

Accepted Manuscript

Polysulfone porous hollow fiber membranes for ethylene-ethane separation in gas-liquid membrane contactor

Anna Ovcharova, Vladimir Vasilevsky, Ilya Borisov, Stepan Bazhenov, Alexey Volkov, Alexandr Bilydukevich, Vladimir Volkov

PII: S1383-5866(16)32898-2
DOI: <http://dx.doi.org/10.1016/j.seppur.2017.03.023>
Reference: SEPPUR 13609

To appear in: *Separation and Purification Technology*

Received Date: 29 December 2016
Revised Date: 15 March 2017
Accepted Date: 15 March 2017

Please cite this article as: A. Ovcharova, V. Vasilevsky, I. Borisov, S. Bazhenov, A. Volkov, A. Bilydukevich, V. Volkov, Polysulfone porous hollow fiber membranes for ethylene-ethane separation in gas-liquid membrane contactor, *Separation and Purification Technology* (2017), doi: <http://dx.doi.org/10.1016/j.seppur.2017.03.023>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Polysulfone porous hollow fiber membranes for ethylene-ethane separation in gas-liquid membrane contactor

Anna Ovcharova ^{1,*}, Vladimir Vasilevsky ¹, Ilya Borisov ¹, Stepan Bazhenov ¹,
Alexey Volkov ¹, Alexandr Bildyukevich ², and Vladimir Volkov ¹

¹ *A.V. Topchiev Institute of Petrochemical Synthesis, Russian Academy of Sciences;
tips@ips.ac.ru*

² *Institute of Physical Organic Chemistry, National Academy of Sciences of Belarus;
ifochl@bas-net.by*

* *Correspondence: ovcharoff@ips.ac.ru; Tel.: +7-495-955-4893*

Abstract

Separation of olefin from paraffin having same carbon number is one of the most energy intensive separations in petrochemical processes. Employing gas-liquid membrane contactors for olefin/paraffin separation is very attractive. In the present work, the membrane contactor ethylene/ethane separation was investigated based on porous asymmetric polysulfone hollow fiber membranes having mesoporous ($d_{av} \sim 2$ nm) skin layer structure in contrast to conventional ultrafiltration membranes ($d_{av} \sim 50$ -100 nm). Also, the membranes selective layer surface was modified to increase its hydrophobic properties expecting that pore size and surface properties tailoring prevents liquid absorbent penetration into membrane pores. The membrane contactor performance was studied under various operating parameters such as absorbent (aqueous AgNO₃) solution concentration and gas and liquid flow rates. Ethylene permeance value was 185 l/(m²·h·bar), which is at the level of the best results available in literature for porous membranes, at ethylene recovery rate up to 39%, which is three times higher than that in literature. Modified membranes were characterized after membrane contactor experiments. SEM, EDX and XRD analysis as well as gas permeance measurements showed that silver nitrate crystals deposition in the membranes pore space occurs. However, no noticeable change of membrane contactor performance was observed during two months of experiments on ethylene/ethane separation.

Keywords: olefin/paraffin separation; membrane contactor; polysulfone; porous hollow fiber membrane; surface modification.

Download English Version:

<https://daneshyari.com/en/article/4989929>

Download Persian Version:

<https://daneshyari.com/article/4989929>

[Daneshyari.com](https://daneshyari.com)