Pengaruh pelarut terhadap transesterifikasi dan interesterifikasi minyak kelapa sawit menggunakan lipase candida rugosa terimobilisasi pada partikel nano Fe3O4-polidopamin = The effect of solvents on transesterification and interesterification from palm oil using immobilized lipase candida rugosa on Fe3O4 polydopamine nanoparticles

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Abstrak

Etil ester asam lemak dapat diperoleh melalui reaksi transesterifikasi dan interesterifikasi minyak sawit. Reaksi transesterifikasi dan interesterifikasi dilakukan secara enzimatik menggunakan lipase Candida rugosa bebas dan yang terimobilisasi pada partikel nano Fe3O4-polidopamin. Nilai persen loading imobilisasi yang diperoleh adalah 78%. Lipase bebas memiliki aktivitas spesifik sebesar 13,81 U/mg, sedangkan lipase terimobilisasi sebesar 2,86 U/mg. Lipase imobilisasi memberikan efisiensi sebesar 21% dengan penurunan aktivias 79%. Partikel Nano Fe3O4-Polidopamin dan lipase terimobilisasi dikarakterisasi menggunakan FTIR, FESEM, EDS, PSA, dan XRD. Pelarut yang digunakan pada reaksi transesterifikasi dan interesterifikasi yaitu t-butanol, metil isobutil keton, dan n-heksan. Hasil etil ester asam lemak dianalisis dengan GC-FID. Persen komposisi tertinggi pada transesterifikasi dengan katalis lipase bebas dan lipase terimobilisasi sebesar 5,59% dan 3,21% dalam pelarut metil isobutil keton. Sementara itu, Persen komposisi tertinggi pada interesterifikasi dengan katalis lipase bebas dan lipase terimobilisasi sebesar 2,15% dan 1,46% dengan pelarut metil isobutil keton. Enzim terimobilisasi dalam reaksi transesterifikasi dan interesterifikasi dapat digunakan tiga kali pengulangan. Setelah tiga kali pengulangan, aktivitas menurun 61%.Transesterifikasi dan interesterifikasi berlangsung dalam pelarut metil isobutil keton.
<hr>Fatty acid ethyl ester is produced by either transesterification and interesterification between palm oil and ethanol or ethyl acetat as reactants. Transesterification and interesterification were enzim-catalized using immobilized Candida rugosa lipase on Fe3O4-polydopamine. Loading percentage of immobilized lipase was 78%. Free lipase had specific activity about 13.81U/mg, while immobilized lipase of 2.86 U/mg. Immobilization lipase gave efficiency of 21% with a decrease in the specific activity of 79%. Fe3O4-polidopamin nanoparticle have been characterized using FTIR, FESEM, EDS, PSA, and XRD. Variation of solvents used for reaction were t-butanol, methyl isobutyl ketone, and n-hexane. Analysis of fatty acid ethyl ester was performed by GC-FID. The highest composition of transesterification using free lipase and immobilized lipase, with methyl isobutyl ketone as solvent, were 5.59% and 3.21%, respectively. Meanwhile, highest composition percentage of interesterification using free lipase and immobilized lipase were 2.15% and 1.46%, using methyl isobuthyl ketone. Immobilized enzyme in transesterification and interesterification can use three times recycle. After third recycle, the presentation of relative activity decreased 61%. Transesterification and interesterification took place in methyl isobuthyl ketone as solvent.