

Enhanced ultrafiltration of bovine serum albumin with pulsed electric field and fluidized activated alumina

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Abstract

The purpose of this paper was to determine the effect of the static deployed metal sheet on the performance in the ultrafiltration process. The sheet was first utilized to provoke turbulence near the membrane, and at the same time as an anode to create a pulsed electric field. The electro-ultrafiltration module reduced the global membrane resistance by combining three factors: turbulence created by the static metal deployed sheet, the turbulence induced by the formation of oxygen bubbles just near the membrane skin and the electrophoresis of the protein by the pulsed electric field. The application of pulsed electric field of about $E = 700$ V/m allowed an increase of the permeate flux by about 300%. The addition to the feed solution of activated alumina (AA) as a dynamic turbulence promoter shows that the presence of the AA considerably reduced the effect of the turbulence induced by the formation of oxygen bubbles and the electrophoresis of the protein. Nevertheless, the utilization of an electric field ($E = 700$ V/m) made an increase of the permeate flux of about 10% possible.

Keywords: Ultrafiltration; Bovine serum albumin; Pulsed electric field; Turbulence promotion
