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Why on earth do we need experiments to choose the right membrane?

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Ultrafiltration (UF) is a relatively inexpensive, versatile, expedient, simple, nondestructive, and reagent-free technique for fractionating biological solutions in order to purify and concentrate high added value compounds. However its practical use appears to be somewhere limited. To account for this fact, it is often referred to various problems of membrane fouling, investment costs….But the first problem encounters is the choice of the right membrane!

In order to prepare different fractions of fructo oligosaccharides from agave juice, 9 different membranes with molecular weigh cut off (MWCO) between 5 and 10 kDa were selected and tested in dead-end filtration cell. The results were then expressed in terms of flux and retention rates.

First it is important to note that membranes prepared from the same polymer (polyethersulfone (PES)) with the same MWCO lead to very different performances which cannot be explained by membrane structure. The membrane which showed the more porous structure by SEM observation presented the lowest flux. Its poor performances are related to a high fouling index which cannot be estimated without any experiment.

However, thanks to an appropriate experimental procedure, it was possible to selected with only few experiment the best membrane allowing the total retention of fructo oligosaccharides with degree of polymerization (DP) higher than 40. Furthermore the results obtained in dead-end filtration cell were confirmed in a tangential filtration device