

**Errata Notice**

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PSS WINGPC Application Note #4:

Sieve Curve Determination Using PSS WINGPC

GPC is an excellent tool for the characterization of pore structures and sieve curves determination e.g. of membranes. Sieve and rejection curves can be calculated easily using the GPC chromatograms of permeate and retentate solutions (ASTM E1343-90). PSS WINGPC offers an elegant way to calculate the sieve curve from these data.

In order to determine the sieve curve of a membrane, a solution of a broad distributed sample is passed through the membrane. The permeate as well as the stock (or the retentate) solution are analyzed by use of GPC. The relative concentration of permeate relative to the stock solution curve is plotted as a function of molecular weight (sieve curve). The molecular weight which the sieve curve reaches a value of 10% is defined as the membrane's cut-off.

The relative concentrations can be easily calculated within PSS WINGPCs overlay mode. However, in order to plot the relative concentration as a function of molar mass correctly we have to eliminate the typical GPC calculation. Since this transformation is the division of the elugram signal by the slope of the calibration curve, we have to multiply the relative ratio of the concentrations by the slope of the calibration curve prior to the calculation of the molar mass distribution.

Calculation of sieve curves in WINGPC:

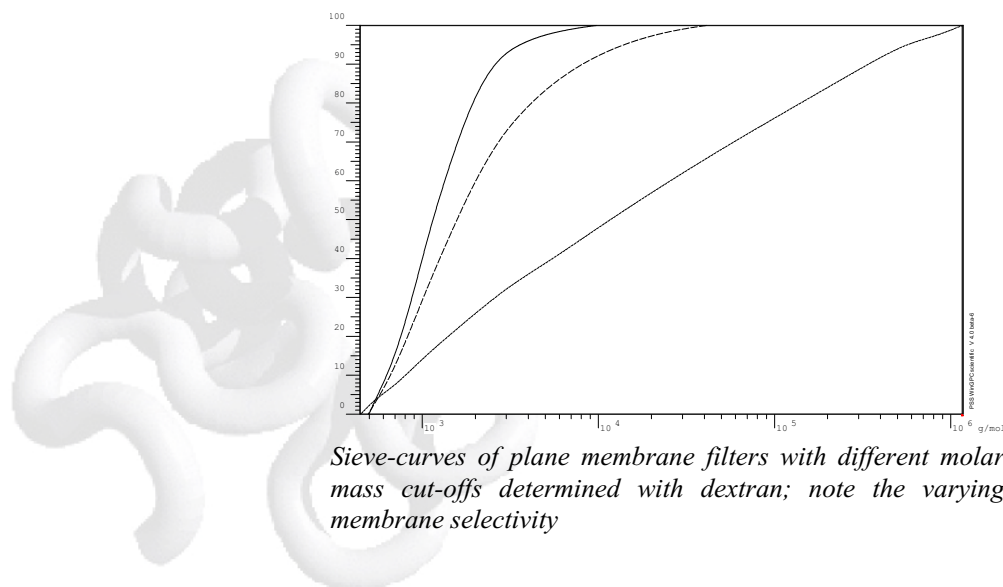
1. Overlay the calibration curve with the elugram of permeate (Elugram window, [Curves] [Calibration Curve]).
2. Transfer the curves into PSS WINGPCs overlay mode (Elugram window, [Overlay] [Include Curve]).
3. Select the retentate and perform the same operation as in step 2
4. Enter PSS WINGPCs overlay mode (Elugram [Overlay] [Overlay]).
5. Select [Curves][free] and enter the following equation for the calculation of the sieve curve:

$$A/C*(-1)*(B')$$

where A is the elugram of the permeate, C is the elugram of the retentate and B' is the first derivative of the calibration curve (please note: the parentheses are important, as well as the factor -1!).



The correct sieve curve is now displayed together with the differential molecular weight distributions of permeate and retentate in the mass distribution window.



Sieve-curves of plane membrane filters with different molar mass cut-offs determined with dextran; note the varying membrane selectivity

(Note: Various references define sieve curves in different ways. However, the different formulae can be calculated in the same way as described above.)

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