Imobilisasi biokatalis lipase aspergillus niger hasil fermentasi solid state pada limbah pertanian secara adsorpsi-crosslinking = Immobilization of lipase aspergillus niger biocatalyst from solid state fermentation using agricultural waste by adsorption-crosslinking

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Abstrak

Penggunaan lipase untuk skala komersial masih terbatas karena alasan ekonomis dimana lipase memiliki harga yang mahal dan sulit dipisahkan. Imobilisasi enzim secara adsorpsi-crosslinking dengan menggunakan lipase yang diproduksi secara fermentasi solid-state (SSF) merupakan solusi permasalahan tersebut. Penelitian ini diawali dengan membandingkan hasil imobilisasi lipase non komersial (crude powder A. niger) dan komersial (C. rugosa dan A.niger) pada support komersial (resin) dan non komersial (limbah pertanian). Semua support yang digunakan terlebih dilapisi dengan kitosan. Crude powder lipase A.niger diproduksi secara fermentasi solid state menggunakan limbah pertanian. Selanjutnya imobilisasi enzim juga dilakukan menggunakan support limbah pertanian. Hasil penelitian Menunjukkan bahwa limbah pertanian terbukti dapat dijadikan sebagai substarat untuk produksi lipase maupun sebagai support untuk imobilisasi. Produksi lipase A.niger secara fermentasi solid state menggunakan substrat ampas tahu menghasilkan aktivitas optimum sebesar 14,14 U/g dss. Aktivitas hidrolisis yang diperoleh dari pemanfaatan support resin XAD7HP dan MP-64 masing-masing untuk C. rugosa (18,21 dan 24,69 U/g support), A. niger (28,3 dan 29,41 U/g support) dan crude A.niger 6,33 U/g support MP-64. Aktivitas sintesis fatty acid methyl ester (FAME) dari pemakain support resin masing-masing diperoleh sebesar 62% (C. rugosa), 83% (A. niger) dan 56% untuk crude A. niger. Pemanfaatan support kulit jagung dari C.rugosa dan crude A. niger diperoleh aktivitas hidrolisis masing-masing sebesar 20,83 dan 6,33 U/g support serta aktivitas sintesis biodiesel sebesar 59% untuk C. rugosa dan 50% crude A. niger. Berdasarkan studi ini, lipase yang diproduksi melalui metode fermentasi solid state menggunakan substrat limbah pertanian mempunyai potensi untuk dikembangkan sebagai enzim yang dapat diimobilisasi pada support yang mudah diperoleh dan tidak beracun (limbah pertanian).

.....The use of lipase for commercial scale is still limited due to economic reasons, since lipase is expensive and difficult to separate. Adsorption-crosslinking enzyme immobilization using lipase produced by solid-state fermentation (SSF) is the solution of the problem. This study began by comparing the results of non-commercial (A. niger) and commercial (C. rugosa and A. niger) lipase immobilization in commercial (resin) and non-commercial support (agricultural waste). All supports used were dilapisi with chitosan. A. niger lipase crude powder was produced by solid state fermentation using agricultural waste as the substrate. In addition, enzyme immobilization was also carried out using agricultural waste as the support. The results showed that agricultural waste was proven to be used as the substrate for lipase production and immobilization support. Production of A. niger lipase by solid state fermentation using tofu pulp substrate, obtained an optimum activity of 8.48 U/mL. The hydrolysis activity were obtained using XAD7HP and MP-64 support resins for C. rugosa (18.21 and 24.69 U/g supports), A. niger (28.3 and 29.41 U/g supports), and crude A. niger (6.33 U/g supports MP-64). The fatty acid methyl ester (FAME) synthesis activity obtained using resin as the support were 62% (C. rugosa), 83% (A. niger) and 56% (crude A. niger). The utilization

of corn husk as the support for C. rugosa and crude A. niger lipase, obtained the hydrolysis activity of 20.83 and 6.33 U/g support, respectively and fatty acid methyl ester synthesis activity of 59% for C. rugosa and 50% for crude A. niger. Based on this study, lipase produced by the solid state fermentation method using agricultural waste substrates has the potential to be developed as an enzyme that can be immobilized in an easily available and non-toxic support (agricultural waste).