

Sintesis biodiesel dari bahan baku minyak sawit menggunakan reaktor jet bubble column = Biodiesel synthesis from palm oil using jet bubble column reactor

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Abstrak

Saat ini, dunia sedang mengalami krisis energi dan lingkungan akibat menipisnya cadangan bahan bakar fosil dan polutan yang dihasilkan pembakaran bahan bakar fosil. Oleh karena itu diperlukan energi alternatif dari bahan terbarukan. Biodiesel dari minyak sawit sangat potensial dikembangkan di Indonesia. Namun selama ini proses sintesis biodiesel cukup rumit dan mahal karena memerlukan reaktor berpengaduk dan pemanas. Suhu reaksi yang digunakan mendekati titik didih metanol sehingga rawan terjadinya penguapan reaktan metanol.

Reaktor jet bubble column ini dikembangkan untuk membuat proses sintesis biodiesel menjadi lebih sederhana. Reaktor ini tidak memerlukan pengaduk karena adanya pengadukan otomatis akibat arus eddy yang timbul dalam reaktor. Selain itu, suhu operasi reaksi berlangsung dalam keadaan ambient sehingga tidak memerlukan pemanas dan menghilangkan risiko kehilangan metanol akibat penguapan. Reaksi dilakukan dalam variasi rasio mol metanol minyak 6:1 hingga 3:1 dan variasi penggunaan katalis dan tanpa katalis.

Hasil reaksi katalitik memberikan keadaan optimal setelah reaksi berlangsung 30 menit pada rasio mol 6:1 dengan yield biodiesel sebesar 85%. Sedangkan hasil reaksi non-katalitik memberikan hasil optimal pada rasio mol 6:1 setelah reaksi berlangsung selama 50 menit dengan yield biodiesel sebesar 73%.

.....Today, the world is experiencing an energy and environmental crisis as a consequence of fossil fuel reserve depletion and pollutants produced by combustion of fossil fuels. Therefore, we need alternative energy from renewable materials. In Indonesia, biodiesel that produced from palm oil is very potential to be developed. However, the biodiesel synthesis process is quite complicated and expensive because it requires stirred reactor and heating. Furthermore, reaction temperature that is used in commercial process is very close to the boiling point of methanol, so the evaporation of methanol is very likely to occur.

Jet bubble column reactor was developed to make a much simpler biodiesel synthesis process. This reactor doesn't need a mixer because of the automatic mixing that is caused by eddy currents that arise inside it. In addition, the reaction takes place in ambient operating temperature, thus the reactor doesn't require heating and the risk of loss of methanol due to evaporation can be eliminated. In this research, the reaction was carried out with ratio variations of methanol to oil from 6:1 to 3:1 and variation of catalyst and without catalyst.

The experiment shows that catalytic reactions provide optimal result after the reaction lasted for 30 minutes at a ratio of 6:1 at a yield of 85% biodiesel. Meanwhile, the non-catalytic reaction provides optimal result in 6:1 ratio after the reaction lasted for 50 minutes at a yield of 73% biodiesel.