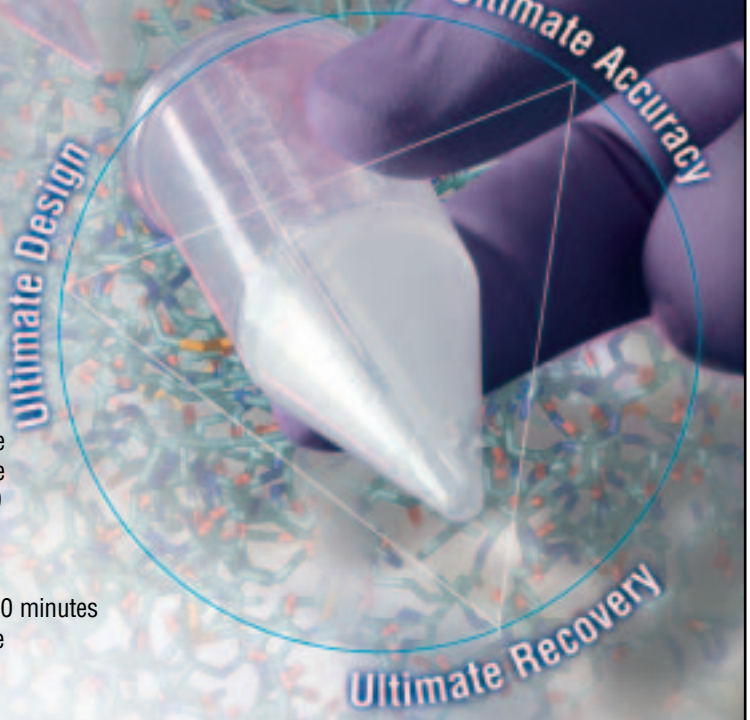
Popper (Product #)	Organisms/Samples	Dialyze[1]	Compatibility	Notes
B-PER® Reagent 78248 500 ml 78243 165 ml	Gram(-) bacteria, *S. aureus H. pylori*, *E. coli* strains BL21(D3)> JM109> DH5α >M15, Archaebacteria, nematodes, *Acinetobacter* sp., insect cells	Yes	Reporter assays, IPs,[2] Western blot, GST- and His-tag purification	Protease inhibitors[3] may be added to prevent protein degradation. Salts, chelating agents and reducing agents can be added for more efficient lysis. Do not exceed 0.5 M NaCl. Better lysis if cells are frozen in B-PER® Reagent.
B-PER® II Reagent 78260 250 ml (For smaller volume samples)	Gram(-) bacteria, *S. aureus H. pylori*, *E. coli* strains BL21(D3)> JM109> DH5α >M15, Archaebacteria, nematodes, *Acinetobacter* sp., insect cells	Yes	Reporter assays, IPs,[2] Western blot, GST- and His-tag purification	Protease inhibitors[3] may be added to prevent protein degradation. Salts, chelating agents and reducing agents can be added for more efficient lysis. Better lysis if cells are frozen in B-PER® Reagent.
B-PER® PBS Reagent 78266 500 ml	Gram(-) bacteria, *S. aureus H. pylori*, *E. coli* strains BL21(D3)> JM109> DH5α >M15, Archaebacteria, nematodes, *Acinetobacter* sp., insect cells	Yes	Reporter assays, IPs,[2] Western blot, GST- and His-tag purification	Protease inhibitors[3] may be added to prevent protein degradation. Salts, chelating agents and reducing agents can be added for more efficient lysis. Better lysis if cells are frozen in B-PER® Reagent.
Y-PER® Reagent 78990 500 ml 78991 200 ml	*S. cerevisiae, Schizo-saccharomyces pombe, C. albicans , B. subtilis, E. coli, P. pastoris, Strep. avidinii, Acinetobacter sp.*	No	IPs,[2] Western blot, β-Gal enzyme assays, IEF after dialysis, GST- and His-tag purification	Protease inhibitors[3] may be added to prevent protein degradation. Use at room temperature. Double incubation time for use at 4°C. Use log-phase cells. For stationary-phase cells, add 0.1 M DTT or 20-50 mM TCEP. Will work with 1 mM EDTA. Does not lyse spores. Cannot use with ion-exchange columns.
Y-PER® Plus Reagent 78998 25	ml 78999 500 ml	Yeast (*S.	*cerevisiae*) *Acinetobacter* sp.	Yes
GST- and His-tag purification, Western blot	Protease inhibitors[3] may be added to prevent protein degradation. The addition of up to 2 M NaCl may result in increased efficiency of lysis and		protein yield.	**M-PER® Reagent** 78503 25 ml 78501 250 ml 78505 1 L
Cultured mammalian cells. COS7, NIH3T3,	Hepa 1-6, 293, CHO, MDA, MB231, FM2 and insect cells	Yes	Luciferase, β-Gal (low signal), CAT, kinase assays, ELISAs, immobilized glutathione, Western blot	Protease inhibitors[3] may be added to prevent protein degradation. Adding 150 mM NaCl results in increased efficiency of lysis and higher protein yield in some cell lines. A PBS rinse of cells prior to lysis removes contam-
inants such as phenol red and increases protein yield.	**T-PER® Reagent** 78510 500 ml	Heart, liver, kidney and brain	Yes	Luciferase, β-Gal, CAT, kinase assays, Western blot, ELISAs, immobilized glutathione
Protease inhibitors[3] may be added to prevent protein degrada-	tion. Mechanical disruption of the tissue is still required. Can also be used for cultured cells.	**NE-PER® Reage**	**nt** 78833 Kit	Tissue: calf liver cultured cells: epithelial (HeLa), fibroid (Cos7), kidney (NIH3T3), liver (Hepa 1) and brain (C6)
NEW! .0 (CER) Yes (NER)	EMSA (if using <3 µl or 10%, otherwise dialyze first in SAL MINIs),[4] Western blot, reporter assays, IEF (after	dialysis to reduce	salt concentration)	Protease inhibitors[3] may be added to prevent protein degradation. Packed cell vol.: 2 x 10^6 HeLa cells =10 µl = 20 mg Tissue Yield (calf liver): 3-4 mg cytoplasmic protein/100 mg tissue; 1-1.5 mg nuclear protein/100 mg tissue Cell Yield (HeLa): 300-400 µg cytoplasmic protein/

1. The detergent can be removed by dialysis
2. Immunoprecipitation
3. Halt™ Protease Inhibitor Cocktail, Product # 78410 and 78415 (EDTA-free)
4. Slide-A-Lyzer® MINI Dialysis Units.
5. Samples prepared in Mem-PER® Reagent can be dialyzed if the buffer contains detergent (e.g., CHAPS).

iCON™
PROTEIN CONCENTRATORS

Concentrate for Success

iCON™ Concentrators are advanced disposable ultrafiltration centrifugal devices for concentration and diafiltration/buffer-exchange of biological samples such as enzymes, antigens or antibodies. The innovative conical design* and high-performance regenerated cellulose membrane provide excellent protein concentration and recovery from dilute protein samples. iCON™ Concentrators are available with MWCO of 9K and 20K in 7 and 20 ml volume sizes.



Highlights:

- Achieve 150- to 400-fold protein concentrations in less than 30 minutes
- Accommodate concentration volumes over a wide working range (7 ml = 1-7 ml and 20 ml = 5-20 ml ranges)
- Desalt and exchange buffers
- Uses the maximum membrane surface area, providing unsurpassed protein concentration
- Compatible with swinging-bucket or fixed-angle rotors
- No invert spin required
- Excellent recovery of dilute proteins

Ordering Information

Product #	Description	Pkg. Size
89884	iCON™ Concentrators, 7 ml, 9K MWCO	25/pkg.
89885	iCON™ Concentrators, 20 ml, 9K MWCO	25/pkg.
89886	iCON™ Concentrators, 7 ml, 20K MWCO	25/pkg.
89887	iCON™ Concentrators, 20 ml, 20K MWCO	25/pkg.

** iCON™ Technology is protected by U.S. patents # 6,269,957 and 6,357,601.*

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Outside the United States, visit our web site or call 815-968-0747 to locate your local Perbio Science branch office (below) or distributor

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