Characterisation of flow through a porous medium for Volume Swing Osmosis

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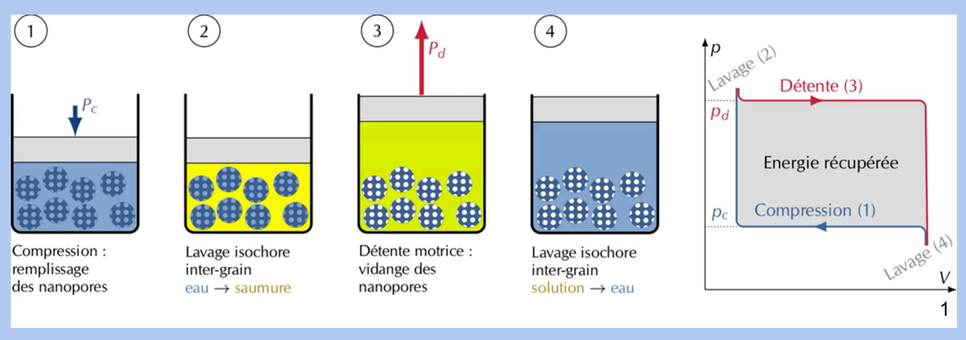
Introduction

Volume Swing Osmosis

A new renewable energy harvesting method that uses the osmotic pressure produced by the hydrophobic porous nanoparticles, ZIF-8.

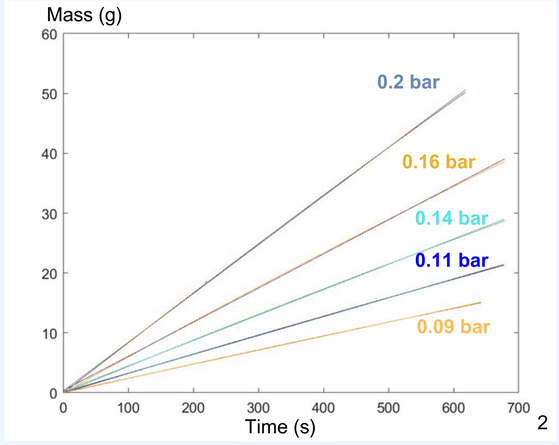


Objectives

- Study the mechanisms involved in the phase 2 of the VSO
- Caracterise the flowrate through a porous medium formed of ZIF-8 nanoparticles
- Study the evolution of salinity during the fluid transition

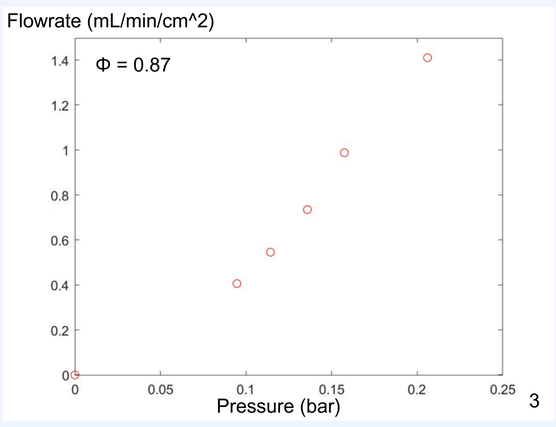
Caracterisation of flow through a porous medium

Short experiments at different pressures

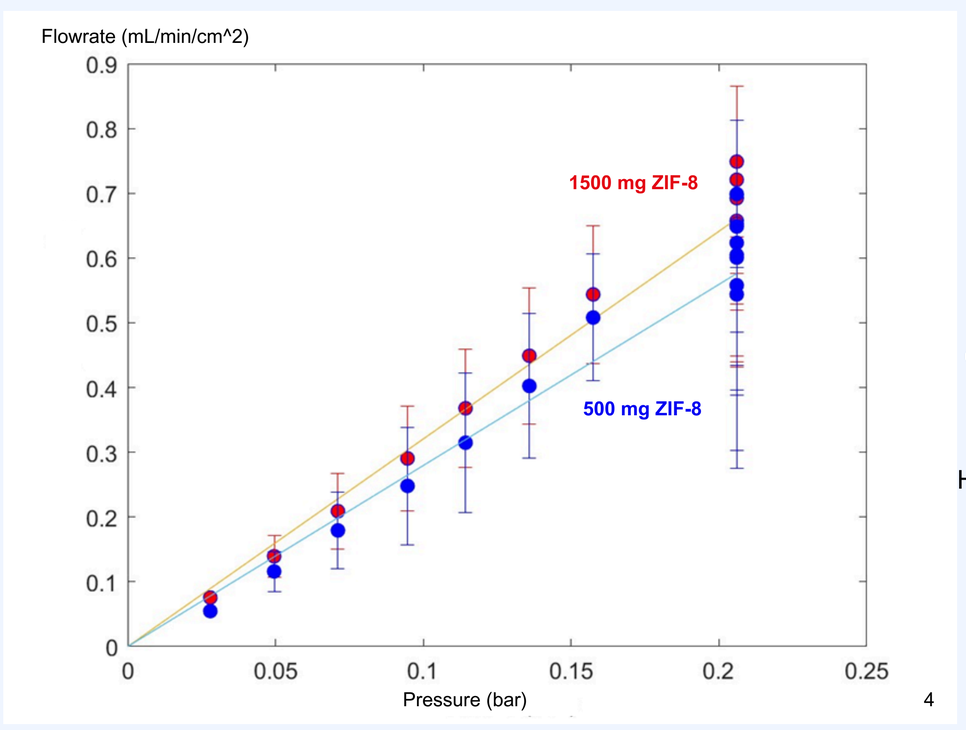


Non perfectly linear behaviour → Aging of the sample

Lower florwrate than expected theoreticaly

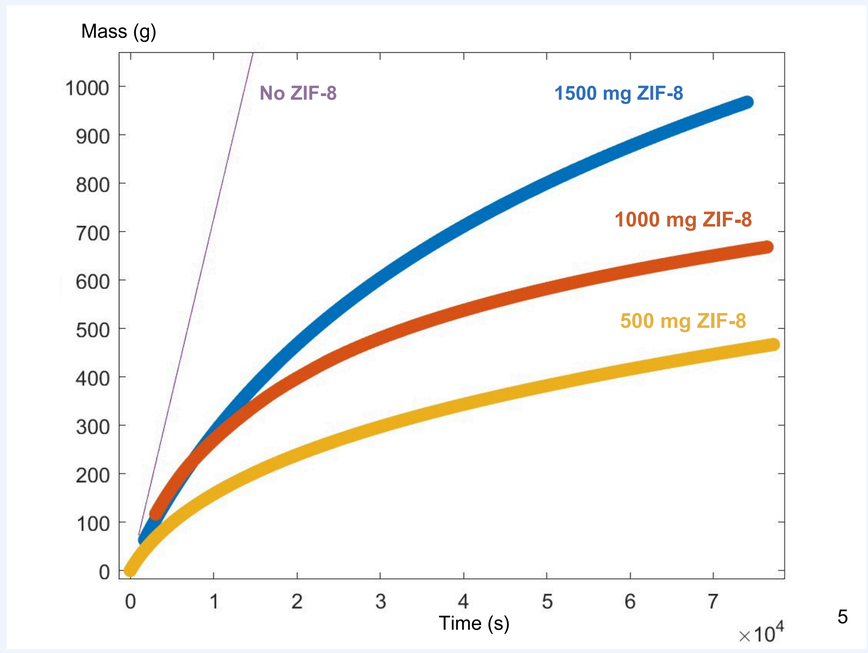


Flowrate at different pressures, with different concentations



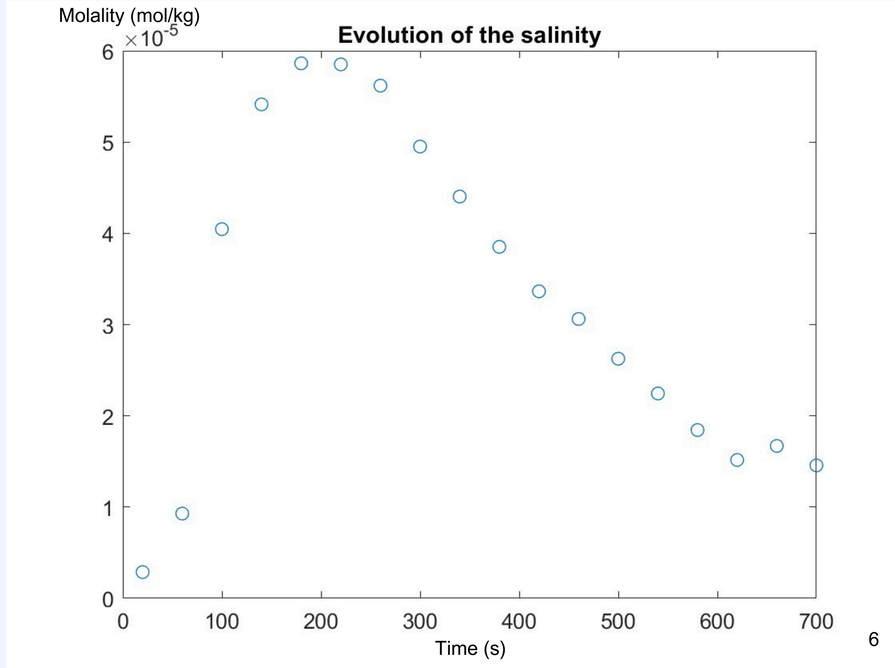
Higher ZIF-8 concentrations → Higher flowrates

Evolution of flowrate for differnt ZIF-8 concentations over long periods of time



Non linear evolution of the flowrate demontrates the formation of a compact deposit that does not tend to stabilisation.

Evolution of salinity in the outlet



Conclusion

- Need for a stabilisation of the sample to produce a predictable flowrate curve
- Need for a better understanding of the influence the amount ZIF-8 has on the flowrate
- The implementation of an experiment that shows the dispersion of the two fluids in the porous medium is needed to better understand the fluid mechanics involved in the volume swing.

Acknowledgements

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