

OPTIMALISASI WAKTU *PRE-TREATMENT* NaOH PADA PRODUKSI KOLAGEN KULIT KAMBING KACANG MENGGUNAKAN PROTEASE ENZIM *Aspergillus oryzae*

Devina Nathania Al Hafshah
21/474226/PT/08836

INTISARI

Penelitian ini bertujuan untuk mengetahui pengaruh lama waktu *pre-treatment* NaOH pada produksi kolagen yang dilakukan dengan lima perlakuan yaitu A (kontrol), B (6 jam); C (12 jam); D (18 jam); dan E (24 jam). Proses ekstraksi kolagen dilakukan dengan metode acid enzimatik dengan memanfaatkan enzim *Aspergillus oryzae*. Karakteristik yang diuji meliputi rendemen, analisis berat molekul dengan elektroforesis SDS PAGE (*Sodium Dodecyl Sulphate Polyacrylamide Gel Electrophoresis*), viskositas, pH, analisis stabilitas termal dengan metode *Differential Scanning Calorimetry* (DSC), dan spektra menggunakan *Fourier Transform Infrared Spectroscopy* (FTIR). Data yang diperoleh dianalisis secara deskriptif kualitatif dan analisis statistik menggunakan *oneway anova* dilanjutkan uji *Duncan's New Multiple Range Test* (DMRT). Hasil penelitian nilai rendemen menunjukkan adanya perbedaan secara nyata ($P < 0,05$) berturut-urut $37,44 \pm 5,32\%$; $33,81 \pm 5,21\%$; $27,65 \pm 2,26\%$; $25,51 \pm 1,80\%$; dan $24,57 \pm 0,53\%$. Hasil *SDS-PAGE* pada kelima sampel diperoleh hasil kolagen tipe I. Viskositas menunjukkan hasil berbeda nyata ($P < 0,05$) berturut-urut $2,51 \pm 0,09$; $2,06 \pm 0,02$; $2,03 \pm 0,05$; $1,99 \pm 0,08$; $1,98 \pm 0,01$ cP. Nilai pH kolagen menunjukkan hasil yang tidak signifikan ($P > 0,05$) berturut-urut yaitu $5,11 \pm 0,32$; $4,70 \pm 0,87$; $5,22 \pm 0,33$; $4,79 \pm 0,64$; $5,11 \pm 0,32$. Hasil analisis stabilitas termal pada sampel kontrol memiliki dua puncak yaitu $78,90^\circ\text{C}$ dan $159,66^\circ\text{C}$; sampel 6 jam memiliki dua puncak $66,30^\circ\text{C}$ dan $170,01^\circ\text{C}$; sampel 12 jam memiliki dua puncak $67,11^\circ\text{C}$ dan $166,76^\circ\text{C}$; sampel 18 jam memiliki satu puncak $167,03^\circ\text{C}$; sampel 24 jam memiliki dua puncak $93,28^\circ\text{C}$ dan $150,89^\circ\text{C}$. Hasil analisis gugus fungsional FTIR menunjukkan wilayah serapan amida A, B, I, II, dan III yang sesuai dengan serapan khas kolagen. Berdasarkan hasil yang diperoleh dapat disimpulkan bahwa lama waktu perendaman NaOH mempengaruhi rendemen, viskositas, serta berat molekul protein.

Kata kunci: Kolagen, Kulit kambing kacang, *Pre-treatment*, Karakterisasi kolagen, Enzim *Aspergillus oryzae*.

OPTIMIZATION OF NAOH *PRE-TREATMENT* TIME ON COLLAGEN PRODUCTION FROM KACANG GOAT SKIN USING *Aspergillus oryzae* PROTEASE ENZYME

Devina Nathania Al Hafshah

21/474226/PT/08836

ABSTRACT

This research aims to determine the effect of different durations of NaOH pre-treatment time on collagen production, conducted using five treatments A (control), B (6), C (12), D (18), and E (24) hours. The collagen extraction process was carried out using the acid-enzymatic method, utilizing the enzyme *Aspergillus oryzae*. Parameters analyzed included yield, molecular weight analysis using SDS-PAGE (Sodium Dodecyl Sulphate Polyacrylamide Gel Electrophoresis), viscosity, pH, thermal stability analysis using Differential Scanning Calorimetry (DSC), and functional group analysis using Fourier Transform Infrared Spectroscopy (FTIR). Data were evaluated using descriptive analysis and one-way ANOVA, followed by Duncan's Multiple Range Test (DMRT). The results of the yield value showed significant difference ($P < 0.05$) respectively $37.44 \pm 5.32\%$; $33.81 \pm 5.21\%$; $27.65 \pm 2.26\%$; $25.51 \pm 1.80\%$; and $24.57 \pm 0.53\%$. SDS-PAGE confirmed the presence of Type I collagen in all samples. Viscosity showed a significant difference ($P < 0.05$) with values of 2.51 ± 0.09 , 2.06 ± 0.02 , 2.03 ± 0.05 , 1.99 ± 0.08 , and 1.98 ± 0.01 cP, respectively. The pH values showed no significant difference ($P > 0.05$), with values of 5.11 ± 0.32 , 4.70 ± 0.87 , 5.22 ± 0.33 , 4.79 ± 0.64 , and 5.11 ± 0.32 , respectively. Thermal stability analysis showed that the control sample had two peaks at 78.90°C and 159.66°C ; the 6-hour sample had peaks at 66.30°C and 170.01°C ; the 12-hour sample at 67.11°C and 166.76°C ; the 18-hour sample had a single peak at 167.03°C ; and the 24-hour sample had two peaks at 93.28°C and 150.89°C . FTIR spectra confirmed characteristic collagen peaks, including amides A, B, I, II, and III. Based on the results, it can be concluded that NaOH pre-treatment duration significantly affects collagen yield, viscosity, and protein molecular weight.

Keywords: Collagen, Kacang Goatskin, Pre-treatment, Characterization collagen, *Aspergillus oryzae* enzyme