LEMBAR

HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*

KARYA ILMIAH : PROSIDING

Judul Jurnal Ilmiah (Artikel)	: Study of the rate of adsorption of toxic gases in shrimp ponds using Sukabumi natural zeolite	
Nama Penulis	: **Indro Sumantri**, Luqman Buchori, Fiqky Akbar Widya Mukti, Fitra Ramadhani, and Didi Dwi Anggoro	
Jumlah Penulis	: 5 orang	
Status Pengusul	: **Penulis Pertama dan Penulis Korespondensi**	
Identitas Jurnal Ilmiah	: a. Nama Prosiding	: **AIP Conference Proceedings 2019.**
	b. Nomor ISSN	: 0094243X, 15517616
	c. Volume, Nomor, Bulan, Tahun	: 25 September 2019
	d. Penerbit	: AIP Publishing
	e. DOI artikel (jika ada)	: https://doi.org/10.1063/1.5140962
	f. Alamat URL Prosiding	: https://aip.scitation.org/journal/apc
	Alamat URL Artikel	AIP Conference Proceedings **2197**, 120005 (2020)
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Semarang, 25 Januari 2022

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Prof. Dr. Aji Prasetyaningrum, ST, MT
NIP. 19691002 199403 2 003
(Bidang Ilmu/Unit Kerja : Teknik Kimia Universitas Diponegoro)

Reviewer 2

Prof. Dr. Ir. Hargono, MT
NIP. 19561126 198703 1 002
(Bidang Ilmu/Unit Kerja : Teknik Kimia Universitas Diponegoro)

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	b. Nomor ISSN	: 0094243X, 15517616
	c. Volume, Nomor, Bulan, Tahun	: 25 September 2019
	d. Penerbit	: AIP Publishing
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	b. Nomor ISSN	: 0094243X, 15517616
	c. Volume, Nomor, Bulan, Tahun	: 25 September 2019
	d. Penerbit	: AIP Publishing
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AIP Conference Proceedings • Volume 2197 • 2 January 2020 • Article number 120005 • 2nd International Conference on Chemical Process and Product Engineering 2019, ICCPPE 2019 • Semarang • 25 September 2019 through 26 September 2019 • Code 156365

Document type
Conference Paper

Source type
Conference Proceedings

ISSN
0094243X

ISBN
978-073541948-3

DOI
10.1063/1.5140962

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Sumantri, Indro; Buchori, Luqman; Mukti, Fiqky Akbar Widya; Ramadhani, Fitra; Anggoro, Didi Dwi

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Abstract

Shrimp production is hampered by the high level of shrimp susceptibility to death caused by pond water conditions that are not optimal. Zeolite is a very useful mining product and has properties as a molecular filter, absorber and ion exchange. Zeolite Cikembar, Sukabumi Regency is a floating rocky green tuff dominated by SiO_2. The activation process is carried out on Sukabumi zeolites by physical activation by heating. To eliminate the toxic gas NH3, NH_4^+, and NO_2 carried out contact with the adsorption process and analyzed the UV-VIS spectrophotometry. BET SAA analysis showed zeolite surface area of 28,776 m^2/gram. Sukabumi Zeolite at 30 grams absorbs more NH_3, NH_4^+ and NO_2 ions compared to 20 grams and 10 grams. Sukabumi's natural zeolite adsorption rate, k_{ads} (in $hour^{-1}$) for NH_3 gas is 0.0724 (10 grams); 0.0896 (20 grams); 0.0922 (30 grams). Whereas NH_4^+ gas is 0.0648 (10 grams); 0.0901 (20 grams); 0.0955 (30 grams). As for NO_2 gas is 0.0108 (10 grams); 0.0128 (20 grams); 0.0292 (30 grams). © 2020 Author(s).

Author keywords

adsorption; shrimp ponds; sukabumi zeolite; toxic gas

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Volume 2197

Proceedings of 2nd International Conference on Chemical Process and Product Engineering (ICCPPE) 2019

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Location: Semarang, Indonesia
ISBN: 978-0-7354-1948-3
Editors: Luqman Buchori, Aprilina Purbasari and Dessy Ariyanti
Volume number: 2197
Published: Jan 2, 2020

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PRELIMINARY

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SHOW ABSTRACT

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Department of Chemical Engineering, University of Diponegoro Tembalang, Semarang, Indonesia

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Abstract. Shrimp production is hampered by the high level of shrimp susceptibility to death caused by pond water conditions that are not optimal. Zeolite is a very useful mining product and has properties as a molecular filter, absorber and ion exchange. Zeolite Cikembar, Sukabumi Regency is a floating rocky green tuff dominated by SiO_2. The activation process is carried out on Sukabumi zeolites by physical activation by heating. To eliminate the toxic gas NH_3, NH_4^+, and NO_2 carried out contact with the adsorption process and analyzed the UV-VIS spectrophotometry. BET SAA analysis showed zeolite surface area of 28,776 m^2 / gram. Sukabumi Zeolite at 30 grams absorbs more NH_3, NH_4^+ and NO_2 ions compared to 20 grams and 10 grams. Sukabumi's natural zeolite adsorption rate, k_{ads} (in hour-1) for NH_3 gas is 0.0724 (10 grams); 0.0896 (20 grams); 0.0922 (30 grams). Whereas NH_4^+ gas is 0.0648 (10 grams); 0.0901 (20 grams); 0.0955 (30 grams). As for NO2 gas is 0.0108 (10 grams); 0.0128 (20 grams); 0.0292 (30 grams).

Keywords: sukabumi zeolite, shrimp ponds, toxic gas, adsorption

INTRODUCTION

Development of cultivation systems from traditional to intensive with the majority shrimp ponds have potential towards increasing environmental pollution. Less optimal utilization of excessive feed will cause accumulation of organic matter. Decomposition of organic matter requires oxygen in the process, so that the availability of oxygen for the biota in it is reduced. If this happens continuously it will cause death for shrimp and other biota. Pollution materials that are difficult to decompose by microorganisms also cause hoarding and result in damage to the environment which will directly disrupt organisms that live in these environments. Organic pollution materials that function as fertilizers are actually detrimental due to algae blooms and aquatic plantscausing oxygen competition in the waters. The above factors are the cause of the decline in the body's resistance to the attack of the disease because of the poor quality of the environment, if this is left continuously then mass death will occur so that the population will decline [1].

Traditional methods for nitrogen removal from wastewater are denitrification, nitrification, chemical coagulation, adsorption, selective ion exchange, ammonia stripping, electrodialysis, filtration, and reverse osmosis [2, 3, 4, 5]. Removal processes of dissolved nitrogen compounds, can vary. For intensive RAS (Return Activated Sludge), the most common practice involves utilizing nitrifying bacteria to convert ammonia-nitrogen to nitrate-nitrogen [6]. The rate limiting step of this process is the oxidation of ammonia [7]. Incomplete nitrification occurs when a lack of NOB (Nitrite Oxidizing Bacteria) productivity is present, leading to increased concentrations of nitrite. The adsorption process is more widely used in industry because it has several advantages, which are more economical and also does not cause toxic side effects and is able to eliminate organic materials. Adsorption is a process that occurs when molecules from substances liquid or gas accumulates on a solid / liquid surface, forming a thin layer formed from

Proceedings of 2nd International Conference on Chemical Process and Product Engineering (ICCPPE) 2019
AIP Conf. Proc. 2197, 120005-1–120005-8; https://doi.org/10.1063/1.5140962
Published by AIP Publishing. 978-0-7354-1948-3/$30.00

Synthesis of free standing TiO_2 nanostructures (FSTNS) via hydrothermal process for organic photocatalytic degradation

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Abstract. The superiority of TiO_2 nanoparticle for photocatalytic degradation of organic pollutant has been acknowledged in many researches. However, the powder form of TiO_2 face new challenge related to its recovery after photocatalytic process. In this paper the synthesis of free standing TiO_2 nanostructures (FSTNS) via hydrothermal process were reported. The effect of hydrothermal processing time at temperature 180°C to the FSTNS properties were observed. The optimum FSTNS was synthesized at 180°C in 18 hours by using acetone as oxidation agent. The synthesized FSTNS was effectively able to degrade the organic pollutant (Bromothymol blue) via photocatalysis under black light illumination.

INTRODUCTION

Almost 80% of wastewater is simply discharged into the environment without further treatment, including domestic waste and 300-400 cubic tons of industrial waste [1, 2]. In Indonesia, industrial wastewater, domestic wastewater and commercial wastewater are the largest contributors of the total wastewater. According to the Indonesian Agency for the Assessment and Application of Technology (BPPT), domestic and industrial wastewater have a high pollution potential due to the lack of affordable technology to be applied in the wastewater treatment system [3].

Wastewater contains various components such as colloidal particles, pathogenic microorganisms, inorganic pollutants and organic pollutants. Domestic and industrial wastewater both small and medium contain more organic components with a COD value of 7000-10,000 ppm [3]. Organic components include dyes, pesticides, fertilizers, hydrocarbons, phenols, plasticizers, biphenyl, detergents, oils, fats, pharmaceutical ingredients, proteins and polysaccharides [4-6].

At present, organic wastewater treatment still relies on biological methods such as aerobic and anaerobic processes. This process can degrade organic pollutants, but the time required is very long and this process is very vulnerable to environmental changes [5, 6]. Advanced oxidation processes (AOPs) are relatively new destructive technologies and can be used as an alternative for wastewater treatment processes that contained organic components. The basic principle of this process is the formation of hydroxyl radicals (• OH) which can degrade organic pollutants to form minerals. One of the technologies categorized as AOP is photocatalysis with semiconductor material TiO_2. In photocatalytic oxidation process UV / TiO_2 hydroxyl radicals (• OH) are generated by the illumination of ultraviolet light into the surface of TiO_2 [7, 8]. TiO_2 has high photoreactive properties and chemical stability compared to other materials [9].

Proceedings of 2nd International Conference on Chemical Process and Product Engineering (ICCPPE) 2019
AIP Conf. Proc. 2197, 050003-1–050003-5; https://doi.org/10.1063/1.5140915
Published by AIP Publishing. 978-0-7354-1948-3/$30.00

Computation and Numerical Modeling of Fuel Concentration Distribution and Current Density on Performance of The Microfluidic Fuel Cell

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Abstract. This study numerically investigates current density and fuel concentration on the performance of microfluidic fuel cells that breathe air as an oxidant. The microfluidic fuel cells having a microchannel width of 1.0 mm and 50 μm in-depth with an electrode spacing of 0.3 mm. The concentration formic acid of 0.3 M, 0.5 M, and 1.0 M mixed with 0.5 M sulfuric acid (supporting electrolyte) in aqueous solution was used as fuel and another inlet a stream of 0.5 M sulfuric acid as an electrolyte which were varied at an inlet flow rate of 0.3, 0.5, and 0.7 mL/min. First, a three-dimensional microfluidic fuel cell model was established using COMSOL Multiphysics 5.1 to simulate the fuel cell performance. Subsequently, both V-I curves obtained from simulation and published experimental data under similar operating condition were compared to assure the validity of the simulation. The transport phenomena in the microfluidic fuel cells were formulated with continuity equation, momentum equation, species transport equation, and charge equation. The porous media flow in the gas diffusion layer was described by Brinkman equation. The Butler-Volmer equations were applied to get the V-I curves. The maximum power density of the fuel cell at 0.7 mL/min fed with 0.3 M, 0.5 M, and 1.0 M formic acid for the measured was approximately 27 mW/cm^2, 30 mW/cm^2, and 36 mW/cm^2, respectively, while for the simulation was approximately 21.64, 29.82, and 36.57 mW/cm^2, respectively.

Keywords: air-breathing; microfluidic, fuel cells; formic acid; fuel utilization

INTRODUCTION

The development of novel miniaturized fuel cell based on MEMS (micro electro mechanical systems) are considered as promising candidate of alternative power sources for future generation due to its potentially wide range applications in portable devices [1-5], such as cell phones, laptop, clinical diagnostics, small stationary power etc. Microfluidic cells have some significant intrinsic advantages than conventional Li-battery [6-8], i.e. fuel cell ability to continuously generate power as long as both fuel and oxidant are supplied into the cell, higher energy density, longer lifetimes without replaced and recharged periodically, more reliable related in diverse power input, no emissions and no pollutions, and no interrupts if integrated into the system. Power sources are corresponding for fuel cell applications is batteries in which the use of a longer operating time without needed frequent recharging power.

Proceedings of 2nd International Conference on Chemical Process and Product Engineering (ICCPPE) 2019
AIP Conf. Proc. 2197, 090001-1–090001-21; https://doi.org/10.1063/1.5140949
Published by AIP Publishing. 978-0-7354-1948-3/$30.00

Green Technology in Treating Aquaculture Wastewater

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Abstract. Aquaculture contributes a large number of world food supplies which increases rapidly over these few years. Similarly, there is a huge development of aquaculture in Malaysia over the years. However, aquaculture activities generate wastewater with high in nutrients where developing a proper treatment system is crucial. An appropriate wastewater treatment is needed to reduce uncontrolled pollution and environmental impacts while sustaining the development of aquaculture industry. Hence, this study focuses on the implementation of green technology method namely physical and biological in treating aquaculture wastewater. Major effect of releasing wastewater that is rich in nutrients is mainly eutrophication. This problem could be mitigated utilizing microalgae whereby the nutrients used as feed for microalgae growth. However, excess nutrients will cause undesirable consequences such as algal blooms due to the rapid growth of microalgae. Therefore, harvesting microalgae after treating the wastewater helps in the prevention of this problem. Current microalgae harvesting technology depends on sophisticated and complex approaches such as hollow fiber filtration, chemical flocculants and centrifugation, which are deemed feasible if high value products were obtained. The potentiality of *Moringa oleifera*, filamentous fungus (*Aspergillus niger*), microalgae (*Ankistrodesmus* sp.), Biofloc Technology (BFT) and chitosan as bio-flocculant were investigated in harvesting microalgae, *Chlorella* sp.. This type of development in phytoremediation and phycoremediation with continuous bio-harvesting could promote the use of sustainable green technology for effective aquaculture wastewater treatment.

AQUACULTURE

Aquaculture is known as the growing of aquatic animal and plant. It ranges from cultivation of fish in simple naturally occurring pond in rural areas to a complex intensive culture of commercial fish in fiberglass tanks. Aquaculture globally has undergone a rapid growth from a production of less than a million tons in the early 1950s to over than 50 million tons in the present. World aquaculture production is growing about 8 to 14% annually as compared to 1.5% for capture fisheries [1]. Besides, aquaculture in Malaysia has developed tremendously from a small-scale family pond to a large commercial scale. However, about 90% of the contribution came from capture fisheries sector and only 10% is produced from aquaculture [1]. Malaysia normally exports most of its high value fish to foreign market includes United States, Singapore, Japan, Italy and China. The main commodities produced include shrimp, high grade fish and mollusk. The most commonly practiced aquaculture system is aquaculture pond, cage aquaculture, raceway aquaculture system and recirculating aquaculture system. On top of that, the combination of hydroponic vegetable production and fish aquaculture production which is known as aquaponic is also gained popularity in Malaysia.

Proceedings of 2nd International Conference on Chemical Process and Product Engineering (ICCPPE) 2019
AIP Conf. Proc. 2197, 020001-1–020001-16; https://doi.org/10.1063/1.5140892
Published by AIP Publishing. 978-0-7354-1948-3/$30.00