ABSTRAK

PENINGKATAN KESTABILAN ENZIM α-AMILASE DARI *Aspergillus fumigatus* DENGAN PENAMBAHAN GLUTARALDEHID

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Pada penelitian ini, telah dilakukan penambahan glutaraldehid pada enzim α-amilase yang diisolasi dari *A. fumigatus*. Ekstrak kasar enzim dimurnikan dengan fraksinasi menggunakan amonium sulfat, dan dialisis. Aktivitas enzim ditentukan dengan metode Fuwa, dan metode Mandels. Kadar protein ditentukan dengan metode Lowry. Hasil penelitian menunjukkan aktivitas spesifik α-amilase hasil pemurnian sebesar 520,51 U/mg, meningkat 8,93 kali dibandingkan dengan ekstrak kasar yang mempunyai aktivitas spesifik sebesar 58,31 U/mg. Enzim hasil pemurnian mempunyai pH optimum 5; suhu optimum 55°C; K_M = 10,80 mg/mL substrat dan V_{maks} = 10,13 µmol/mL^{-1} menit^{-1}. Uji stabilitas termal enzim hasil pemurnian pada suhu 60°C selama 100 menit memiliki aktivitas sisa 12,00% dengan nilai k_i = 0,0228 menit^{-1}; $t_{1/2}$ = 30,39 menit dan ΔG_i = 103,639 kJ/mol^{-1}. Enzim hasil penambahan glutaraldehid dengan konsentrasi 0,02; 0,04; dan 0,06% mempunyai pH optimum 6,5; suhu optimum 55°C; K_M berturut-turut sebesar = 12,85; 21,73; dan 14,54 mg/mL substrat dan nilai V_{maks} = 7,37; 9,85; dan 7,37 µmol/mL^{-1} menit^{-1}, nilai k_i = 0,0082; 0,0083; dan 0,0084 menit^{-1}; $t_{1/2}$ = 84,51; 83,49; dan 82,50 menit dan ΔG_i = 106,491; 106,463; dan 106,436 kJ/mol^{-1}. Terjadi peningkatan waktu paruh ($t_{1/2}$) dan ΔG_i serta penurunan nilai k_i enzim hasil penambahan glutaraldehid dibandingkan dengan enzim hasil pemurnian sebesar 2,7 sampai 2,8 kali.

Kata kunci: α-amilase, stabilitas enzim, *A. fumigatus*, glutaraldehid.

ABSTRACT

STABILITY IMPROVEMENT OF α-AMYLASE ENZYME FROM *Aspergillus fumigatus* BY THE ADDITION OF GLUTARALDEHYD

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In this research, the addition of glutaraldehyde to the α-amylase enzyme isolated from *A. fumigatus* has been carried out. Enzyme crude extract was purified by fractionation using ammonium sulfate, and dialysis. Enzyme activity was determined by Fuwa method, and Mandels method. Protein content was determined by Lowry method. The results showed that the specific activity of α-amylase purified was 520.51 U/mg, an increase of 8.93 times from the crude extract which had a specific activity of 58.31 U/mg. The purified enzyme has an optimum pH of 5; optimum temperature 55°C; K_M = 10.80 mg/mL substrate and V_{max} = 10.13 mol/mL^{-1} min^{-1}. Thermal stability test of purified enzyme at 60°C for 100 minutes had a residual activity of 12.00% with a value of k_i = 0.0228 min^{-1}; $t_{1/2}$ = 30.39 min and ΔG_i = 103.639 kJ/mol^{-1}. Enzyme resulted from the addition of glutaraldehyde with a concentration of 0.02%; 0.04%; and 0.06% have an optimum pH of 6.5; optimum temperature 55°C; K_M = 12.85; 21.73; and 14.54 mg/mL of substrate consecutively and the value of V_{max} = 7.37; 9.85; and 7.37 mol/mL^{-1}, k_i value = 0.0082; 0.0083; and 0.0084 min^{-1}; $t_{1/2}$ = 84.51; 83.49; and 82.50 minutes and ΔG_i = 106.491; 106.463; and 106.436 kJ/mol^{-1}. There was an increase in half-life ($t_{1/2}$) and ΔG_i as well as a decrease in the k_i value of the enzyme resulting from the addition of glutaraldehyde compared to the enzyme by 2.7 to 2.8 times.

Keywords: α-amylase, enzyme stability, *A. fumigatus*, glutaraldehyde.