



## High-quality enzyme processing

- by using Alfa Laval membrane filtration

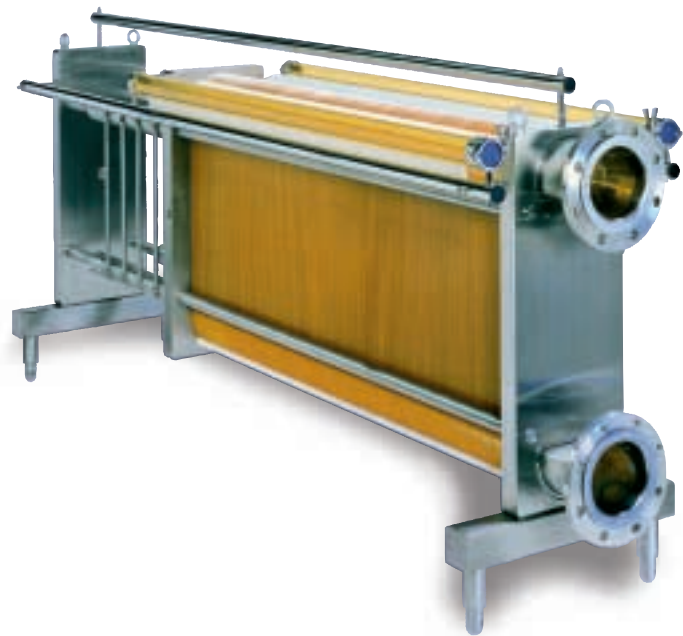


# Simultaneous concentration and purification with minimum loss of activity

Saving a step in enzyme processing is one way to increase profitability, thus reducing both equipment investment and running costs. This can be achieved with membrane filtration, where the overall yield is also increased and the quality of the enzymes improved. Membrane filtration can be used to simultaneously concentrate and purify enzymes and to recycle water in the production process.

## Concentration and purification

The majority of enzymes are produced by microbial fermentation, but they can also be extracted from plants and animal tissue. The enzyme solutions resulting from such production are rich in low molecular weight compounds such as salts or metabolic products. These can be removed by a range of different separation techniques, in which the use of membrane filtration in enzyme processing is well established.

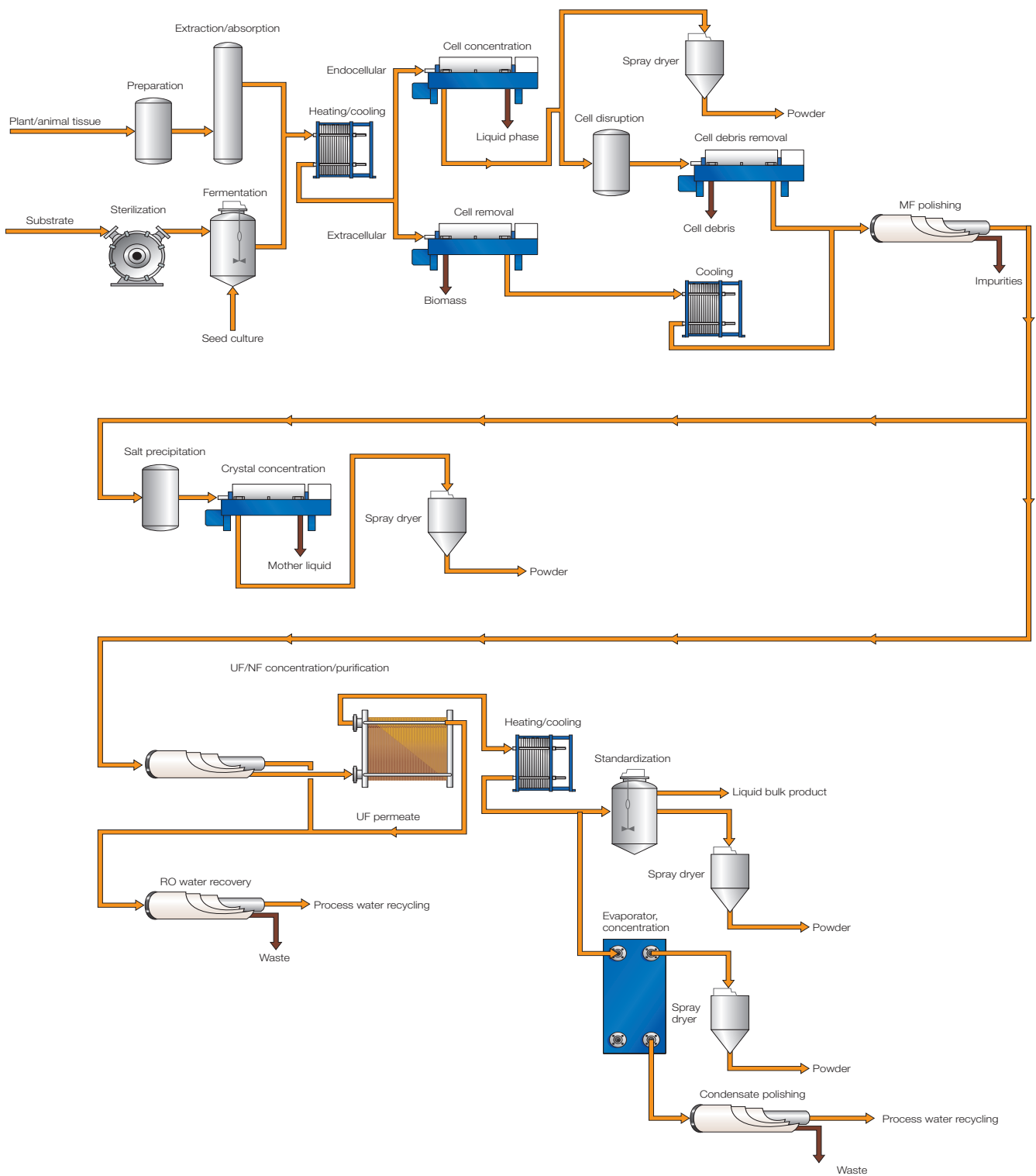


This is due to it being both a “non-destructive” technology and one that is able to combine molecular separation, purification and concentration.

Microfiltration can be used before the concentration stage as a pre-treatment step. When using ultrafiltration, enzyme strength can typically be concentrated

25 times with hardly any loss of enzyme activity. The enzymes are automatically purified during the process, since impurities in the form of low molecular weight compounds pass through the membranes. The use of diafiltration can increase the purity still further, thus reducing the colour and endotoxins.







### Recycling of water

Reverse osmosis and nanofiltration can subsequently be used to concentrate the permeate from the ultrafiltration process in order to recover and recycle the water. This decreases the overall need for process water and thereby reduces costs.

### Enzyme processing solutions

Alfa Laval has considerable experience in applying membrane filtration technology to optimize the processes used in enzyme production, and provides customers with both high-quality membranes and customized solutions.

Enzyme concentration and purification can be based on both Plate & Frame and spiral wound systems. Specific customer requirements, as well as the characteristics of the feed liquid, can determine the choice of system. Combined solutions can also be considered for optimum performance.

The wide range of Alfa Laval ultrafiltration membranes makes it possible to select the most suitable membrane for a specific enzyme type, thus achieving the highest levels of enzyme concentration.

Nanofiltration/reverse osmosis can be used in the final concentration stage as an alternative to evaporation or as a complement to this step.

### Wide range of applications

Alfa Laval membrane filtration equipment can be used for both the concentration and purification of a wide range of enzymes, including

- Microbial: protease, amylase, cellulase, lipase, AMG, pectinase, lactase (mainly extracellular)
- Animal: rennet, trypsin, pepsin
- Plant: bromelain, papain
- Other: lysozyme.

### Advantages of using Alfa Laval membrane filtration

- Concentration and purification in one continuous step
- Reduction of salts, colour and endotoxins by using diafiltration
- High yield, even at low temperatures (5°C (41°F))
- Low energy consumption
- High enzyme purity
- Higher enzyme concentration when combining ultrafiltration and nanofiltration processes
- Ambient operation temperature and elimination of contamination problems
- Tailor-made solutions



Alfa Laval knows the high demands associated with enzyme production.

We can provide you with tailor-made solutions for your specific process. These will help you improve performance and bring down your production costs.

### **Alfa Laval in brief**

Alfa Laval is a leading global provider of specialized products and engineered solutions.

Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

### **How to contact Alfa Laval**

Up-to-date Alfa Laval contact details for all countries are always available on our website at [www.alfalaval.com](http://www.alfalaval.com)