

Extraction of gelatin from bigeye tuna skin: Effect of acid pretreatment in supercritical carbon dioxide

Raju Ahmed, Yeon Jin Cho, and Byung-Soo Chun*

Department of Food Science and Technology, Pukyong National University, Busan, Republic of Korea,
Busan 48513

*Correspondence author: bschun@pknu.ac.kr

Gelatin is a biopolymer derived from the partial denaturation or hydrolysis of collagen. It has wide application in food, pharmaceuticals, medical, photographic and cosmetic industries. The main sources of commercial gelatin are those from bovine and porcine skins and bones. But, the application of these gelatin has been limited because of the emergence of some transmitting diseases. Besides, these gelatins are also restricted in their application due to the constraints from Muslim, Jewish and Hindu religions. In this context, gelatins from marine resources have been attracting increasing attention as an alternative to terrestrial based gelatins. The mother protein of gelatin is collagen, which is a heterotrimer composed of three α -chains in a triple-helix structure. The triple-helix structure is stabilised by hydrogen bonds and aggregates with other collagen molecules to form a staggered array that is stabilised by covalent inter-molecular cross-links. Due to this stabilisation, insoluble native collagen must be pretreated before heating extraction to break both the hydrogen bonds and covalent cross-links to disorganise the triple-helix structure and allow adequate swelling and collagen solubilisation. Various acid were used as a pretreatment for swelling the raw material. However, the type of acid and concentration affected the yield and properties of gelatin. Besides, supercritical CO₂ with acidified water was used for the extraction of collagen/gelatin from sponges. In this connection, this study pretreated raw material by HCl at different concentration (0.25, 0.62 and 1%) with a pressure at 300 bar by supercritical carbon dioxide for different duration (20, 40, 60 min) and the extracted gelatin was evaluated in terms of yield, viscosity, gel strength, denaturation temperature, color etc. Increased concentration of acid increased the yield and decreased the gel strength and viscosity of gelatin. The yield of gelatin increased with the duration of pretreatment, while viscosity decreased with the increasing pretreatment duration.

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