

Accepted Manuscript

Continuous Reactive Coupling of Glycerol and Acetone – a Strategy for Triglyceride Transesterification and In-situ Valorisation of Glycerol by-product

Valentine C. Eze, Adam P. Harvey

PII: S1385-8947(18)30659-4
DOI: <https://doi.org/10.1016/j.cej.2018.04.078>
Reference: CEJ 18878

To appear in: *Chemical Engineering Journal*

Received Date: 18 May 2017
Revised Date: 6 April 2018
Accepted Date: 13 April 2018

Please cite this article as: V.C. Eze, A.P. Harvey, Continuous Reactive Coupling of Glycerol and Acetone – a Strategy for Triglyceride Transesterification and In-situ Valorisation of Glycerol by-product, *Chemical Engineering Journal* (2018), doi: <https://doi.org/10.1016/j.cej.2018.04.078>



This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Continuous Reactive Coupling of Glycerol and Acetone – a Strategy for Triglyceride Transesterification and In-situ Valorisation of Glycerol by-product

Valentine C. Eze^a, Adam P. Harvey^a

^a School of Engineering, Newcastle University, NE1 7RU, UK.

Corresponding: Tel.: +44-191-208-5747; E-mail address: v.eze@ncl.ac.uk (Valentine C. Eze)

Abstract

Methyl esters of fatty acids are widely used as biodiesel, a sustainable replacement for petro-diesel. The conventional biodiesel process produces crude glycerol, which constitutes about 10wt% of the total products. This has led to a surplus of crude glycerol due to global increase in biodiesel use, necessitating increased research into sustainable processes that could convert the crude glycerol into higher value-added products. This study investigates biodiesel processes for continuous transesterification of triglycerides to methyl esters, coupled to conversion of the glycerol by-product into solketal, a value-added product, via reaction with acetone in situ. The study was carried out using one-stage and two-stage catalytic transesterification of triacetin and methanol in mesoscale oscillatory baffled reactors (meso-OBRs). The two-stage process involved two meso-OBRs in series packed with AmberlystTM resin catalysts: a basic AmberlystTM A26-OH in the first stage to catalyse transesterification of triacetin with methanol, and an acidic AmberlystTM 70-SO₃H in the second stage to catalyse the coupling of glycerol and acetone to form solketal. One-stage triacetin transesterification and glycerol coupling with acetone was carried out in a meso-OBR packed with the acidic AmberlystTM 70-SO₃H resin. In the two-stage process, the triacetin was converted to 99.1±2.0% methyl acetate and 98.0±1.3% glycerol after 25min residence time in the first reactor and the glycerol was reacted with acetone in the second reactor to achieve 76.5±2.8% solketal conversions after 35min. The single-stage process achieved 48.5±2.7% solketal conversion after 30min. The meso-OBR was operated continuously to achieve high quality steady states and consistent triacetin conversions. The triglyceride transesterification with reactive coupling of

Download English Version:

<https://daneshyari.com/en/article/6579203>

Download Persian Version:

<https://daneshyari.com/article/6579203>

[Daneshyari.com](https://daneshyari.com)