



## Pilot module for electrodialysis–metathesis protected against shunt currents

N. Václavíková\*, L. Zich, M. Doležel

MemBrain s.r.o., Pod Vinicí 87, 471 27 Stráž pod Ralskem, Czech Republic, Tel. +420 725862562;  
emails: natalia.vaclavikova@membrain.cz (N. Václavíková), ladislav.zich@membrain.cz (L. Zich),  
marek.dolezel@membrain.cz (M. Doležel)

Received 11 August 2016; Accepted 15 December 2016

---

### ABSTRACT

Electrodialysis–metathesis is electromembrane process working with two diluting and two concentrating streams. Cations from the first diluate combine with anions from the second diluate and form the first concentrate stream, and, vice versa, cations from the second diluate combine with anions from the first diluate and form the second concentrate stream. Due to the presence of ion-exchange membranes in sealing area and high concentration differences and diluate conductivity lower than membrane's, there occurs shunt current capable of “burning the membranes” and decreasing the total current effectivity. In pilot module for electrodialysis–metathesis, a part of ion-exchange membrane around distribution channels was replaced by electrically non-conductive insert. This module was tested in the application of potassium nitrate production from ammonium nitrate and potassium chloride solutions. In parallel, the same tests were performed using standard pilot module without these treatments to be able to evaluate their impact on process performance. The module with protective treatments achieved almost 6% higher total current efficiency and 6% lower energy consumption in comparison with standard module.

*Keywords:* Electrodialysis; Metathesis; Shunt currents; Insulated membrane

---

\* Corresponding author.

Presented at PERMEA 2016 (Membrane Science and Technology Conference of Visegrád Countries) and MELPRO 2016 (Membrane and Electromembrane Processes Conference), 15–19 May 2016, Prague, Czech Republic.

1944-3994/1944-3986 © 2017 Desalination Publications. All rights reserved.