The Production of Collagen and Collagen Peptides from Nile Tilapia Skin Using Membrane Technology

Authors : M. Thuanthong, W. Youravong, N. Sirinupong

Abstract : Nile tilapia (Oreochromis niloticus) is one of fish species cultured in Thailand with a high production volume. A lot of skin is generated during fish processing. In addition, there are many research reported that fish skin contains abundant of collagen. Thus, the use of Nile tilapia skin as collagen source can increase the benefit of industrial waste. In this study, Acid soluble collagen (ASC) was extracted at 5, 15 or 25 ˚C with 0.5 M acetic acid then the acid was removed out and collagen was concentrated by ultrafiltration-diafiltration (UFDF). The triple helix collagen from UFDF process was used as substrate to produce collagen peptides by alcalase hydrolysis in an enzymatic membrane reactor (EMR) coupling with 1 kDa molecular weight cut off (MWCO) polysulfone hollow fiber membrane. The results showed that ASC extracted at high temperature (25 ˚C) with 0.5 M acetic acid for 5 h still preserved triple helix structure. In the UFDF process, the acid removal was higher than 90 % without any effect on ASC properties, particularly triple helix structure as indicated by circular dichroism spectrum. Moreover, Collagen from UFDF was used to produce collagen peptides by EMR. In EMR, collagen was pre-hydrolyzed by alcalase for 60 min before introduced to membrane separation. The EMR operation was operated for 10 h and provided a good of protein conversion stability. The results suggested that there is a successfulness of UF in application for acid removal to produce ASC with desirable preservation of its quality. In addition, the EMR was proven to be an effective process to produce low molecular weight peptides with ACE-inhibitory activity properties.

Keywords : acid soluble collagen, ultrafiltration-diafiltration, enzymatic membrane reactor, ace-inhibitory activity
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