UNIVERSITI TEKNOLOGI MARA

PRODUCTION AND CHARACTERISATION OF GELATIN FROM SKINS OF SIN CROAKER AND SHORTFIN SCADS

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ABSTRACT

This study was undertaken with the purpose of extracting, determining the physico-chemical properties of gelatin from Carangidae (*Decapterus Macrosoma bleeker*), Shortfin Scads, Selayang and Scianidae (*Jhoniecops Sina*), Sin Croaker, Gelama. The extraction was carried out by a series of steps, which included washings with 0.2% (w/v) NaOH followed by 0.2% (w/v) H_2SO_4 and 1.0% (w/v) citric acid. The gelatin were extracted at 40-50°C for 12 h. Physicochemical properties of gelatin such as chemical composition, colour, pH, amino acid profile, bloom value, thermal and viscoelastic properties were determined. The yields of gelatin obtained from Sin Croaker and Shortfin Scads skins were 14.25 and 7.25% respectively. The fish gelatin extracted had yellowish in colour and light-textured in appearance which is similar to the commercial gelatin.

Thermal properties of gelatin were studied by using Differential Scanning Calorimetry (DSC) and rheometer. Melting and gelling temperature of gelatin from DSC and rheometer was similar. After holding for 2 h at 5°C, melting temperature of fish gelatins was tremendously increased by about 1.5 times while bovine gelatin only increased by about 0.5 times. Gelling and melting temperatures were increased with the addition of $CaSO_4$ and $MgSO_4$ salts and decreased with the addition of $CaCl_2$ salts. However, there were no effects in gelling and melting temperatures of bovine gelatin when $CaSO_4$ and $MgSO_4$ were added as compared to fish gelatins.

Storage modulus (G′) of fish gelatins were observed greatly increased by more than 10 folds after holding for 2 h at 5°C while storage modulus (G′) for bovine gelatin only double. Viscous modulus (G″) increased 6 times for both Shortfin Scads and Sin Croaker gelatin compared to bovine gelatin only increased about 2 times after holding for 2 h at 5°C. $CaCl_2$ addition to the gelatin solution decreased the moduli of gelatins and resulted in the no gelling ability to Sin Croaker gelatin at 0.4M concentration. The addition of $CaSO_4$ and $MgSO_4$ improved the storage modulus (G′) of Shortfin Scads and Sin Croaker gelatins higher than that of bovine gelatin. The bloom value which is the large deformation of gel after storing for 18 h at 7°C gave similar results as the viscoleastic studies.

The findings in this study revealed that fish gelatin solution had rheological properties greatly improved after holding for 2 h at 5°C. $MgSO_4$ can be used to improve the bloom value, elastic and viscous moduli of the fish gelatin. Shortfin Scads gelatin had better thermal and rheological properties than Sin Croaker gelatin.

CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

Gelatin is essentially pure protein food ingredient obtained by controlled hydrolysis of a fibrous insoluble protein collagen which is widely found in skin, bone and connective tissue in mammalian origin. It composes of long chain amino acids joined through peptide linkage and is rich in both acidic and basic functional group (Stainsby, 1977; Eastoe, 1955). Gelatin is produced on a large scale from skin and bone of mammalian origin by alkaline or acidic extraction (Veis, 1964; Leunberger, 1991). Generally, gelatin has a very broad application in the food, pharmaceutical, photography and technical applications. The use of gelatin in food industry worldwide is growing considerably. It is used as an ingredient to enhance the elasticity and stability of food products. Gelatin is a highly digestible animal protein. It is a pure food protein of natural origin which is added to other foods not only for technological reasons, but also for its nutrition value.

Gelatin is normally derived from beef or pork (Grossman and Bergman, 1992; Choi and Regenstein, 2000). There are several reasons for the need of gelatin from alternative sources such as a) out-break of mad cow disease. It has been disturbed since the recent UK Bovine Spongiform Encephalopathy (BSE) crisis, mad cow disease and also mouth and feet disease appeared. b) Religious considerations. Traditional sources of gelatin from mammalian sources present problems for many people in many parts of the world including Jews, Muslim, vegetarian and Buddhist. c) Use of by-products from underutilized resources. There is a possibility to produce fish gelatin of using extracted fish skins as a means of maximizing the usage of the waste from fish shop and fish processing factories. d) Value added product. Recently there has been a lot of interest in investigating possible means of making more effective use of under-utilised resources and industrial waste. Therefore, the study of