

Response Surface Methodology Approach to Defining Ultrafiltration of Steepwater from Corn Starch Industry

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Abstract : In this work the concentration of steep-water from corn starch industry is monitored using ultrafiltration membrane. The aim was to examine the conditions of ultrafiltration of steep-water by applying the membrane of 2.5nm. The parameters that vary during the course of ultrafiltration, were the transmembrane pressure, flow rate, while the permeate flux and the dry matter content of permeate and retentive were the dependent parameter constantly monitored during the process. Experiments of ultrafiltration are conducted on the samples of steep-water, which were obtained from the starch wet milling plant Jabuka, Pancevo. The procedure of ultrafiltration on a single-channel 250mm length, with inner diameter of 6.8mm and outer diameter of 10mm membrane were carried on. The membrane is made of α -Al₂O₃ with TiO₂ layer obtained from GEA (Germany). The experiments are carried out at a flow rate ranging from 100 to 200lh-1 and transmembrane pressure of 1-3 bars. During the experiments of steep-water ultrafiltration, the change of permeate flux, dry matter content of permeate and retentive, as well as the absorbance changes of the permeate and retentive were monitored. The experimental results showed that the maximum flux reaches about 40lm-2h-1. For responses obtained after experiments, a polynomial model of the second degree is established to evaluate and quantify the influence of the variables. The quadratic equitation fits with the experimental values, where the coefficient of determination for flux is 0.96. The dry matter content of the retentive is increased for about 6%, while the dry matter content of permeate was reduced for about 35-40%, respectively. During steep-water ultrafiltration in permeate stays 40% less dry matter compared to the feed.

Keywords : ultrafiltration, steep-water, starch industry, ceramic membrane

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