GE Healthcare
Life Sciences

Diafiltration time optimization

Method Description

In a concentration process, the optimized crossflow and TMP conditions established above can be used to identify the diafiltration point (the point which provides the fastest buffer exchange), and optimal buffer consumption. A typical result file for diafiltration time optimization is shown in Fig. 1.

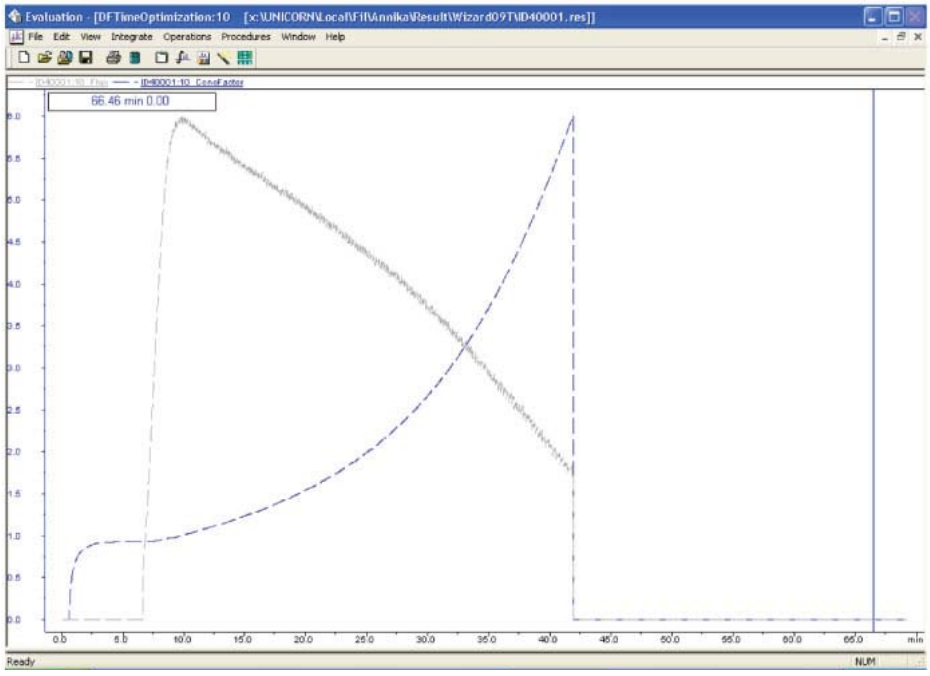

Figure 1 Result file for diafiltration time optimization. Flux is the grey curve, concentration factor is the blue curve.

A curve of Flux*concentration factor versus concentration factor can be created in the Evaluation module which enables the optimization of diafiltration time (Fig. 2). The highest value on the y axis at the highest concentration identifies the fastest diafiltration with the lowest buffer consumption. This example also shows that diafiltration takes the same time if performed at four times or five times concentration, because the decrease in retentate volume at five times concentration is offset by the decrease in flux.

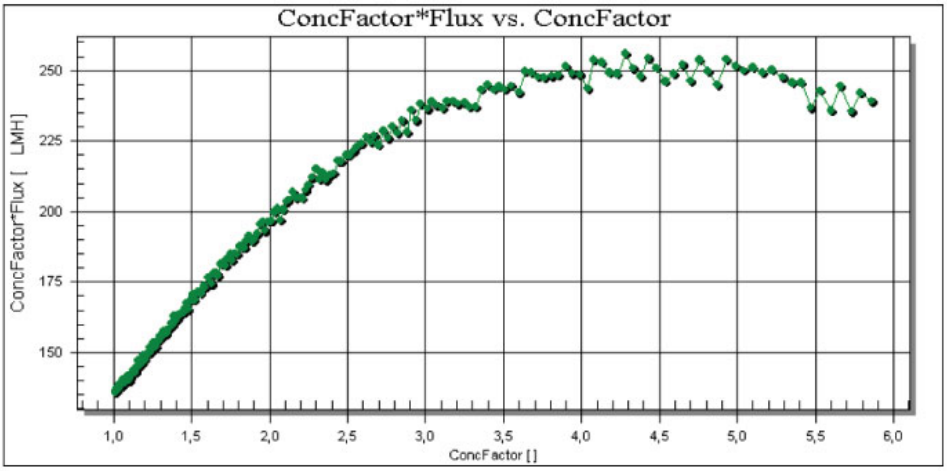

Figure 2. Diafiltration time optimization.

Diafiltration factor

The Diafiltration factor (DF) is the percentage of original buffer remaining in the feed:

Diafiltration factor =Sample Volume/Buffer Volume

The volume of buffer required to achieve a desired diafiltration factor can be calculated using the following formulae:

Continuous diafiltration: $C_f/C_o = (1-ß)DF/ß$

One shot diafiltration: $C_f/C_o = 1/(DF+1)$

Discontinuous diafiltration: $C_f/C_o = 1/2DF$

Where:

C_f = final concentration

C_o = Original concentration

ß = sample turn over ratio per unit time

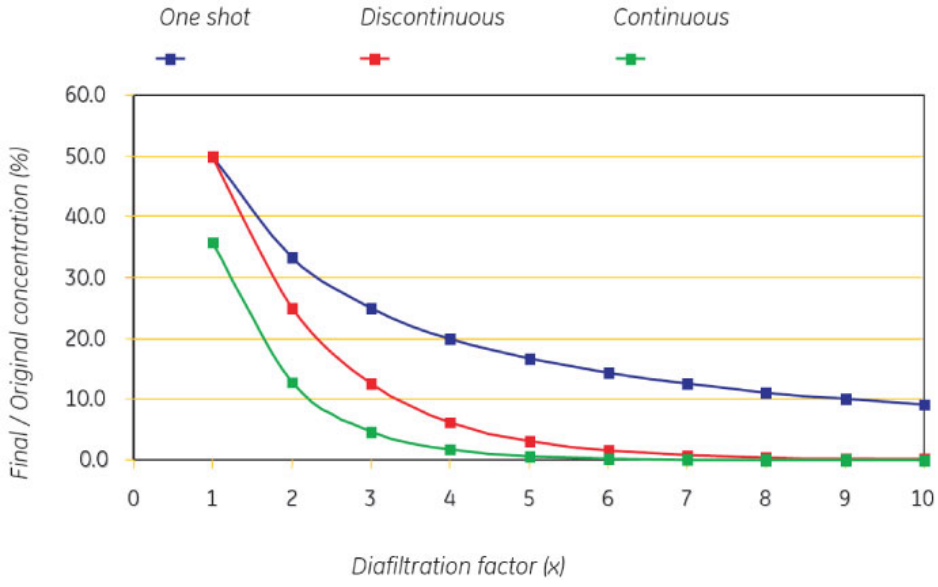

Figure 3 Effect of diafiltration methods on the buffer concentration.