



Wolfson Department of Chemical Engineering Seminar
Wolfson Department of Chemical Engineering,
Wednesday, August 12th, 2020 at 13:30

Online seminar via Zoom

<https://technion.zoom.us/j/91975672066>

Donnan process for nitrate removal from contaminated water

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In many parts of the world, the quality of drinking water supplies is being negatively impacted by agricultural, commercial and industrial activities and is experiencing rising nitrate levels. Contamination of nitrate is of an acute public health concern. Donnan dialysis is a process that utilizes ion exchange membranes to achieve separation or concentration of ionic species. Due to its simple operation and low energy requirement, Donnan dialysis has a high potential for removal of ionic contaminants from aqueous solutions. The objective of this research was to develop a process for nitrate separation based on Donnan purification of water while minimizing high salinity brine disposal. Batch, semi-continuous and fully-continuous Donnan dialysis experiments were carried out aiming:

- to study the effects of solution chemistry on nitrate removal
- to investigate and model the process kinetics and mechanism
- to examine the adsorption of nitrate ions by anion exchange membranes
- to determine the effects of design parameters on the efficiency of nitrate, bicarbonate and sulfate removals
- to study the effect of the properties of anion exchange membranes on the performance of the process.

The overall results of the study lend support to the high potential of Donnan dialysis for nitrate removal from contaminated water.