Fish Skin Gelatin from 3 selected cultured freshwater fish skin by Alkaline Extraction

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Introduction

Gelatin has a very broad application for e.g. in the food, pharmaceuticals, and photographic industries. Present commercial gelatins are produced from skins and bones of cows and pigs. Gelatin can be produced by acid extraction or by the alkaline (liming) process, which is the procedure used for the extraction of gelatins from bovine and porcine sources. However, these traditional sources of gelatins raised several sensitive religious issues among certain communities. Fish skin is normally discarded in the filleting operation. Some recovery of the skin is possible in the deboning operation. Direct adoption of the liming procedure as used in the extraction of gelatin from the porcine or the bovine source for the extraction of the gelatin from fish skin is not possible due to the delicate nature of the fish skin. Therefore, the strength and the duration of the extraction period are very critical in obtaining the desired gelatin characteristics. No literature is available for liming procedure for the extraction of gelatin from fish based source. Attempts to develop the liming process for the extraction of gelatin from fish skin are made in view of the many steps involved in the extraction of gelatin in the organic acids extraction (reported in the 'acid extraction of fish skin gelatin). Therefore, this study was carried out to investigate the feasibility of the liming process for gelatin extraction from the skins of red tilapia (*Oreochromis nilotica*), walking catfish (*Clarias batrachus*) and striped catfish (*Pangasius sutchi fowler*).

Materials and Methods

The fresh skin was obtained by manually filleting the fish. The skins were washed off blood pigments and slime, soaked in saturated alkali solutions for the predetermined periods, rinsed, and the gelatin extracted through normal air-suction filtration. pH of the slurry was then adjusted through an anion exchange process. The slurry was then dried prior to analysis. The analyses carried out are those related to quality indices of gelatin such as rheological properties, amino acid profile, peptide bands, and visual properties such as color and odor.

Results and Discussion

Gelatins from the skins of red tilapia (*Oreochromis nilotica*), walking catfish (*Clarias batrachus*) and striped catfish (*Pangasius sutchi fowler*) were obtained through a liming process for 14 days. The highest average percentage yield based on wet basis of the fish skin was obtained from *Clarias batrachus* (~ 18.0 %), which was followed by *Oreochromis nilotica* (~ 13 %) and *Pangasius sutchi fowler* (~ 12.0 %). The gelatins have very mild to undetectable fishy odor. All gelatins have acceptable color attributes based on the values obtained from the Hunter Color analysis. They were light yellowish to whitish in appearance. The pH values of the gelatins are 5.14, 5.09 and 5.38 for *Clarias batrachus, Pangasius sutchi* and *Oreochromis nilotica*, respectively. The bloom strength is also significantly different among the samples with gelatin from tilapia exceeding 300 g. The bloom strength of the gelatin obtained from tilapia even surpasses the bloom strength normally reported and marketed for bovine and porcine-based gelatin. The viscosity (cP) was highest in the *Clarias batrachus*, followed by *Pangasius sutchi* and *Oreochromis nilotica*. Their melting points are approximately at 26 ± 1 °C. Based on the overall physico-chemical properties evaluated, it is concluded that the gelatin from the fish skins studied are marketable. Due to their varied bloom strength and viscosity characteristics, they are applicable as gelling agents as well as thickenesr at different concentrations

Conclusions

The liming process can be adapted to producing fish skin gelatins. The results also indicate that gelatin from locally cultured freshwater fish has great potential as an alternative source of food gelatin. This is due to their suitable physico-chemical characteristics and the relatively high yield.

Benefits from the study

Development of a liming procedure for the extraction of fish skin gelatin for studied freshwater fish. Production of gelatin, a food ingredient, from cultured tropical freshwater fish.

Patent(s), if applicable:

Not applicable for time being

Stage of Commercialization, if applicable:

Have potential, but requires the interest of the private sector.

Project Publications in Refereed Journals

1. Azizah, A., Jamilah, B., Che Man, Y. and Yazid, A.M. 2003. Gelatin characteristics extracted from 5 selected Malaysian fishskins. Food Chmeistry (to be submitted)

2. Jamilah, B. and Tan, K.W. 2003. The characteristics of fish skin gelatin from tilapia extracted by the alkali method. Journal of Science of Food and Agriculture (to be submitted)

Project Publications in Conference Proceedings

1. Jamilah, B., Azizah, A., Tan, K.W., Yazid, A.M., and Che Man, Y. 2003. Gelatin from 3 cultured freshwater fish skins obtained by liming process. Pameran rekacipta dan penyelidikan UPM 2003. 8-10 July, UPM. *Won gold award.*

2. Jamilah, B., Azizah, A., Tan, K.W., Yazid, A.M., and Che Man, Y. 2003. Gelatin from 3 cultured freshwater fish skins obtained by liming process. . Pameran dan persidangan penyelidikan dan pembangunan IPTA 2003. 2-5 Oktober, PWTC, Kuala Lumpur.

3. Jamilah, B., Azizah, A., Tan, K.W., Yazid, A.M., and Che Man, Y. 2003. Gelatin from 3 cultured freshwater fish skins obtained by liming process. Science and Technology Exhibition, 7-9 August 2003., PWTC, Kuala Lumpur. *Won gold award.*

Graduate Research

Name of Graduate	Research Topic	Field of Expertise	Degree Awarded	Graduation Year
Azizah Ahmad	Extraction, characterization and functional properties of gelatin using the liming process for selected fish species	Food Processing and chemistry	MSc	In the process

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