Recovery of valuable polymeric solutions by lowering the salinity using electrodialysis

Sub-department of Environmental Technology

Mar 2016 - 2020

Researcher	Supervisor	Promotor
MSc. Paulina Sosa	Dr. ir. J. Post Dr. ir. H. Bruning	Prof. dr. ir. H. Rijnaarts Prof. dr. ir. J. v. d. Gucht

Motivation

Desalination technologies that extract water seem prohibited when polymers and/or surfactants are present. Electrodialysis (ED), a technology that extract salts from the treated solution, is often proposed as a cost effective method to desalinate organic-rich waste streams. An promising application of ED is the treatment of produced water from enhanced oil recovery (EOR) (Figure 1).

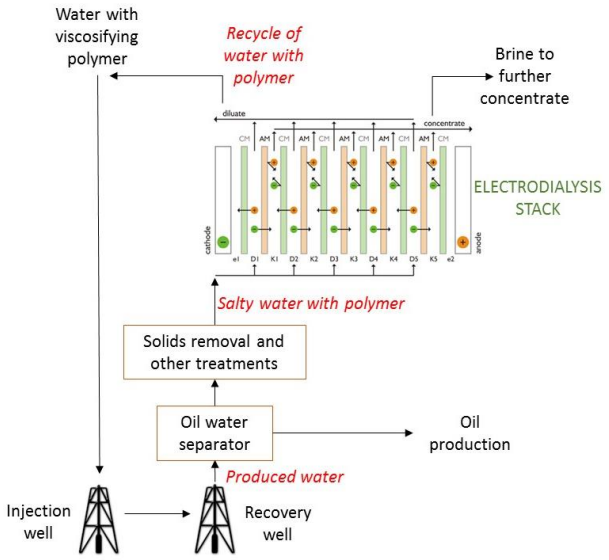

Fig.1 Electrodialysis application in the EOR process

EOR produced water still contains the viscosifying polymer, usually anionic polyacrylamide (APAM), but also a high amount of salts, solids and oil, which limit its reuse. Even after removing the oil and solids, the high salt content makes the mixture unsuitable for reinjection. This is because the salts interact with the polymer and change its morphology, consequently lowering the solution's viscosity. Therefore, the use of ED to reduce the salinity of the stream would help to restore the properties of the APAM molecules, increasing the viscosity and reducing the consumption of fresh polymer.

Similar combinations of water, salts and charged organic compounds can be found in the dairy industry (organics being mainly fats and proteins) and in the drinking water production, among others. Thus, the study of the desalination of solutions containing diverse organic material will yield results of interest for many applications.

Technological challenge

The main challenge of this research is the to understand the membrane fouling mechanism in the electrodialysis process, especially the one due to anionic polymers, and to control it (Figure 2). This will contribute to water reuse and minimization of water discharge in the oil and the water treatment industries, as well as to the improvement of processes in the dairy industry.

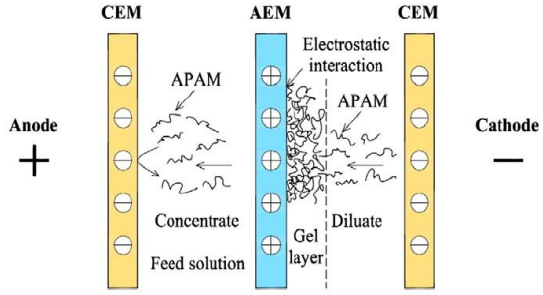

Fig.2 Proposed fouling mechanism of AEM by APAM
(Taken from Guo et al. (2014). Desalination 346(0): 46-53.)

CV Researcher; Paulina A. Sosa Fernandez
Graduated; MSc. in Membrane Engineering
Erasmus Mundus Program (Montpellier/Prague/Lisboa)
Hobbies; Traveling, reading, taking dance lessons
e-mail; Paulina.SosaFernandez@wetsus.nl
tel; +31 (0)58 284 3000 ext. 3194

wetsus

WAGENINGEN UNIVERSITY
WAGENINGEN UR