ABSTRACT

UKI ISMIYATI. Determination of Nanofiltration Resistances using Series Resistance Model at Separation of Beta-carotene and Alpha-tocopherol Palm Oil in Isopropanol. Under the direction of SAPTA RAHARJA, PRAYOGA SURYADARMA and ERLIZA NOOR.

Palm oil contains high concentrations of carotenoids and tocopherols that can be recovered by adsorption using attapulgite and desorption in isopropanol and then applying membrane technology to separate the beta-carotene and alphatocopherol in isopropanol. The aim of this study was to determine the optimum condition of nanofiltration and to obtain resistances of membranes using the series resistance model. Titania membranes with different pore diameters (5 and 10 nm) were used to conduct the study on nanofiltration membranes. Applied pressure was range from 1.5 to 2.5 bar and crossflow velocity was range from 0.14 to 0.97 m s⁻¹. It was found that membrane 5 nm had optimum transmembrane pressure at 0.42 m s⁻¹ with permeate flux 0.96 L m⁻² h⁻¹. On the other side, membrane 10 nm had optimum transmembrane pressure at 2.2 bar and feed flow velocity at 0.69 m s⁻¹ with permeate flux 2.4 L m⁻² h⁻¹. The intrinsic membrane resistances, Rm, the total membrane resistances, R’m, and the fouling resistances, Rf, of membrane 5 nm were 0.25, 2.08 and 1.29 bar m⁻² h L⁻¹, respectively, with the resistance index, Φ, was 1.04 m² h L⁻¹. On the other side, membrane 10 nm had Rm, R’m and Rf 0.78, 0.49 and 0.24 bar m⁻² h L⁻¹, respectively, with Φ was 0.42 m² h L⁻¹. The conclusion of this research is nanofiltration 5 and 10 nm are ineffective to separate beta-carotene and alphatocopherol in isopropanol because permeate flux and rejection are very low with resistances of membranes and resistance index are very high. So that to increase the permeate flux and rejection needed study about usage of different membrane and solvent type, conditioning of feed and controlling of aggregate alphatocopherol in isopropanol.

Keywords: nanofiltration, series resistance, beta-carotene, alpha-tocopherol, isopropanol