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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH*

Judul Jurnal Ilmiah (Artikel) : Optimization of monoglycerides production using KF/CaO-MgO Heterogeneous Catalysis

Nama Penulis : Luqman Buchori*, Didi Dwi Anggoro, Indro Sumantri, Riko Rikardo Putra

Jumlah Penulis : 4 orang

Status Pengusul : Penulis ketiga

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b. Nomor ISSN	: 1978-2993
c. Volume, Nomor, Bulan, Tahun	: Vol. 14, No. 3, 2019, pp. 689-696
d. Penerbit	: Teknik Kimia, Universitas Diponegoro
e. DOI artikel (jika ada)	: https://doi.org/10.9767/bcrec.14.3.4251.689-696
f. Alamat web Jurnal	: https://ejournal2.undip.ac.id/index.php/bcrec/issue/view/427
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Semarang, 28 Januari 2022

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Reviewer 2



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 (Bidang Ilmu/Unit Kerja : Teknik Kimia Universitas Diponegoro)

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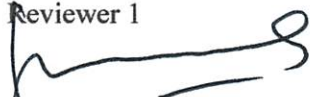
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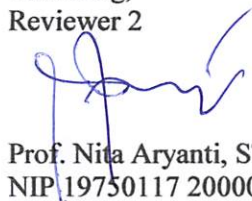
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Document type
Article • Gold Open Access

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ISSN
19782993

DOI
10.9767/bcrec.14.3.4251.689-696

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Optimization of monoglycerides production using KF/CaO-MgO heterogeneous catalysis

Buchori, Luqman ; Anggoro, Didi Dwi; Sumantri, Indro; Putra, Riko Rikardo

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^a Department of Chemical Engineering, Faculty of Engineering, Diponegoro University, Jl. Prof. Soedarto, SH, Tembalang, Semarang, 50275, Indonesia

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Abstract

The production of monoglyceride or monoacylglycerol (MAG) from triglycerides and glycerol has been studied. The purpose of this research was to study the effect of using KF/CaO-MgO catalyst on MAG production with batch reactor. The effect of reaction temperature, reaction time, and catalyst loading was investigated using Response Surface Methods (RSM). The reaction temperature, reaction time, and catalyst loading were varied at 200-220 °C, 2-4 hours, and 0.1-0.3 % w/w, respectively. The maximum yield of monoglyceride 41.58% was achieved the optimum conditions of catalyst loading of 0.19 % (w/w), reaction temperature of 208.37 °C, and reaction time of 3.20 hours. Copyright © 2019 BCREC Group. All rights reserved.

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Bulletin of Chemical Reaction Engineering & Catalysis

Volume 14, Issue 3, Year 2019 (Regular Issue: December 2019)

Available online since 30th September 2019 at: <https://bcrec.undip.ac.id/> or <https://bcrec.id>

Bull. Chem. React. Eng. Catal.	Vol. 14	No. 3	Pages: 478 - 714	Semarang, December 2019	e-ISSN: 1978-2993
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Research Article

Optimization of Monoglycerides Production Using KF/CaO-MgO Heterogeneous Catalysis

Luqman Buchori*, Didi Dwi Anggoro, Indro Sumantri, Riko Rikardo Putra

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Received: 25th January 2019; Revised: 28th May 2019; Accepted: 29th May 2019;
Available online: 30th September 2019; Published regularly: December 2019

Abstract

The production of monoglyceride or monoacylglycerol (MAG) from triglycerides and glycerol has been studied. The purpose of this research was to study the effect of using KF/CaO-MgO catalyst on MAG production with batch reactor. The effect of reaction temperature, reaction time, and catalyst loading was investigated using Response Surface Methods (RSM). The reaction temperature, reaction time, and catalyst loading were varied at 200-220 °C, 2-4 hours, and 0.1-0.3 % w/w, respectively. The maximum yield of monoglyceride 41.58% was achieved the optimum conditions of catalyst loading of 0.19 % (w/w), reaction temperature of 208.37 °C, and reaction time of 3.20 hours. Copyright © 2019 BCREC Group. All rights reserved

Keywords: KF/Ca-MgO Catalyst; Monoglyceride; Optimization; Response Surface Method

How to Cite: Buchori, L., Anggoro, D.D., Sumantri, I., Putra, R.R. (2019). Optimization of Monoglycerides Production Using KF/CaO-MgO Heterogeneous Catalysis. *Bulletin of Chemical Reaction Engineering & Catalysis*, 14(3): 689-696 (doi:10.9767/bcrec.14.3.4251.689-696)

Permalink/DOI: <https://doi.org/10.9767/bcrec.14.3.4251.689-696>

1. Introduction

Cooking oil is made from vegetable oils that has been purified and used in the food industry as well as for daily needs. Most of the fat in food (including cooking oil) has formed of triglycerides, which is broken down, triglycerides will turn into one glycerol molecule and three free fatty acid molecules. The more triglycerides that break down causes more free fatty acids to be produced [1,2]. Monoacylglycerol (MAG) / monoglyceride is a chemical oleo compound that is widely used in the food, pharmaceutical, cosmetics, detergent [3,4], oil well drilling [5], textiles [6], packaging [7], plastic processing [7], and construction material [8]. Triglycerides are widely converted to monoglycerides and diglyc-

erides, because these two product are very widely used in food processing.

Monoglycerides can be prepared by glycolysis reactions between fat and fatty acid methyl esters of palm oil. The glycolysis reactions can be carried out by biocatalyst (enzymatic glycolysis/enzymatic reactions), without catalyst (non-catalyst reaction), or by chemical catalyst (chemical glycolysis). The most common method is the catalysis reaction using alkaline catalysts such as NaOH [9], NaOCH₃ [10], MgO [11,12] and CaO [13]. However, the use of this alkaline catalyst has a low catalyst activity. The activity of the catalyst can be increased by dispersing a metal oxide on the surface of another metal oxide [14] (such as: CaO on the surface of MgO). Mixed metal oxides (CaO-MgO) provide stronger basic strength than pure oxide (CaO or MgO) [15]. Mixed metal oxides will also increase the surface area of the catalyst [14]. The use of im-

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Research Article

Pd-Fe₃O₄/RGO: a Highly Active and Magnetically Recyclable Catalyst for Suzuki Cross Coupling Reaction using a Microfluidic Flow Reactor

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Received: 1st November 2018; Revised: 8th March 2019; Accepted: 13rd March 2019;
Available online: 30th September 2019; Published regularly: December 2019

Abstract

There are several crucial issues that need to be addressed in the field of applied catalysis. These issues are not only related to harmful environmental impact but also include process safety concerns, mass and heat transfer limitations, selectivity, high pressure, optimizing reaction conditions, scale-up issues, reproducibility, process reliability, and catalyst deactivation and recovery. Many of these issues could be solved by adopting the concept of micro-reaction technology and flow chemistry in the applied catalysis field. A microwave assisted reduction technique has been used to prepare well dispersed, highly active Pd/Fe₃O₄ nanoparticles supported on reduced graphene oxide nanosheets (Pd-Fe₃O₄/RGO), which act as a unique catalyst for Suzuki cross coupling reactions due to the uniform dispersion of palladium nanoparticles throughout the surface of the magnetite - RGO support. The Pd-Fe₃O₄/RGO nanoparticles have been shown to exhibit extremely high catalytic activity for Suzuki cross coupling reactions under both batch and continuous reaction conditions. This paper reported a reliable method for Suzuki cross-coupling reaction of 4-bromobenzaldehyde using magnetically recyclable Pd/Fe₃O₄ nanoparticles supported on RGO nanosheets in a microfluidic-based high throughput flow reactor. Organic synthesis can be performed under high pressure and temperature by using a stainless steel micro tubular flow reactor under continuous flow reaction conditions. Optimizing the reaction conditions was performed via changing several parameters including temperature, pressure, and flow rate. Generally, a scalable flow technique by optimizing the reaction parameters under high-temperature and continuous reaction conditions could be successfully developed. Copyright © 2019 BCREC Group. All rights reserved

Keywords: Suzuki cross-coupling; 4-bromobenzaldehyde; Pd-Fe₃O₄/RGO; Flow reactor

How to Cite: Elazab, H.A., Siamaki, A.R., Gupton, B.F., El-Shall, M.S. (2019). Pd-Fe₃O₄/RGO: a Highly Active and Magnetically Recyclable Catalyst for Suzuki Cross Coupling Reaction using a Microfluidic Flow Reactor. *Bulletin of Chemical Reaction Engineering & Catalysis*, 14(3): 478-489 (doi:10.9767/bcrec.14.3.3518.478-489)

Permalink/DOI: <https://doi.org/10.9767/bcrec.14.3.3518.478-489>

1. Introduction

Over the past few decades, micro-reaction technology has been emerged as an ideal route

to solve several critical issues in many aspects including organic chemistry and applied catalysis [1-8]. This new technology has created new promising horizons for chemical synthesis and industry via performing chemistry under continuous flow reaction conditions instead of the conventional batch chemistry [9-16]. This

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Research Article

Isatin Aldazines Synthesis using A Proton Exchanged Algerian Montmorillonite Clay as Acid Eco-friendly Catalyst

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Received: 28th March 2019; Revised: 14th May 2019; Accepted: 21st May 2019;
Available online: 30th September 2019; Published regularly: December 2019

Abstract

An efficient and easy procedure is developed for the synthesis of isatin aldazines or bis-Schiff bases of isatin, catalyzed by a proton exchanged Algerian montmorillonite clay (MMT-H⁺) as green catalyst. The products were obtained in two catalyzed steps under conventional heating in ethanol. Isatin-3-hydrazone obtained from the reaction of isatin with hydrazine monohydrate reacts in the second step with the appropriate aromatic aldehydes to give the desired products in good yields. The main advantages of using this protonated solid non-toxic catalyst in this synthesis are its availability and low cost, the simplicity of its use, the recycling possibilities without significant loss of its catalytic activity and its environmentally benign process. Copyright © 2019 BCREC Group. All rights reserved

Keywords: Montmorillonite-H⁺; Isatine; Isatin-3-hydrazone; bis-Schiff bases; Isatin Aldazines; Green catalyst

How to Cite: Benlahreche, B., Taleb, A., Lahrech, M.B., Hacini, S. (2019). Isatin Aldazines Synthesis using A Proton Exchanged Algerian Montmorillonite Clay as Acid Eco-friendly Catalyst. *Bulletin of Chemical Reaction Engineering & Catalysis*, 14(3): 551-558 (doi:10.9767/bcrec.14.3.4574.551-558)

Permalink/DOI: <https://doi.org/10.9767/bcrec.14.3.4574.551-558>

1. Introduction

Isatin (1H-indole-2,3-dione) and its derivatives possess a broad variety of biological and pharmacological properties [1]. Isatin widely used as starting materials for the synthesis of a broad range of various heterocyclic compounds, including indole, oxoindoles and quinoline [2]. Bis-Schiff bases of isatin also called azines [3] of isatin (Figure 1) are reported to indicate an assortment of biological activities, such as

antibacterial [4], antifungal [5], anticancer [6], antiviral [7], antiproliferative [8], anti-inflammatory [9], antiglycation [10], antitubercular [11], antioxidant [12,13], anticonvulsant [14], anti-HIV [15,16], cytotoxicity [17], analgesic [18], CNS, depressant [19] and also considered as corrosion inhibitors [20].

Synthesis of isatin-based azines are generally made by condensation of 3-hydrazinoindolin-2-one with aldehydes or ketones to yield respectively isatin aldazines (R₁ or R₂ = H) or isatin ketazines (R₁ and R₂ ≠ H) [21]. Most of these synthesis are based mainly on traditional thermal methods in presence of organic solvents and a range of catalysts, such as: acetic acid [22], HCl [23], triethyl amine [24], FeCl₃.6H₂O [25],

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