Amino Acid Profile And Characterization Of Gelatin From Salmon Skin

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Abstract- Gelatin is one of the ingredients which has extensive use, both for food products and non-food products. Gelatin is a biopolymer of the collagen hydrolysis in an animal skin, muscle tissue, and bones. Gelatin is obtained through an acid pre-processed process (gelatin type A) 9 or base (gelatin type B). Gelatin extraction from salmon uses oxalic acid with the concentrations of 0.5%, 1%, and 1.5%. From this action, gelatin is produced consisting of gel strength of 13.9 N, 6.67% viscosity, and the highest amino acid content, namely glycine 28.36%

Keyword: Gelatin, Gel Strength, Viscosity, Amino Acids Profile

I. Introduction

Fish skin is an industrial waste and has not been used optimally although it contains collagen which can be extracted into gelatin. Collagen is a group of proteins in animal binding tissues, for example in bones, cartilage, muscle ligaments and skin veins. The change of collagen to gelatin is produced by collagen extraction with hot water after immersion treatment in an acidic or basic solution[1]. Gelatin is obtained from acid hydrolysis with collagen in fish skins, which produces tropocollagen and water. This results in the breakdown of the triple helix collagen protein into a single helix, to further produce gelatin [2]. Gelatin characteristics are an important trait to determine the quality of gelatin. Physical properties of gelatin are mechanical properties which include rheological properties. Variable physical properties of gelatin include yield, viscosity and gel strength (bloom)[3].

II. MATERIALS AND METHODS

This research was conducted at the Laboratory of Fisheries Product Engineering, Faculty of Fisheries and Marine Sciences, Brawijaya university on March to June 2019. The material used was salmon skin (*Oncorhynchus sp*) obtained from Surabaya seafood industries, oxalic acid ($H_2C_2O_4$), purified water, aluminum foil and calico cloth.

The method used in this research is a completely randomized design. The treatment used in this study was the variation of the concentration of oxalic acid solution ($H_2C_2O_4$). The experimental design used in this study was a completely randomized design with 3 treatments and 6 replications. The concentration of oxalic acid used was 0.5%, 1% and 1.5%.

The process of productions of gelatin from salmon skin begins by cleaning fish skin from blood and the remnants of meat that is still attached. Then, it is followed by cutting the fish skin into 2-3 cm sizes. After that, the fish skin is soaked with a solution of oxalic acid with a concentration of 0.5%, 1%, 1.5% for 18 hours. The next step it to wash the fish skin with running waters in to neutral pH and put it into a beaker glass and add purified water with the ration of 1: 3, and extract it with a temperature of 60°C for 6 hours. Then, the

gelatin liquid is filtered and dried using an oven at 50°C for 48 hours. Results were analyzed for the chemical physical characteristics of gelatin in the salmon skin.

III. RESULT

The results showed that higher levels of acid concentration increasing gel strength and viscosity to increase. The highest gel strength is 13.9 N and the highest viscosity is 6.67 cP at 1.5% oxalic acid concentration. While the lowest gel strength is 5.77N and the lowest viscosity is 4.0 cP at a concentration of 0.5%. The amino acid profile test results showed that the highest amino acid gelatin was Glycine at 28.36% and the lowest was L-Tyrosine at 0.33%.

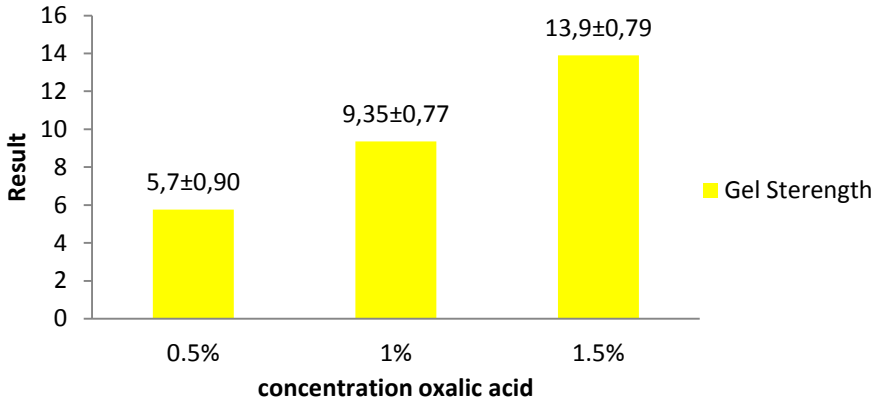

Figure 1. The Result of Gel Strength

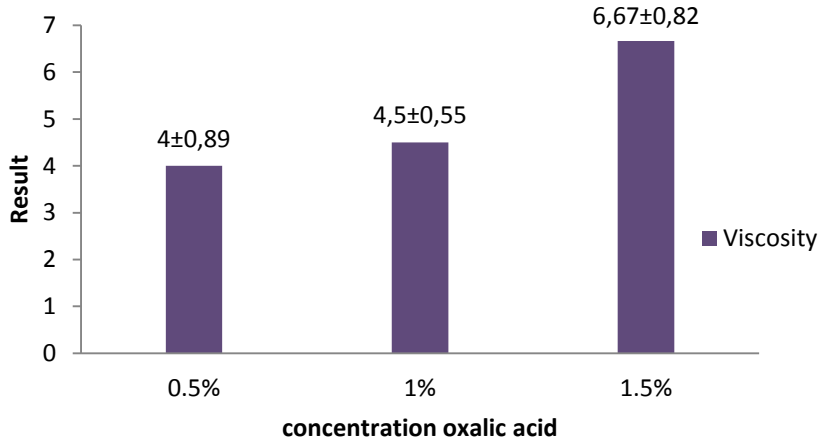

Figure 2. The Result of Viscosity

Table 1. Amino Acid Profile

No.	Parameter	Unit	Result
1	L-Serin	%	4,87
2	L-Asam Glutamat	%	12,23
3	L-Fenilalain	%	2,36
4	L-Isoleusin	%	0,92
5	L-Valin	%	2,85
6	L-Alanin	%	10,73
7	L-Arginin	%	8,45
8	Glisin	%	28,36
9	L-Lisin	%	4,58
10	L-Asam Aspartat	%	6,39
11	L-Leusin	%	3,60
12	L-Tirosin	%	0,33
13	L-Prolin	%	14,98
14	L-Threonin	%	2,71
15	L-Histidin	%	1,08

IV. DISCUSSION

Gel strength in the result of the research was obtained by the highest gel strength at a concentration of 1.5% of 13.9 N or 576.55g/ bloom. At a concentration of 1% of 9.35N or 394.37 g /bloom and 0.5% of 5.77 N or 250.63g /bloom, the gel strength value of the gelatin decreased due to differences in the concentration of oxalic acid used. The use of low acid concentrations was not able to completely hydrolyze collagen while high acid concentrations can cause continued hydrolysis[4], the differences gel strength is value caused by the collagen hydrolysis process due to differences in the concentration of the solution used. The difference of concentration during hydrolysis caused in differences in the size of the collagen peptide chain. Certain concentrations are able to effectively convert collagen to gelatin. In this study, salmon skin gelatin (Oncorhynchus sp.) produced from immersion of oxalic acid concentration of 0.5%; 1% and 1.5% have met the standards according to GMIA (Gelatin Manufacturers Institute of America), and the British Standard with a minimum value of gel strength of 50-300 g / bloom. While the concentration of 1.5% and 1% is greater than GMIA. Based on the results of ANOVA, the gel strength of salmon skin gelatin obtained significantly different results ($P < 0.05$), therefore, it was concluded that the concentration of oxalic acid significantly affected the gel strength of salmon skin gelatin . Based on Tukey's further tests, the gel strength of salmon skin gelatin with a concentration of oxalic acid 0.5%, 1% and 1.5% results were significantly different and had an effect on other treatments

Viscosity is obtained from salmon skin gelatin with 1.5% oxalic acid concentration of 6.67 cP at 1% oxalic acid concentration of 4.5 cP and at a concentration of 0.5% of 4.0 cP [6] the high value of viscosity can be caused by the conversion of collagen to gelatin occurs optimally so that the polypeptide or oligopeptide amino chain formed is long and the viscosity is high. Based on ANOVA results, the viscosity of salmon skin gelatin obtained significantly different results ($P < 0.05$) so that it was concluded that the concentration of oxalic acid significantly affected the viscosity strength of the skin of salmon fish. Based on Tukey's further test, the viscosity of salmon skin gelatin with oxalic acid concentration of 0.5%, 1% and 1.5% results were significantly different and had an effect on other treatments.

Amino acids with a treatment of 1.5% oxalic acid concentration showed that there were 15 amino acids contained in salmon gelatin (Oncorhynchus sp. Sp.), L-Serin at 4.87%; L- Glutamic Acid as much as 12.23%; L-Phenylalanine of 2.36%; L-Isoleucine at 0.92%; L-Valine of 2.85%; L-Alanin at 10.73%; L-Arginine of 8.45%; Glycine at 28.36%; L-Lysine 4.58%; L-Aspartic Acid by 6.39%; L-Leusin 3.60%; L-Tyrosine by 0.33%; L-Prolin of 14.98%; L-Theorine is 2.71% and L-Histidine of 1.08%. In the analysis of the essential amino acid profile, the highest results were obtained at 8.45% L-Arginine and the lowest at 0.92% L-Isoleucine. In the analysis of non-essential amino acid profile, the highest results were obtained by Glycine 28.36% and the lowest by L-Tyrosine 0.33%. [7]the amount of amino acids contained in gelatin is influenced by the type of solution used. Acid curing is known to have a stronger performance in breaking the intermolecular bonds of amino acid chains, thus allowing certain amino acid chains to undergo denaturation and dissolution processes until they are permanently damaged and have an impact on changes in the composition of the amino acids themselves

V.CONCLUSION

The results showed that the best fish skin gelatin was obtained at 1.5% oxalic acid concentration with a gel strength value of 13.09 N, 6.67 viscosity which resulted in the highest amino acid content of glycine at 28.36% and the lowest amino acid L-tyrosine at 0.33%

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