

Study of shear rate influence on the performance of cellulose acetate reverse osmosis hollow fiber membranes

Ani Idris^a, M.Y. Noordin^b, A.F. Ismail^{a,*}, S.J. Shilton^c

^a Membrane Research Unit, Faculty of Chemical and Natural Resources Engineering,
Universiti Teknologi Malaysia, 81310 UTM, Skudai, Johor, Malaysia

^b Department of Manufacturing and Industrial Engineering, Faculty of Mechanical Engineering,
Universiti Teknologi Malaysia, 81310 UTM, Skudai, Johor, Malaysia

^c Department of Chemical and Process Engineering, University of Strathclyde, James Weir Building,
75 Montrose Street, Glasgow G1 1XJ, UK

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Abstract

The effect of shear rate on the separation performance of reverse osmosis hollow fiber membrane is discussed. Experiments involving six different dope extrusion rates (DERs) (ranging 2.5–5 ml/min) are performed with the other process factors set at the optimum conditions determined by the Taguchi analysis. This will enable an assessment to be made on the relationship between the DER and the rejection rate. The regression method is used to analyse the experimental results and an empirical model has been developed. Simultaneously, it is found that there is a fairly strong correlation between extrusion shear rate and the rejection rate of the membranes, whereby as the shear rate increases, the rejection rate increases until a critical level of shear is achieved, beyond which reverse osmosis membrane performance deteriorates, suggesting that there exists an optimum shear rate which yields optimal membrane morphology for reverse osmosis hollow fiber membranes. © 2002 Elsevier Science B.V. All rights reserved.

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* Corresponding author. Tel.: +60-7-5505392;

fax: +60-7-5581463.

E-mail address: fauzi@fkkksa.utm.my (A.F. Ismail).