ABSTRAK

Urease merupakan enzim yang berperan sebagai katalis hidrolisis urea menjadi amonia dan karbon dioksida. Urease banyak manfaatnya sehingga perlu dilakukan eksplorasi dan peningkatan efisiensinya. Tujuan penelitian ini adalah ekstraksi urease dari biji kecipir, optimasi pembuatan *beads* urease amobil dengan matriks kitosan, dan karakterisasinya. Penelitian diawali dengan perkecambahan biji kecipir selama 0, 2, 4, 6, 8, dan 10 hari, selanjutnya diekstrak sehingga diperoleh ekstrak kasar urease. Proses amobilisasi ekstrak kasar urease dioptimasi meliputi konsentrasi kitosan, TPP, dan waktu perendaman. Urease bebas dan amobil dikarakterisasi meliputi penentuan pengaruh variasi konsentrasi substrat, pH, suhu, EDTA, logam dan penyimpanan terhadap aktivitas urease. Urease amobil juga diuji pemakaian berulangnya. Aktivitas urease diuji dengan metode Nessler. Hasil penelitian menunjukkan aktivitas urease biji kecipir tertinggi diperoleh pada waktu perkecambahan 8 hari dengan nilai aktivitas 21,027 Unit/mL. Optimasi pembuatan urease amobil dengan konsentrasi kitosan 4% (w/v), konsentrasi Na-TPP 2,5% (w/v), dan waktu perendaman 60 menit diperoleh nilai aktivitas sebesar 15,076 Unit/mL, dan dapat digunakan sebanyak 5 kali pengulangan dengan sisa aktivitas sebesar 46%. Aktivitas optimum diperoleh pada konsentrasi substrat 0,2 M, pH 7, suhu 35 °C dengan nilai aktivitas urease bebas dan amobil secara berurut yaitu 22,071 Unit/mL dan 15,337 Unit/mL. Urease bebas dan amobil dapat disimpan selama 8 hari dengan sisa aktivitas secara berurut sebesar 53% dan 52%. Logam $CuCl_2$, $ZnCl_2$, $Ag(NO_3)_2$, $Pb(CH_3COO)_2$, dan $CdSO_4$ menjadi inhibitor pada urease biji kecipir. Urease biji kecipir tergolong pada metaloenzim.

Kata kunci : amobilisasi, biji kecipir, karakterisasi, kitosan, TPP, urease.

ABSTRACT

Urease is an enzyme that acts as a catalyst for the hydrolysis of urea to ammonia and carbon dioxide. Urease has many benefits so that it is necessary to explore and increase its efficiency. The objectives of this study were urease extraction from winged bean seeds, optimization of immobilized beads formation in chitosan matrix, and its characterization. Research began with sprouting the beans for 0, 2, 4, 6, 8, and 10 days, then it were extracted to obtain a crude urease extract. The immobilization process of urease crude extract was optimized. The optimization included were concentration of chitosan, TPP, and immersion time. Free and immobilized ureases were characterized by determining the effect of variations in substrate concentration, pH, temperature, EDTA, metals and storage on urease activity. Immobile urease was also tested repeatedly. The urease activity test was conducted using the Nessler method. The results showed that the highest activity obtained at germination time of 8 days with an activity value of 21.027 Units / mL. Optimization of immobilized urease formation with chitosan concentration of 4% (w / v), concentration of Na-TPP 2.5% (w / v), and immersion time of 60 minutes showed an activity value of 15,076 Units / mL, and can be used as many as 5 repetitions with the remaining activity of 46%. The optimum activity was obtained at a substrate with a concentration of 0.2 M, pH 7, temperature 35 ° C with free and immobilized urease activity values, respectively, 22.071 Units / mL and 15.337 Units / mL. Free and immobilized urea can be stored for 8 days with the remaining activity of 53% and 52% respectively. $CuCl_2$, $ZnCl_2$, $Ag(NO_3)_2$, $Pb(CH_3COO)_2$, and $CdSO_4$ were inhibitors of urease of winged bean seeds. Urease of winged bean seeds categorized as metaloenzymes.

Keywords : Characterization, chitosan, immobilization, TPP, urease, winged bean seeds