

ABSTRAK

PENGARUH PENAMBAHAN POLIETILEN GLIKOL (PEG) 4000 TERHADAP KESTABILAN ENZIM α -AMILASE DARI *Aspergillus sp.*

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Pemanfaatan enzim dalam dunia industri membutuhkan kriteria khusus, salah satunya stabilitas tinggi. Semakin tinggi stabilitas suatu enzim, maka semakin baik enzim bekerja pada suhu dan pH ekstrem. Untuk memperoleh enzim dengan stabilitas tinggi, perlu dilakukan peningkatan kestabilan enzim.

Penelitian ini dilakukan dengan tujuan untuk meningkatkan kestabilan enzim α -amilase dari jamur *Aspergillus sp.* dengan metode penambahan zat aditif Polietilen Glikol (PEG) 4000. Tahapan penelitian ini meliputi produksi dan isolasi enzim, pemurnian enzim melalui fraksinasi dan dialisis, serta penambahan zat aditif PEG 4000. Selanjutnya enzim hasil pemurnian sebelum dan setelah penambahan PEG 4000 dikarakterisasi.

Hasil penelitian ini menunjukkan bahwa enzim α -amilase hasil pemurnian memiliki kemurnian lebih tinggi sebesar 10 kali lipat dibandingkan ekstrak kasar enzim, ditunjukkan dengan nilai aktivitas spesifik ekstrak kasar enzim sebesar 287,62 U/mg, sedangkan enzim hasil pemurnian sebesar 2870,13 U/mg. pH optimum enzim hasil pemurnian sebelum dan setelah penambahan PEG 4000 adalah 3,5. Suhu optimum enzim hasil pemurnian sebelum penambahan PEG 4000 adalah 45 °C. Suhu optimum enzim hasil pemurnian setelah penambahan PEG 4000 12, 18, dan 24 % adalah 50 °C. Berdasarkan uji stabilitas termal pada suhu 60 °C selama 100 menit diperoleh aktivitas sisa enzim hasil pemurnian sebelum penambahan PEG 4000 sebesar 58,92 % dengan waktu paruh 126,018 menit. Sedangkan enzim hasil pemurnian setelah penambahan PEG 4000 12, 18, dan 24 % berturut-turut menunjukkan aktivitas sisa sebesar 68,56; 74,58; dan 78,78 %, dengan waktu paruh 187,324; 216,593; dan 301,347 menit. Kemurnian enzim hasil pemurnian sebelum dan setelah penambahan PEG 4000 12, 18, dan 24 % meningkat secara berturut-turut sebesar 1,49; 1,72; dan 2,4 kali lipat.

Kata kunci: α -amilase, *Aspergillus sp.*, stabilitas enzim, PEG 4000

ABSTRACT

THE EFFECT OF POLYETHYLENE GLYCOL (PEG) 4000 ADDITION ON THE α -AMYLASE STABILITY FROM *Aspergillus sp.*

By

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The use of enzymes in industry requires specific criteria, one of which is high stability. The higher the stability of an enzyme, the better it performs at extreme temperatures and pH levels. To obtain enzymes with high stability, it is necessary to improve enzyme stability.

This study was conducted with the aim of enhancing the stability of α -amylase enzymes from the fungus *Aspergillus sp.* using the addition of the additive Polyethylene Glycol (PEG) 4000. The research stages included enzyme production and isolation, enzyme purification through fractionation and dialysis, and the addition of PEG 4000. The purified enzyme before and after the addition of PEG 4000 was then characterized.

The results of this study indicate that the purified α -amylase enzyme has a purity 10 times higher than that of the crude enzyme extract, as evidenced by the specific activity value of the crude enzyme extract being 287.62 U/mg, while the purified enzyme is 2870.13 U/mg. The optimal pH of the purified enzyme before and after the addition of PEG 4000 is 3.5. The optimal temperature of the purified enzyme before the addition of PEG 4000 is 45 °C. The optimal temperature of the purified enzyme after the addition of PEG 4000 at 12, 18, and 24 % is 50 °C. Based on thermal stability testing at 60 °C for 100 minutes, the residual activity of the purified enzyme before the addition of PEG 4000 was 58.92% with a half-life of 126.018 minutes. Meanwhile, the purified enzyme after adding PEG 4000 at 12, 18, and 24 % showed residual activity of 68.56; 74.58; and 78.78 %, respectively, with half-lives of 187.324, 216.593, and 301.347 minutes. The purity of the purified enzyme before and after the addition of PEG 4000 at 12, 18, and 24 % increased by 1.49, 1.72, and 2.4 times, respectively.

Keywords: α -amylase, *Aspergillus sp.*, enzyme stability, PEG 4000