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KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel)	:	Effect of dealumination on the acidity of zeolite Y and the yield of glycerol mono stearate (GMS)		
Jumlah Penulis	:	4 orang (Didi Dwi Anggoro, Herawati Oktavianty, **Setia Budi Sasongko,** Luqman Buchori)		
Status Pengusul	:	penulis ke-3		
Identitas Jurnal Ilmiah	:	a. Nama Jurnal	:	Chemosphere
		b. Nomor ISSN	:	0045-6535
		c. Vol, No., Bln Thn	:	Volume 257, October 2020, 127012
		d. Penerbit	:	Elsevier Ltd.
		e. DOI artikel (jika ada)	:	https://doi.org/10.1016/j.chemosphere.2020.127012
		f. Alamat web jurnal	:	https://www.sciencedirect.com/science/article/pii/S0045653520312054
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Semarang, 10 Agustus 2020

Reviewer 2

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Reviewer

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Identitas Jurnal Ilmiah	:	a. Nama Jurnal : Chemosphere b. Nomor ISSN : 0045-6535 c. Vol, No., Bln Thn : Volume) 257, October 2020, 127012 d. Penerbit : Elsevier Ltd e. DOI artikel (jika ada) : https://doi.org/10.1016/j.chemosphere.2020.127012 f. Alamat web jurnal : https://www.sciencedirect.com/science/article/pii/S0045653520312054 Alamat Artikel : https://doc-pak.undip.ac.id/497/1/1-s2.0-S0045653520312054-main-1.pdf g. Terindex : Scopus, Q1

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Effect of dealumination on the acidity of zeolite Y and the yield of glycerol mono stearate (GMS)

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Effect of dealumination on the acidity of zeolite Y and the yield of glycerol mono stearate (GMS)

Didi Dwi Anggoro [a, *], Herawati Oktavianty [b], Setia Budi Sasongko [a], Luqman Buchori [a]

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HIGHLIGHTS

- The catalytic dealumination process can change the strength of zeolite Y catalyst acid.
- Dealumination variables such as acid concentration, temperature and time of dealumination affect the surface acidity of Zeolite Y.
- The strength of the catalyst acid can increase the yield of Glycerol Monostearate.
- Statistica software can be used to determine the optimum conditions of dealumination zeolite.

ARTICLE INFO

Article history:
Received 5 February 2020
Received in revised form
19 April 2020
Accepted 7 May 2020
Available online 12 May 2020

Handling Editor: Veeriah (Jega) Jegatheesan

Keywords:
Glycerol
Glycerol monostearate
Dealumination
Acidity
Zeolite Y

ABSTRACT

Research on the production of Glycerol Monostearate from glycerol using dealuminated Zeolite Y catalysts has been carried out. Optimization of the dealumination process is conducted using the help of statistical software 10, where the variables used are acid concentration (5–7 M), temperature of dealumination (55–70 °C) and time of dealumination (2–6 h). The acidity characterization test of dealuminated Zeolite Y using ammonia and pyridine solution. Glycerol Monostearate yield was obtained by GC-MS test that was carried out on 2 samples zeolite Y catalyst with the highest value of total and surface acidity of zeolite Y which produced 2.18% and 4% yield of Glycerol Monostearate. The two samples showed that the greater the acidity, the GMS yield was also greater. Compared to previous studies it was found that ZSM-5 catalyst has a higher acidity value than zeolite Y so that the yield of Glycerol Monostearate is higher with the use of ZSM-5 than Zeolite Y.

1. Introduction

Increase in population growth causing increase in fuel consumption too, especially fossil fuels. Biodiesel is a renewable alternative energy that can be used to replace fossil fuels that are low in pollution. This has caused a massive increase in biodiesel production. This biodiesel manufacturing process produces two main results, namely methylester and glycerol. Glycerol, in other words propane-1,2,3-triol at room temperature in the form of liquid has a clear color like water, thick, hygroscopic with a sweet taste. One of the glycerol derivatives is glycerol monostearate and has uses as an emulsifier in the food, pharmaceutical, and cosmetics industries. Glycerol monostearate is produced from the esterification process which reacts glycerol with stearic acid.

In the glycerol monostearate production used catalyst that serves to speed up the reaction and increase the yield of glycerol monostearate. The catalyst is a chemical that can increase the rate of reaction and is involved in chemical reactions even though the substance does not react. Catalysts can be divided into 3 parts, homogeneous catalysts, heterogeneous catalysts, enzyme catalysts (Istadi, 2011). One type of catalyst used in the manufacture of glycerol monostearate is zeolite.

The resulting synthetic zeolite catalyst sometimes does not meet specifications to be used as a catalyst in accelerating the reaction rate. Therefore, the catalyst characterization process is needed to change the properties of the catalyst in accordance with the required specifications (Wang et al., 2015). One of the catalyst

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https://doi.org/10.1016/j.chemosphere.2020.127012
0045-6535/

Chemosphere 257 (2020) 127168

Contents lists available at ScienceDirect

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Inhibition of polychlorinated dibenzo-p-dioxins and dibenzofurans by phosphorus-containing compounds in model fly ash

Pei-Yue Wang [a], Shuai-Xi Xu [b], Zhi-Liang Chen [c], Tong Chen [a, *], Xiao-Qing Lin [a], Yun-Feng Ma [a], Meng-Mei Zhang [d], Xiao-Dong Li [a]

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HIGHLIGHTS

- The activity of the N/P inhibitors on the PCDD/Fs is dominated by NH_4^+.
- $[PO_4]^{3-}$ ion alone cannot act as an effective inhibitor.
- Stabilizing metal catalysts might be the main inhibition mechanism of $CaHPO_4$.

ARTICLE INFO

Article history:
Received 16 March 2020
Received in revised form
18 May 2020
Accepted 20 May 2020
Available online 25 May 2020

Handling Editor: Grzegorz Lisak

Keywords:
PCDD/Fs
$NH_4H_2PO_4$
K_2HPO_4
$CaHPO_4$

ABSTRACT

Waste incineration is a preferred method in China to dispose the municipal solid waste, but controlling the production of highly toxic polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans effectively during incineration is both challenging and imperative. In this study, the suppression of PCDD/Fs by various phosphorus-containing compounds was explored, and the mechanisms responsible for the inhibition were studied in detail. The experiments took place in a lab-scale vertical tubular reactor at 350 °C under a simulated flue gas (12 vol% O_2 in N_2 flow), and both the off-gases and residues were collected for PCDD/Fs analysis. The scanning electron microscopy and energy-dispersive X-ray spectroscopy were used to characterize the reaction residues. The experimental results revealed that $NH_4H_2PO_4$ and $(NH_4)_2 \cdot HPO_4$ showed the highest inhibitory effect (57.2% and 57.3%, respectively) on the PCDD/Fs formation, followed by $CaHPO_4$ with inhibition efficiency of 39.1%. In contrast, KH_2PO_4 and K_2HPO_4 barely inhibited the generation of the PCDD/Fs. The inhibitory effect of $NH_4H_2PO_4$ and $(NH_4)_2 \cdot HPO_4$ was similar to that of nitrogen-based inhibitors. At the same time, it was proven that the inhibitory activity of $CaHPO_4$ might be due to the reaction of it with Cu^{2+} forming stable compounds.

1. Introduction

Due to the fast economic development in China, the amount of municipal solid waste (MSW) is proliferating, reaching 228 million tons as of 2018 (China, 2019). Landfill, composting, and incineration are widely applied in MSW disposal, among which incineration is considered as the most promising technique due to the higher energy recovery and mass/volume reduction (Phua et al., 2019). Over the last decade, the share of waste incineration has increased rapidly and has reached 45.1 wt% by the end of 2018 (China, 2019). However, highly toxic polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/Fs) are readily generated during this process (Yin et al., 2018). Various technologies have been applied to reduce the generation and emission of PCDD/Fs (Mckay, 2002), of which chemical inhibition at the post-combustion zone is a promising method with low-cost and good feasibility (Goldfarb, 1989; Soler et al., 2018; Ma et al., 2019).

Traditional inhibitors are usually divided into four categories based on their chemical composition: i) alkaline substances, e.g., CaO, $Ca(OH)_2$, NaOH (Qian et al., 2005; Zhang and Buekens, 2016), ii) sulfur-based inhibitors, such us S, Na_2S, SO_3, etc. (Gullett et al., 1992; Tuppurainen et al., 1998; Chang et al., 2006), iii) nitrogen-

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https://doi.org/10.1016/j.chemosphere.2020.127168
0045-6535/

Chemosphere 257 (2020) 127114

Contents lists available at ScienceDirect

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Mercury fractionation in tropical soils: A critical point of view

Isabela C.F. Vasques [a], Fernando B. Egreja Filho [b], Everton G. Morais [c], Francielle R.D. Lima [c], Jakeline R. Oliveira [c], Polyana Pereira [c], Luiz Roberto G. Guilherme [c], João José Marques [c, *]

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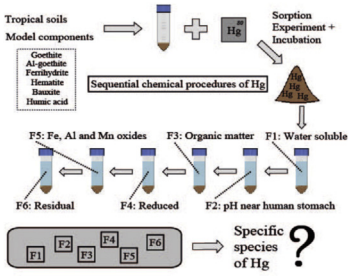
HIGHLIGHTS

- The proposed sequential extraction is not specific for Hg species.
- Liming and organic matter and clay contents did not alter Hg fractionation.
- Aqua regia digestion at room temperature is not suitable for residual Hg assessment.

GRAPHICAL ABSTRACT



ARTICLE INFO

Article history:
Received 16 March 2020
Received in revised form
15 May 2020
Accepted 16 May 2020
Available online 20 May 2020

Handling Editor: Martine Leermakers

Keywords:
Model compounds
Sequential chemical extraction
Single chemical extraction

ABSTRACT

Problems related to specificity and re-precipitation of metals in sequential chemical extractions can impair their routine use. In order to test the efficiency of a sequential chemical procedure, model compounds composed by soil components commonly found in tropical soils such as goethite, Al-goethite, ferrihydrite, hematite, bauxite, and humic acid were incubated with either $Hg(NO_3)_2$ or $HgSO_4$ and submitted to chemical extraction. The procedure aims to assess: (i) water soluble Hg; (ii) bioaccessible Hg at pH near human stomach; (iii) Hg associated with organic matter; (iv) reduced Hg; (v) Hg associated with Fe, Al, and Mn oxides; and, (vi) residual Hg. This procedure was also tested via single and sequential extractions using the surface and subsurface samples of two tropical soils, i.e., a Rhodic Acrudox and a Typic Hapludox, with and without lime application. Soil samples were submitted to an adsorption experiment with $HgCl_2$ and a high adsorption percentage was observed. The majority of Hg at both single and sequential procedure was extracted by an acetic acid solution (pH = 2). Liming, soil depth, and soil type were not determinative on Hg extractability. The sequential extraction applied showed a lack specificity of Hg fractions, confirmed by the model components.

1. Introduction

Mercury is a toxic element and its toxicity is related to its form in the environment, being its most toxic species the organic ones, such as methylmercury (Du et al., 2014). An important concern regarding Hg contamination is the capability of Hg to be volatilized

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https://doi.org/10.1016/j.chemosphere.2020.127114
0045-6535/