

**Performance of single and two-stage cross-flow ultrafiltration membrane in  
fractionation of peptide from microalgae protein hydrolysate (*nannochloropsis  
gaditana*)**

**ABSTRACT**

Cross-flow ultrafiltration (UF) membrane with two different configurations; single (10 kDa and 5 kDa) and two-stage (10/5 kDa) in fractionating microalgae protein hydrolysate (MPH) were studied to obtain a low molecular weight of peptide. The effect of flow rate, trans-membrane pressure (TMP), and pH in fractionating MPH were evaluated based on permeate flux and peptide transmission. The results showed that, for single UF membrane, optimum operating parameters were at a flow rate of 23 mL/min, TMP of 1.5 bar, and pH of 9, with permeate flux of 43.65 L/m<sup>2</sup> h (10 kDa) and 55.42 L/m<sup>2</sup> h (5 kDa) and peptide transmission of 58.20% (10 kDa) and 67.34% (5 kDa). Meanwhile, for two-stage (10/5 kDa) UF membrane, the best parameters were observed at a flow rate of 23 mL/min, TMP of 1.5 bar, and pH of 2, with permeate flux of 69.85 L/m<sup>2</sup> h and peptide transmission of 79.13%. Fractionation of MPH with two-stage UF membrane was observed to be better at producing a low molecular weight of peptide compared to single UF membrane. In conclusion, it was possible to produce permeate flux with a high amount of low molecular weight of peptide by controlling the operating parameters with the suitable configuration membrane.

**Keyword:** Microalgae protein hydrolysate; Peptide; Cross-flow ultrafiltration membrane; Permeate flux; Peptide transmission