

ABSTRACT

DETERMINATION OF KINETICS AND THERMODYNAMICS DATA of PROTEASE FROM INDIGENOUS SOIL BACTERIA - BANDAR LAMPUNG ISOLATE

By

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Soil bacteria have great potential in producing protease enzymes. This research was aimed for determination the activity and characterization of protease enzymes from bacterial isolates isolated from soil in the Bandar Lampung area. Enzyme activity test was carried out quantitatively using the *Kunitz* method. Enzyme characterization included temperature, pH and optimum incubation, determination of K_M and V_{max} , and values of k_i , $t_{1/2}$ and ΔG_i . A bacterial isolate from soil was identified as *Klebsiella* sp. The optimum time for bacterial growth to produce proteases was 42 hours of incubation with protease activity of 0.719 U/mL. This protease enzyme has optimum pH at 7 with an activity value of 0.282 U/mL. The optimum temperature was 50 °C with an activity value of 0.783 U/mL and incubation time for 40 minutes with an activity value of 1.04 U/mL. The V_{max} was 0.6 $\mu\text{mol/mL}\cdot\text{minute}$ while the K_M was 6.1 mg/mL substrate. The values of k_i , $t_{1/2}$ and ΔG_i were 0.018 minute^{-1} , 37.7 minutes and 101.056 kJ/mol, respectively.

Keywords: protease. proteolytic bacteria, *Klebsiella* sp., characterization.

ABSTRAK

PENENTUAN DATA KINETIKA DAN TERMODINAMIKA PROTEASE ISOLAT BAKTERI INDIGEN TANAH BANDAR LAMPUNG

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Bakteri tanah mempunyai potensi besar dalam menghasilkan enzim protease. Penelitian ini dilakukan untuk mengetahui aktivitas dan karakter enzim protease dari bakteri indigen tanah di kawasan Bandar Lampung. Pengujian aktivitas protease dilakukan secara kuantitatif dengan metode *Kunitz*. Karakterisasi enzim meliputi penentuan suhu, pH dan waktu inkubasi optimum, penentuan K_M dan V_{maks} , serta penentuan nilai k_i , $t_{1/2}$ dan ΔG_i . Hasil penelitian menunjukkan bakteri indigen yang diperoleh merupakan *Klebsiella* sp. Waktu optimum pertumbuhan bakteri menghasilkan protease pada 42 jam inkubasi dengan aktivitas protease sebesar 0,719 U/mL. Enzim protease mempunyai kondisi optimum pada pH 7 dengan nilai aktivitas sebesar 0,282 U/mL, suhu optimum enzim protease yaitu pada suhu 50 °C dengan nilai aktivitas sebesar 0,783 U/mL dan waktu inkubasi optimum pada 40 menit dengan nilai aktivitas sebesar 1,04 U/mL. Nilai V_{maks} 0,6 $\mu\text{mol/mL}$ menit sedangkan nilai K_M sebesar 6,1 mg/mL substrat. Nilai k_i , $t_{1/2}$ dan ΔG_i berturut-turut sebesar 0,018 menit^{-1} , 37,7 menit dan 101,056 kJ/mol.

Kata kunci: protease, bakteri proteolitik, *Klebsiella* sp., karakterisasi.