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Mechanism underlying the nanofiltration of protein hydrolysates in chitin alkali wastewater

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ABSTRACT

To investigate mechanism underlying the nanofiltration (NF) of protein hydrolysates in chitin alkali wastewater, the physicochemical characteristics of the protein hydrolysates were identified by mass spectrometry analysis, and the Teorell–Meyer–Sievers (TMS) and the steric-hindrance pore models were induced to calculate the parameters of the virgin and fouled NF membranes (NFM). Results showed that the peptides with molecular weights (MW) lower than 470 g/mol permeated the NFM except ones whose isoelectric points (pI) were at approximately 4, whereas peptides with MW of 490–1500 g/mol were efficiently rejected regardless of their pIs. The surface charge densities of virgin and fouled NFM to solute concentration ratios were 2.39 and 4.16, respectively. The pore radiuses of the virgin and fouled NFM were 0.52 and 0.48 nm, respectively, indicated that the increase of the rejection of crude proteins during their NF might result from the enrichment of the NFM surface negative charge and the NFM pore blocking.

Keywords: Alkali wastewater; Protein hydrolysates; Nanofiltration mechanism; Chitin

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