ABSTRAK

PENINGKATAN KESTABILAN ENZIM PROTEASE DARI *Bacillus subtilis* ITBCCB148 DENGAN AMOBILISASI MENGGUNAKAN ZEOLIT

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Penelitian ini bertujuan untuk meningkatkan stabilitas enzim protease dari isolat bakteri lokal *Bacillus subtilis* ITBCCB148 dengan amobilisasi menggunakan zeolit. Untuk mencapai tujuan tersebut maka dilakukan proses produksi, isolasi, pemurnian, amobilisasi enzim, dan karakterisasi enzim protease sebelum dan sesudah amobilisasi.

Aktivitas spesifik enzim hasil pemurnian diperoleh sebesar 2.680,734 U/mg, meningkat 13 kali dibandingkan ekstrak kasar enzim yaitu 204,465 U/mg. Enzim hasil pemurnian bekerja optimum pada suhu 50ºC, sedangkan enzim amobil pada suhu 55ºC. Aktivitas sisa yang dihasilkan pada uji stabilitas termal pada suhu 60ºC selama 60 menit terhadap enzim hasil pemurnian adalah sebesar 2,215%, sedangkan enzim amobil sebesar 16,971%. Data kinetika enzim hasil pemurnian diperoleh data K_M = 21 mg substrat mL^{-1}, V_{maks} = 500 µmol mL^{-1} $menit^{-1}$, $t_{1/2}$ = 10,661 menit, k_i = 0,065 $menit^{-1}$ dan ΔG_i = 97,667 kJ mol^{-1}, sedangkan enzim amobil adalah K_M = 8,6 mg substrat mL^{-1}, V_{maks} = 200 µmol mL^{-1} $menit^{-1}$, $t_{1/2}$ = 26,653 menit, k_i = 0,026 $menit^{-1}$ dan ΔG_i = 101,685 kJ mol^{-1}. Amobilisasi menggunakan zeolit telah berhasil meningkatkan 2,5 kali stabilitas termal enzim, yang ditunjukkan oleh penurunan nilai k_i.

Kata kunci : Protease, *Bacillus subtilis* ITBCCB148, amobilisasi enzim, zeolit.

ABSTRACT

THE IMPROVEMENT OF PROTEASE ENZYME STABILITY OF *Bacillus Subtilis* ITBCCB148 WITH IMMOBILIZATION BY USING ZEOLITE

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The objective of this research was to improve protease enzyme stability from local bacteria isolates of *bacillus subtilis* ITBCCB148 with immobilization using zeolite. A sequential processes were conducted, i.e: production, isolation, purification, immobilization, and characterization of the protease before and after immobilization.

The specific activity of purified enzyme was 2,680.734 U/mg, increased 13 times higher than the raw extract (204.465 U/mg). The purified enzyme worked well at 50ºC and the immobilized at 55ºC. From thermal stability test at 60ºC for 60 minutes, residual activity of the purified and the immobilized enzyme were 2.215% and 16.971%, respectively. Kinetic datas of the purified enzyme were K_M value = 21 mg substrat mL^{-1}, V_{maks} = 500 µmol mL^{-1} $minute^{-1}$, $t_{1/2}$ = 10.661 menute, k_i = 0.065 $minute^{-1}$, and ΔG_i = 97.667 kJ mol^{-1}, while the immobilized were K_M = 8.6 mg substrat mL^{-1}, V_{maks} = 200 µmol mL^{-1} $minute^{-1}$, $t_{1/2}$ = 26.653 minute, k_i = 0.026 $minute^{-1}$ dan ΔG_i = 101.685 kJ mol^{-1}. Enzyme immobilization using zeolite has succeeded in increasing the thermal stability of the enzyme as much as 2.5 times, which is indicated be decrease in the value of k_i.

Keywords : Protease, *Bacillus subtilis* ITBCCB148, enzyme immobilization, zeolite.