

ABSTRAK

Enzim urease merupakan enzim yang mengkatalis hidrolisis urea menjadi karbon dioksida dan amonia. Enzim urease dalam penelitian ini diisolasi dari biji pare (*Momordica charantia* L.). Penelitian ini bertujuan untuk memurnikan enzim urease dari biji pare (*Momordica charantia* L.) melalui fraksinasi amonium sulfat dan mengamobilisasinya dalam matriks agar-agar komersial. Pemurnian dilakukan melalui fraksinasi bertingkat dengan konsentrasi kejenuhan 0-15% (F15), 15-30% (F30), dan 30-45 (F45), dilanjutkan dengan dialisis. Uji aktivitas enzim urease dilakukan menggunakan metode Nessler dan uji kadar protein menggunakan metode Lowry. Fraksi terbaik kemudian dikarakterisasi variasi suhu, pH, dan konsentrasi substrat, serta diamobilisasi menggunakan agar-agar dengan variasi konsentrasi 1, 2, dan 3%. Urease hasil pemurnian (F30) menunjukkan karakteristik optimum pada pH 7, suhu inkubasi 35 °C, dan konsentrasi substrat 1000 ppm dengan aktivitas spesifik sebesar 1,429 U/mg dengan tingkat kemurnian 75,2 kali dibandingkan ekstrak kasar. Nilai kinetika menunjukkan bahwa urease murni (F30) memiliki nilai K_M sebesar 0,0242 M dan V_{maks} sebesar 1,499 M/menit, sedangkan urease yang diamobilisasi menunjukkan nilai K_M sebesar 0,0259 M dan V_{maks} sebesar 0,2414 M/menit. Aktivitas optimum urease amobil diperoleh pada konsentrasi agar-agar 2% dengan aktivitas sebesar 0,473 U/mL dan efisiensi teramobil sebesar 99%. Urease teramobil dapat digunakan secara berulang hingga 5 kali dengan aktivitas sisa 50%.

Kata kunci: agar-agar, amobilisasi, biji pare, fraksinasi amonium sulfat, urease

ABSTRACT

Urease is an enzyme that catalyzes the hydrolysis of urea into carbon dioxide and ammonia. In this study, urease was isolated from bitter melon seeds (Momordica charantia L.). The aim of this study was to purify urease from Momordica charantia L. seeds through ammonium sulfate fractionation and to immobilize it in a commercial agar matrix. Purification was conducted using stepwise ammonium sulfate precipitation with saturation levels of 0–15% (F15), 15–30% (F30), and 30–45% (F45), followed by dialysis. Urease activity was measured using the Nessler method, and protein concentration was determined using the Lowry method. The best fraction was then characterized for optimal temperature, pH, and substrate concentration, and immobilized in agar with concentrations of 1%, 2%, and 3%. The purified urease (F30) showed optimal activity at pH 7, an incubation temperature of 35 °C, and a substrate concentration of 1000 ppm, with a specific activity of 1.429 U/mg and a purification fold of 75.2 compared to the crude extract. Kinetic analysis revealed that the purified urease (F30) had a K_M value of 0.0242 M and a V_{max} of 1.499 M/min, while the immobilized urease showed a K_M of 0.0259 M and a V_{max} of 0.2414 M/min. The highest activity of immobilized urease was obtained at a 2% agar concentration, with an activity of 0.473 U/mL and an immobilization efficiency of 99%. The immobilized urease could be reused up to five times with a residual activity of 50%.

Keywords: agar-agar, ammonium sulphate fractionation, bitter melon seed, immobilization, urease

