INTRODUCTION

- Fructo-oligosaccharides (FOS) gained in the last years a great commercial interest due to its beneficial properties in the human health as prebiotics.
- In large scale, FOS are produced by fermentative processes. However, the composition of the final broth does not only FOS, such as kestose (GF$_3$), nystose (GF$_4$) and fructo-furanosylfructose (GF$_6$), but also di- and mono-saccharides, namely sucrose (S), fructose (F) and glucose (G) that do not contribute to the prebiotic activity and must be removed.
- Simulated moving bed (SMB) chromatography appears to be an efficient downstream process for the recovery and fractionation of sugars in an industrial scale. As adsorbent, sulfonated poly(styrene-co-divinylbenzene) (PS-DVB) resins in potassium form are used. The mechanism of separation using these resins occurs by size exclusion and restricted diffusion effects.

AIMS

- Found a suitable resin to use in a SMB unit.
- Determine the adsorption parameters for Dowex 50W-X2 and Dowex Monosphere 99K/320 resins in potassium form.
- Estimate the parameters by numerical simulation using the least-squares method to minimize the distance between the experimental and simulated data.

CONCLUSIONS

- Dowex Monosphere 99K/320 was found to be more suitable to work in the SMB unit as compared to Dowex 50W-X2 due to a greater resistance at high pressure.
- Very sharp concentration profiles travel through the column and non-oscillatory schemes are necessary to avoid spurious oscillations and unrealistic negative concentration values. This scheme is quite efficient and leads to the following time evolution at the column outlet. The results obtained by numerical simulation compared with the experimental data showed a relatively good fit using the model parameters determined in the batch experiments.

EXPERIMENTAL RESULTS

- elution profile of sugars

NUMERICAL SIMULATION

- Retention Time Method

PREPARATIVE TEST ON THE SMB AT 20 ML/MIN

- Possible to separate sugars from salts.
- High compressibility of the particles.
- Back pressure > 60bar (up to the maximum allowed by the SMB ).
- Broader peaks for G, F and S due to a slower kinetics caused by large particles.
- Sharper peaks to FOS.
- Constant porosity.
- Back pressure < 60 bar.