

Studi pengaruh pelarut t-butanol dan metil isobutil keton terhadap esterifikasi asam lemak hidrolisat minyak kelapa sawit dengan fruktosa menggunakan lipase candida rugosa E.C. 3.1.1.3. terimobilisasi nanopartikel Fe₃O₄ kitosan = study of t butanol and methyl isobutyl ketone effect on esterification between palm oil fatty acid and fructose using immobilized candida rugosa lipase E.C.3.1.1.3. on Fe₃O₄ chitosan nanoparticles

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Abstrak

[SFAEs (Sugar Fatty Acid Esters) atau ester asam lemak-gula dapat disintesis enzimatis menggunakan lipase Candida rugosa E.C.3.1.1.3 terimobilisasi pada nanopartikel Fe₃O₄-Kitosan antara asam lemak hidrolisat minyak sawit dan fruktosa. Nanopartikel Fe₃O₄-Kitosan disintesis dengan metode kopresipitasi dan dikarakterisasi menggunakan FTIR (Fourier Transform Infra Red), FESEM (Field Emission Scanning Electron Microscopy), TEM (Transmission Electron Microscopy), dan VSM (Vibrating Sample Magnetometer). Esterifikasi dilakukan menggunakan lipase terimobilisasi untuk pemakaian pertama dan berulang. Nilai persen loading pada lipase terimobilisasi yang diperoleh adalah sebesar 68,15%. dengan aktivitas sebesar 1,39 U/mg dan efisiensi imobilisasi sebesar 3,52%. Untuk lipase terimobilisasi pemakaian kedua didapatkan aktivitas spesifik sebesar 0,51 U/mg dengan efisiensi imobilisasi sebesar 1,28%. Reaksi esterifikasi dilakukan dalam pelarut organik yang berbeda yaitu t-butanol dan metil isobutil keton (MIBK). Persen konversi tertinggi diperoleh dengan pelarut t-butanol sebesar 28,09% dengan derajat substitusi (DS) ester 3 menggunakan lipase bebas, 21,80% dengan DS ester 2 menggunakan lipase terimobilisasi dan 16,81% dengan DS ester 2 menggunakan lipase terimobilisasi pemakaian kedua.

.....Sugar Fatty Acid Esters (SFAEs) can be synthesized by an enzymatic esterification between palm oil fatty acid and fructose using immobilized Candida rugosa lipase E.C.3.1.1.3 on Fe₃O₄-Chitosan nanoparticles. Fe₃O₄-Chitosan nanoparticles were synthesized by using coprecipitation method and characterized using FTIR (Fourier Transform Infra Red), FESEM (Field Emission Scanning Electron Microscopy), TEM (Transmission Electron Microscopy), and VSM (Vibrating Sample Magnetometer). The esterification reaction was performed using immobilized lipase for first and second usage. The loading percentage value of immobilized lipase obtained in this study was 68.15% with the specific activity of the immobilized lipase and immobilization efficiency was 3.52%. For the second usage of immobilized lipase, the specific activity obtained was 0.51 U/mg and immobilization efficiency obtained was 1.28%. The solvents used in the esterification reaction are t-butanol and methyl isobutyl ketone (MIBK). The highest percentage conversion was obtained in t-butanol as a solvent using free lipase with the value of 28.09% and degree of substitution (DS) value of ester was 3. The conversion percentage using immobilized lipase was 21.80% and DS value of ester was 2. Last but not least, for the second usage of immo., Sugar Fatty Acid Esters (SFAEs) can be synthesized by an enzymatic esterification between palm oil fatty acid and fructose using immobilized Candida rugosa lipase E.C.3.1.1.3 on Fe₃O₄-Chitosan nanoparticles. Fe₃O₄-Chitosan nanoparticles were synthesized by using coprecipitation method and characterized using FTIR (Fourier Transform Infra Red), FESEM (Field Emission Scanning Electron Microscopy), TEM (Transmission

Electron Microscopy), and VSM (Vibrating Sample Magnetometer). The esterification reaction was performed using immobilized lipase for first and second usage. The loading percentage value of immobilized lipase obtained in this study was 68.15% with the specific activity of the immobilized lipase and immobilization efficiency was 3.52%. For the second usage of immobilized lipase, the specific activity obtained was 0.51 U/mg and immobilization efficiency obtained was 1.28%. The solvents used in the esterification reaction are t-butanol and methyl isobutyl ketone (MIBK). The highest percentage conversion was obtained in t-butanol as a solvent using free lipase with the value of 28.09% and degree of substitution (DS) value of ester was 3. The conversion percentage using immobilized lipase was 21.80% and DS value of ester was 2. Last but not least, for the second usage of immo]