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Separation of whey proteins and their hydrolyzates in membrane filtration

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Whey is a valuable source of biological active proteins, which contain in their structure immunomodulatory peptides. These peptides might be obtained from enzymatic hydrolysis process connected with membrane separation, mainly nanofiltration. In first step we separated whey proteins. We tested a wide range of micro- and ultrafiltration membranes. The obtained retentate/permeate streams were additionally purified by chromatography methods. After laboratory scale testing, we present a concept for an industrial scale process for the fractionation of the whey proteins with purities of nearly 100%. In the second step using selected whey protein (serum albumin) we obtained peptides by enzymatic hydrolysis with thermolysin. The hydrolysis associated with membrane separation could be integrated in the one unit running in a continuous manner called membrane bioreactor. It provides enzyme immobilization in reaction area. Almost full retention of enzyme decreases of cost. Whereas, product is pure and is not contaminated by unreacted substrate. In order to carry out the mentioned process in membrane bioreactor it was necessary to select an adequate membrane. The most important parameter is cut-off coefficient. The research sets out experiments aimed at membrane selection to separation of peptides obtained after proteolysis. We tested both ceramic and polymeric membranes. In literature there is emphasized that addition of salt results an extra layer – ionic cloud around proteins. Changing of pH causes modification of protein' load and it affects positive or negative interaction with membrane. Experiments described in this research had attempted to explore the influence of salt addition and pH changing on peptides separation on the nanofiltration membranes. The selected membrane was applied to short peptides isolation during the albumin hydrolysis.

Biography

Anna Trusek-Holownia, PhD, DSc, since 1995 carried out scientific work, receiving an MA degree in biotechnology, PhD and DSc in Chemical Engineering. She is a Professor at the Department of Chemistry, Wroclaw University of Technology. She is the chief of Division of Bioprocess and Biomedical Engineering at Wroclaw University of Technology. She is a member of the Federation of Biotechnology, the European Desalination Society and the Polish Membrane Society. She has published more than 150 papers (more than 30 in reputed journals on Web of Science). She is also the author of book titled "Membrane Bioreactors- models to process design", Balaban Publication, USA 2011.

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