

Thesis Title	Effects of Modification of Zirconia Membrane By Acids on Adsorption Behavior of Bovine Serum Albumin
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Abstract

The aim of this research was to study the filtration performance of Zirconia ultrafiltration membranes modified by various acids namely formic acid, acetic acid, citric acid, caproic acid and nitric acid. Bovine Serum Albumin (BSA) solution was used as the representative protein to study the interaction of protein with these modified membranes.

Firstly, 0.1 M of each acid was used to modify the membrane surface which 0.1 g/L of BSA solution (pH 6.5) was subsequently filtered through. The experimental results revealed that all modified membranes gave lower flux values than unmodified membrane. The interaction between acid adsorbed on membrane surface and BSA solution mainly affected the efficiency of filtration (flux and rejection values). The interaction depended on the amount of acid adsorbed on membrane, chemical structure, molecular size, hydrophilicity/hydrophobicity and the amount of negative charge of the acids. Membrane modified by acetic acid exhibited higher BSA flux value than those of nitric acid, formic acid, caproic acid and citric acid, respectively. All the modified membranes gave higher initial rejection values than the unmodified membrane.

The rejection value of the membranes treated with formic acid, nitric acid and acetic acid increased considerably with the time of filtration. This was different from membranes modified by caproic acid and citric acid which showed slight increase of rejection values and finally had the rejection values lower than the unmodified membrane.

Secondly, the effect of various concentrations of acetic acid ranging from 0.1, 0.01 and 0.001 M on membrane modification was studied. The 0.001 M acetic acid showed higher BSA flux than 0.01 and 0.1 M acetic acids, respectively and vice versa the amount of protein adsorption.

Keywords : BSA Solution / Surface Modification / Zirconia Membrane /
Ultrafiltration / Acid