

Fractionation of tilapia by-product protein hydrolysate using multilayer configuration of ultrafiltration membrane

ABSTRACT

Production of small-sized peptides is significant because of their health benefits. Ultrafiltration (UF) membrane provides an effective fractionation of small-sized peptides on a large scale. Thus, the present study was aimed to evaluate the performance of multilayer UF membrane in fractionating tilapia fish by-product (TB) protein hydrolysate by observing the permeate flux, peptide transmission, and peptide distribution under different stirring speed, pH of feed solution, and salt concentration (NaCl). The fractionation process was carried out using a dead-end UF membrane system that consists of a stack of two membrane sheets with different (10/5 kDa) and similar (5/5 kDa) pore sizes in one device. The highest permeate flux (10/5 kDa–39.5 to 47.3 L/m².h; 5/5 kDa– 15.8 to 20.3 L/m².h) and peptide transmission (10/5 kDa–51.8 to 61.0%; 5/5 kDa–18.3 to 23.3%) for both multilayer membrane configurations were obtained at 3.0 bar, 600 rpm, pH 8, and without the addition of salt. It was also found that the permeates were enriched with small-size peptides (<500 Da) with a concentration of 0.58 g/L (10/5 kDa) and 0.65 g/L (5/5 kDa) as compared to large-sized peptides (500–1500 Da) with concentration of 0.56 g/L (10/5 kDa) and 0.36 g/L (5/5 kDa). This might indicate the enrichment of small-size peptides through the multilayer membrane which could potentially enhance the biological activity of the protein hydrolysate fraction.

Keyword: Tilapia by-product protein hydrolysate; Dead-end ultrafiltration; Multilayer membrane; Permeate flux; Peptide transmission