Perbandingan kinerja biokatalis yang diimobilisasi melalui metode entrapment menggunakan medium support dari kitin, kitosan, dan zeolit untuk sintesis biodiesel rute non-alkohol = The comparison of immobilized biocatalyst performance by entrapment method using medium support on chitin, chitosan, and zeolite for non-alcohol route of biodiesel synthesis

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Abstrak

Salah satu sumber energi alternatif ramah lingkungan yang berpotensi dalam mengatasi krisis energi yang terjadi di dunia adalah biodiesel. Umumnya produksi biodisel mempergunakan proses teknik kimia konvensional yang memiliki kelemahan dalam penggunaan energi dan pembentukan produk samping yang tidak dikehendaki. Oleh karena itu, dikembangkan proses enzimatis melalui rute non-alkohol. Pada penelitian ini, biodiesel akan disintesis melalui interesterifikasi antara substrat minyak jelanta dan metil asetat dengan perbandingan 1:12 pada sistem batch dengan kondisi suhu 37oC, shaker 150 rpm dan pada sistem kontinyu menggunakan reaktor packed bed berukuran ID 11 mm dan panjang 150 mm. Interesterifikasi ini dikatalis dengan enzim Candida rugosa lipase. Karena alasan teknis dan ekonomi, lipase diimobilisasi melalui metode entrapment pada support kitin, kitosan dan zeolit. Variasi yang akan dilakukan adalah variasi rasio massa kitin dan kitosan sebagai support terhadap lipase, waktu imobilisasi kitin dan kitosan, konsentrasi sodium tripolyphosphate (TPP) dalam proses gelasi support kitin dan support kitosan dan variasi perbandingan enzim dan support pada imobilisasi dengan support zeolit. Enzim loading terbesar dihasilkan melalui entrapment dengan support kitosan. Enzim loading yang dihasilkan adalah 97,24%. Yield biodiesel terbesar yang dihasilkan pada reaktor batch berasal dari sintesis biodiesel dengan support zeolit sebesar 99,79%. Dan pada reaktor kontinyu, stabilitas lipase terbaik dihasilkan dari lipase terimobilisasi dalam support kitosan

<hr>One of the alternative energy sources that are environmentally friendly potentially to overcome energy crisis in the world is biodiesel. Generally, biodiesel production process use conventional chemical techniques, which has disadvantages related to energy use and formation of unwanted byproducts. Therefore, the enzymatic process non-alcohol route developed. In this research, biodiesel will be synthesized by interesterification process between waste cooking oil as substrate and methyl acetate with ratio 1:12 in batch system with the conditions of 37° C, shaker at 150 rpm and continuous system using a packed bed reactor sized 11 mm ID and 150 mm long. This reaction is catalyzed by Candida rugosa lipase enzyme. Because of technical and economic reasons, lipase will be immobilized by entrapment methods on chitin, chitosan and zeolite as supports. The variations in this research are mass ratio of chitin and chitosan as supports for lipase, immobilization time on chitin and chitosan, tripolyphosphate (TPP) concentration in gelation process of chitin and chtitosan, and variation of comparison between enzyme and support in immobilization on zeolite. The largest enzyme loading produced by entrapment in the chitosan support. The resulting enzyme loading was 97.24%. And the largest yield of biodiesel produced in batch reactors from the synthesis of biodiesel by zeolite, which is 99.79%. And from the continuous system, the best stability produced from immobilized on chitosan.