Desalination and Water Treatment
www.deswater.com

doi: 10.5004/dwt.2021.26647

214 (2021) 64–73
February

The influence of surfactant Pluronic P123 addition on the mixed matrix membrane PEBAX® 2533 – ZIF-8 separation properties

Daniel Polak, Justyna Sułkowska, Maciej Szwast*

Faculty of Chemical and Process Engineering, Warsaw University of Technology, Waryńskiego 1, 00-645, Warsaw, Poland, email: maciej.szwast@pw.edu.pl (M. Szwast)

Received 27 February 2020; Accepted 27 June 2020

ABSTRACT

The membrane gas separation process is frequently employed to remove H_2S from biogas and to enrich it with methane. This process could be conducted using polymeric membranes, that is, made from PEBAX® 2533 copolymer. The mixed matrix membranes prepared using PEBAX® 2533 and metallic-organic framework fillers were tested in this paper. The presence of the dispersion phase could lead to the formation of defects in the composite structure. This is, in particular, the result of the agglomerates formation and the formation of void spaces between filler particles and polymeric chains. In order to decrease the probability of negative phenomena, the influence of Pluronic P123 surfactant addition on the membrane properties was also tested in this work. In the tests of the membranes with ZIF-8 filler, for CO_2, CH_4 and N_2, there was noticed an improvement of permeability of about 20%–50% after the addition of Pluronic P123 surfactant, as well as an increase of membrane selectivity of about 10%–30%.

Keywords: Membrane gas separation; Mixed matrix membrane; PEBAX® 2533; Modification; ZIF-8; Surfactant

* Corresponding author.