

ABSTRAK

PENGARUH PENAMBAHAN POLIETILEN GLIKOL (PEG) 6000 TERHADAP STABILITAS ENZIM α -AMILASE DARI *Aspergillus sp.*

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Enzim α -amilase berperan penting dalam industri pengolahan pati karena kemampuannya menghidrolisis amilum menjadi gula sederhana. Namun, kestabilan enzim terhadap kondisi ekstrem masih menjadi kendala. Penelitian ini bertujuan meningkatkan stabilitas enzim α -amilase dari *Aspergillus sp.* melalui penambahan PEG 6000.

Proses penelitian meliputi produksi enzim, isolasi, pemurnian dengan fraksinasi amonium sulfat dan dialisis, serta penambahan PEG 6000 konsentrasi 12, 18, dan 24 % untuk dikarakterisasi. Aktivitas enzim ditentukan dengan metode Fuwa dan Mandels, serta kadar protein dengan metode Lowry.

Hasil penelitian menunjukkan kemurnian enzim hasil dialisis meningkat 10 kali dibanding ekstrak kasar enzim, ditunjukkan dengan meningkatnya aktivitas spesifik dari 369,405 U/mg pada ekstrak kasar enzim menjadi 3705,535 U/mg pada enzim hasil dialisis. Enzim hasil dialisis dan enzim hasil penambahan PEG 6000 konsentrasi 12, 18, dan 24 % memiliki pH optimum sama, yaitu pada pH 4. Sementara itu, enzim hasil dialisis memiliki suhu optimum yang sama dengan enzim penambahan PEG 6000 konsentrasi 12 % yaitu 45 °C, sedangkan pada penambahan PEG konsentrasi 18 dan 24 % mengalami pergeseran suhu optimum menjadi 50 °C. Uji stabilitas termal dilakukan pada suhu 60 °C selama 100 menit, enzim hasil dialisis memiliki aktivitas sisa sebesar 82 % dengan waktu paruh 364,814 menit, sedangkan enzim hasil penambahan PEG 6000 konsentrasi 12, 18, dan 24 % berturut-turut menunjukkan aktivitas sisa sebesar 85, 87, dan 87 % serta waktu paruh 433,217; 533,197; dan 533,197 menit. Peningkatan stabilitas enzim hasil penambahan PEG 6000 konsentrasi 12, 18, dan 24 % berturut-turut sebesar 1,187; 1,461; dan 1,461 kali dibanding dengan enzim hasil dialisis.

Kata kunci: α -amilase, *Aspergillus sp.*, polietilen glikol 6000, stabilitas enzim.

ABSTRACT

THE EFFECT OF ADDITION OF POLYETHYLEN GLYCOL (PEG) 6000 ON STABILITY OF α -AMYLASE ENZYME FROM *Aspergillus sp.*

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The α -Amylase enzyme plays a vital role in the starch processing industry due to its ability to hydrolyze starch into simple sugars. However, its stability under extreme conditions remains a challenge. This study aims to enhance the stability of α -amylase from *Aspergillus sp.* through the addition of PEG 6000.

The research involved enzyme production, isolation, purification via ammonium sulfate fractionation and dialysis, and characterization after adding 12, 18, and 24 % PEG 6000. Enzyme activity was measured using Fuwa and Mandels methods, and protein content by the Lowry method.

The research results show that the purity of the enzyme obtained from dialysis increased 10 times compared to the crude enzyme extract, as indicated by the increase in specific activity from 369.405 U/mg in the crude enzyme extract to 3705.535 U/mg in the enzyme obtained from dialysis. All enzyme samples, including those treated with 12, 18, and 24 % PEG 6000, had the same optimum pH of 4. The dialyzed enzyme and the one with 12 % PEG had an optimum temperature of 45 °C, while the 18 % and 24 % PEG-treated enzymes shifted to 50 °C. At 60 °C for 100 minutes, the dialyzed enzyme retained 82 % of its activity with a half life of 364.814 minutes. PEG treated enzymes showed higher residual activity: 85, 87, and 87 %, with half-lives of 433.217, 533.197, and 533.197 minutes, respectively. PEG 6000 improved thermal stability by 1.187 to 1.461 times compared to the dialyzed enzyme.

Keywords: α -amylase, *Aspergillus sp.*, polyethylene glycol 6000, enzyme stability.