

Sintesis biodiesel rute non Alkohol dari minyak goreng dengan biokatalis terimmobilisasi entrapment pada reaktor batch dan reaktor packed bed = Biodiesel synthesis by non alcohol route from cooking oil with biocatalyst immobilized entrapment in reactor batch and reactor packed bed

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Abstrak

Biodiesel dapat dihasilkan dengan bantuan biokatalis melalui reaksi enzimatik enzim lipase melalui rute non-alkohol atau reaksi interesterifikasi. Enzim lipase sebagai biokatalis dapat diaplikasikan tetapi enzim lipase merupakan enzim komersial dimana pemakaiannya dapat menaikkan harga jual produk biodiesel. Oleh karena itu, diperlukan metode imobilisasi enzim lipase untuk memaksimalkan penggunaan enzim lipase. Penelitian ini diarahkan pada optimalisasi metode imobilisasi enzim lipase terpilih yaitu metode entrapment dan sintesis biodiesel. Metode entrapment menggunakan serbuk zeolit sebagai support dan NaF agen pengemulsi gel. Kondisi optimal imobilisasi didapatkan dari besarnya konsentrasi enzim termobilisasi pada support.

Pengukuran dilakukan dengan mengukur konsentrasi sisa enzim imobilisasi dengan metode Lowry dimana didapatkan rasio 3% enzim dalam support zeolit sebagai kondisi optimal dengan enzim loading 80%.

Sintesis biodiesel rute non-alkohol dengan reaksi interesterifikasi antara minyak goreng yang merupakan minyak kelapa sawit dan metilasetat dengan perbandingan 1:12 dimanapada sistem batch diujikan dengan kondisi suhu 37°C, shaker 150 rpm dan menggunakan biokatalis hasil imobilisasi dengan rasio massa enzim 3% berbanding massa support maka didapatkan 64,52% yield biodiesel dalam waktu 40 jam.

Pada sistem kontinyu reaksi dilakukan pada reaktor packed bed berukuran ID 11 mm dan panjang 150 mm. Kondisi operasi dilakukan dengan laju alir umpan 1 mL/jam, suhu jaket 37°C, waktu tinggal 5 jam, dan kolom reaktor terisi 75% biokatalis dari volume total. Sistem kontinyu ini mampu menghasilkan % yield biodiesel sebesar 40,62% pada sampel jam ke-50.

..... Biodiesel can be produced with the help of biocatalyst lipase enzyme through an enzymatic reaction via the route of non-alkoholic or interesterification reaction. The enzyme lipase as a biocatalyst can be applied but enzyme lipase is commercial enzyme and use it can raise the selling price of biodiesel product.

Therefore, lipase immobilization methods are needed to maximize enzyme lipase.

This study aimed at optimizing the lipase enzyme immobilization method was chosen the method of entrapment and synthesis of biodiesel. Entrapment method using zeolite powder as a support and NaF emulsifying agent gel. Optimal immobilization conditions obtained from the large concentration of enzyme immobilized on a support.

Measurements were made by measuring the residual concentration of enzyme immobilization by Lowry method which the ratio of 3% of enzyme obtained in support of zeolite as the optimal conditions with an enzyme loading of 80%. Biodiesel synthesis route of non-alkoholic interesterification performed on the reaction between vegetable oil which is palm oil and methyl acetate with a ratio of 1:12 which in batch system was tested with the conditions of 37° C, 150 rpm shaker and the results biocatalyst immobilization of enzymes with a ratio of 3% then 64.52% yield of biodiesel obtained within 40 hours.

In continuous systems the reaction carried out in packed bed reactor sized ID 11 mm and length 150 mm. Operating conditions performed with the feed flow rate 1mL/jam, jacket temperature of 37°C, residence time 5 hours, and a column reactor filled with 75% of the total volume biocatalyst. Continuous system is capable of producing 40.62% at sampling 50 hour.