

Disposable Hollow Fiber Modules vs. Flat Sheet Cassettes for Processing Monoclonal Antibodies

A Case Study: Single Use Hollow Fiber Modules for Therapeutic Product Processing

Background

A contract manufacturer of therapeutic antibodies was using conventional reusable cassette filtration systems. Although these devices had provided adequate performance, two important factors persuaded the company to look at Spectrum's tangential flow systems, utilizing disposable hollow fiber modules:

- Process Cost
- FDA Validation

Preparation of the flat sheet cassettes and systems could take up to an entire day, wasting valuable time. In addition, the reusable cassettes could only be utilized for one particular species of product. Consequently, many filter cassettes required storage until future batches were available for processing.

Application

The process application required the diafiltration of batch sizes of antibody ranging from 20 to 200 liters with a buffer solution, followed by an approximate ten-fold concentration. Since Spectrum's KrosFlo® Pilot System features a 50 LPM rotary lobe pump, 316 stainless steel piping and sanitary fittings and can process volumes ranging from 3 to 1,000 liters, the system was perfectly suited for this monoclonal antibody purification application.

The system was set up in a diafiltration mode, using a KrosFlo® module (product no. K25S-100-01N) with polysulfone hollow fiber with a retention rating of 50 kD and a surface area of 1.6 m². A batch of 20 liters was diafiltered and concentrated down to 2.5 liters in 45 minutes. No antibody was detected in the filtrate. And the recovery was calculated to be 96%.

The KrosFlo® Pilot System was easily cleaned after the single run and the disposable KrosFlo® module discarded, enabling a rapid turnaround time for processing subsequent batches. Reusable flat sheet cassettes were exhausted after only 2 or 3 uses, and were approximately 3 times more expensive. Other advantages of disposable hollow fiber filters or single use were:

- Rapid validation of the system with no risks of cross-contamination. Spectrum modules are non-pyrogenic and manufactured in a class 10,000 clean room under GMP conditions.
- Consistent performance; flow characteristics of reusable cassettes deteriorate with each use.
- Reduced working capital; capital is not tied up with large inventories of partly used cassettes.

Conclusion

The Application shows that disposable Spectrum's hollow fiber modules have a distinct advantage over conventional reusable



KrosFlo® Pharma Production System for processing volumes from 100 to 10,000 liters

cassettes for processing monoclonal antibodies.

Cost Comparison

| Spectrum Hollow Fiber Modules | Competitor's Flat Sheet Cassettes |
|--|-----------------------------------|
| Single Use | Single Use |
| 20-Liter batch | 20-liter batch |
| KrosFlo® K25S-100-01N - 1.6 m ² | 0.46m ² Cassette |
| Number used = 1 | Number used = 3 |
| Cost Each = \$337 | Cost each = \$600 |
| Total Cost = \$337 | Total cost = \$1,800 |
| Triple use | Triple use |
| Total cost= \$1,011 | Total cost= \$1,800 |

