

Penggunaan berulang lipase candida rugosa terimobilisasi pada partikel nano fe<sub>3</sub>o<sub>4</sub> polidopamin untuk reaksi transesterifikasi dan interesterifikasi Minyak Kelapa Sawit dengan pelarut isooktana dan 2 heptanon = Reuse of immobilized candida rugosa lipase on fe<sub>3</sub>o<sub>4</sub> polydopamine nanoparticle for transesterification and interesterification reaction of Palm Oil by using isooctane and 2 heptanone solvent

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Abstrak

Etil ester asam lemak dan propil ester asam lemak dapat diperoleh melalui reaksi transesterifikasi dan interesterifikasi minyak sawit. Pada penelitian ini, reaksi transesterifikasi dan interesterifikasi dilakukan secara enzimatik menggunakan lipase *Candida rugosa* bebas dan lipase terimobilisasi pada partikel nano Fe<sub>3</sub>O<sub>4</sub>- polidopamin. Aktivitas spesifik lipase bebas dan lipase terimobilisasi masing-masing sebesar 13,09 U/mg dan 1,67 U/mg. Persen loading lipase terimobilisasi sebesar 84,88%. Partikel nano Fe<sub>3</sub>O<sub>4</sub>- polidopamin dan lipase terimobilisasi dikarakterisasi menggunakan FTIR, FESEM EDS, TEM dan XRD. Hasil alkil ester asam lemak dianalisis dengan GC-FID. Lipase terimobilisasi dapat digunakan hingga tiga kali reaksi. Seluruh sampel menunjukkan persen konversi transesterifikasi yang lebih tinggi daripada interesterifikasi. Berdasarkan reaksi transesterifikasi, persen konversi total etil ester asam lemak dan propil ester asam lemak dalam pelarut isooktana yaitu 24,33% dan 22,73% menggunakan lipase bebas serta 51,55% dan 45,15% menggunakan lipase terimobilisasi. Persen konversi total etil ester asam lemak dan propil ester asam lemak dalam pelarut heptanon yaitu 18,47% dan 18,39% menggunakan lipase bebas serta 32,95% dan 28,76% menggunakan lipase terimobilisasi.

*Fatty acid ethyl esters and fatty acid propyl esters were produced by transesterification and interesterification reaction of palm oil. In this research, transesterification and interesterification reaction were carried out in enzymatic reaction by free *Candida rugosa* lipase and immobilized *Candida rugosa* lipase on Fe<sub>3</sub>O<sub>4</sub>-polydopamine nanoparticle. Specific activity of free lipase and immobilized lipase were 13,09 U/mg and 1,67 U/mg. The loading percentage of immobilized lipase was 84,88%. Fe<sub>3</sub>O<sub>4</sub>-polydopamine nanoparticle and immobilized lipase were characterized by FTIR, FESEM, EDS, TEM and XRD. Fatty acid alkyl esters were analyzed by GC-FID. Immobilized lipase could be used up to three times of reaction. All sample showed higher conversion percentage of transesterification than interesterification reaction. Based on the transesterification reaction, total conversion percentage of fatty acid ethyl ester and propyl ester in isooctane solvent by free lipase were 24,33% and 22,73%, while immobilized lipase were 51,55% and 45,15%. On the other hand, total conversion percentage of fatty acid ethyl ester and propyl ester in 2-heptanone solvent by free lipase were 18,47% and 18,39%, while immobilized lipase were 32,95% dan 28,76%.*