



Purification and concentration of surfactant solutions using tubular nanofiltration modules

Izabela Kowalska, Aleksandra Klimonda*

Chair of Water and Wastewater Treatment Technology, Faculty of Environmental Engineering, Wrocław University of Technology, Wybrzeże S. Wyspińskiego 27, 50-370 Wrocław, Poland, Tel. +48 71 3203639; emails: aleksandra.klimonda@pwr.edu.pl (A. Klimonda) izabela.kowalska@pwr.edu.pl (I. Kowalska)

Received 27 March 2018; Accepted 23 June 2018

ABSTRACT

The effectiveness of tubular nanofiltration modules used for the purification and concentration of a cationic surfactant solution was investigated. Commercially available modules (AFC 80 and AFC 30) were employed for the experiments. Cationic surfactant hexadecyltrimethylammonium bromide (CTAB) solutions were treated. During the first stage of the tests, the usefulness of the modules for the treatment of solutions in a wide range of concentrations (50–1,000 mg/L) was assessed. The next part concerned the surfactant concentration process. The feed solution of 500 mg/L was examined. During both stages, the separation efficiency of membranes, as well as the surfactant effect on their hydraulic properties were assessed. The conducted experiments proved that properties of membranes and the initial surfactant concentration were important factors for both, the contaminant rejection, as well as the membrane hydraulic capacity. The AFC 80 module enabled the highest CTAB removal (up to 98%) for a 1,000 mg/L solution, while AFC 30 proved to be more suitable for a low-contaminated solution treatment and achieved up to 100% removal from the feed of 50 mg CTAB/L. It was found that during concentration experiments, AFC 30 was more fouling-resistant. On the other hand, AFC 80 showed a better selectivity of the surfactant. The CTAB concentration in the permeate ranged from 35 to 236 mg/L and from 119 to 200 mg/L for AFC 80 and AFC 30, respectively. During the experiments, the maximum surfactant concentration in the concentrate solutions amounted to 770 (AFC 80) and 1,170 mg/L (AFC 30).

Keywords: Surface-active agent; Biocide; Pressure-driven membrane process; Recovery

* Corresponding author.

Presented at the XII Scientific Conference “Membranes and Membrane Processes in Environmental Protection” – MEMPEP 2018 13–16 June 2018, Zakopane, Poland.