LEMBAR

HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*

KARYA ILMIAH : PROSIDING

Judul Jurnal Ilmiah (Artikel)	: Biogas Production of Tomato Sauce Wastewater by Batch Anaerobic Digestion	
Nama Penulis	: Amin Nugroho, and **Indro Sumantri**	
Jumlah Penulis	: 2 orang	
Status Pengusul	: **Penulis Kedua dan Penulis Korespondensi**	
Identitas Jurnal Ilmiah	: a. Nama Prosiding	: **AIP Conference Proceedings 2197.**
	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/10.1063/1.5140902
	f. Alamat URL Prosiding	: https://aip.scitation.org/journal/apc
	Alamat URL Artikel	AIP Conference Proceedings **2197**, 030010 (2020)
	g. Terindek	: SCOPUS (SJR : 0,19)

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Semarang, 27 Januari 2022

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Prof. Dr. Didi Dwi Anggoro, ST, M Eng.
NIP. 19671114 199303 1 001
Bidang Ilmu/Unit Kerja : Teknik Kimia Universitas Diponegoro)

Reviewer 2

Prof. Nita Aryanti, ST, MT, Ph D.
NIP 19750117 200003 2 001
(Bidang Ilmu/Unit Kerja : Teknik Kimia Universitas Diponegoro)

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c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	9			8,0
d. Kelengkapan unsur dan terbitan/jurnal (30%)	9			8,0
Total = (100%)	**30**			**27,5**
Nilai Pengusul	**0,5 x 27,5 = 13,75**			

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Semarang,
Reviewer I

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NIP. 19671114 199303 1 001
Unit Kerja : Fak. Teknik Universitas Diponegoro
Bidang Ilmu : Teknik Kimia

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c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	9		8,0
d. Kelengkapan unsur dan terbitan/jurnal (30%)	9		8,5
Total = (100%)	**30**		**28,0**
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AIP Conference Proceedings • Volume 2197 • 2 January 2020 • Article number 030010 • 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
10.1063/1.5140902

Biogas production of tomato sauce wastewater by batch anaerobic digestion

Nugroho, Amin; Sumantri, Indro

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[a] Department of Chemical Engineering, Faculty of Engineering, Diponegoro University, Indonesia

Abstract

The wastewater of tomato sauce production is a degradable and contains high organic compounds. Treatment for high content organic compounds is effectively treated through anaerobic treatment. High organic content is also a potential to produce biogas. The ultimate point of this research is to evaluate the influence of mass of activated sludge and the concentration of organic compounds (COD) to the production of biogas. The research is conducted in batch process in 2 L reactor, MLSS concentration was 12,000 mg/L, room temperature, atmospheric pressure, and pH of 7-7.5. Research variables were the volume of active sludge (40%-80% of the reactor), the concentration of synthetic wastewater (5,000 - 17,000 mg/L) and the response was the volume of biogas. The obtained result indicated that the highest biogas production achieved when volume of activated sludge applied of 80%, the higher the activated sludge the higher the content of microbes, hence it was also required high organic compound. While the effect of COD's wastewater concentration on biogas production, the higher the COD concentration will significantly increase the biogas production. © 2020 Author(s).

Author keywords

activated sludge; anaerobic; and biogas; organic compound; tomato sauce

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Location: Semarang, Indonesia
ISBN: 978-0-7354-1948-3
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Volume number: 2197
Published: Jan 2, 2020

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Experimental investigation of phycocyanin microencapsulation using maltodextrin as

Biogas Production of Tomato Sauce Wastewater by Batch Anaerobic Digestion

Amin Nugroho and Indro Sumantri[a)]

Department of Chemical Engineering, Faculty of Engineering, Diponegoro University, Indonesia

[a)]Corresponding author: indrotekim@yahoo.com

Abstract. The wastewater of tomato sauce production is a degradable and contains high organic compounds. Treatment for high content organic compounds is effectively treated through anaerobic treatment. High organic content is also a potential to produce biogas. The ultimate point of this research is to evaluate the influence of mass of activated sludge and the concentration of organic compounds (COD) to the production of biogas. The research is conducted in batch process in 2 L reactor, MLSS concentration was 12,000 mg/L, room temperature, atmospheric pressure, and pH of 7-7.5. Research variables were the volume of active sludge (40%-80% of the reactor), the concentration of synthetic wastewater (5,000 – 17,000 mg/L) and the response was the volume of biogas. The obtained result indicated that the highest biogas production achieved when volume of activated sludge applied of 80%, the higher the activated sludge the higher the content of microbes, hence it was also required high organic compound. While the effect of COD's wastewater concentration on biogas production, the higher the COD concentration will significantly increase the biogas production.

Keywords: tomato sauce, anaerobic, activated sludge, organic compound, and biogas.

INTRODUCTION

Wastewater of tomato sauce industries is produced during the production process. The characteristics of wastewater tomato sauce contains high COD concentration (> 16,000 mg/L) [1], suspended solids, dissolved organic compounds, microorganisms and inorganic salts. When, there is no treatment, high organic content will absorb oxygen in the aquatic and deteriorate the aquatic environment [2] and this wastewater is classified as food waste with high degradable compound [3,4,5]. In a world with depleting energy due to the limited resources, the amount of food waste generated from this industries everyday requires to move towards sustainable development. This wastewater, rich in organic acids, constitutes an ideal source for bioenergy recovery [6].

Anaerobic digestion, a biological process to convert of organic matter into methane, carbon dioxide, inorganic nutrients and humus-like matter, is the most promising method for FW treatment [7]. Compared to the aerobic method, the use of anaerobic processes for treatment of wastewater provides greater economic and environmental benefits and advantages [8]. Anaerobic digestion technology is a famous method for waste utilization. This tend to develop the various configurations of the reactor type have been developed thus far. The most simple and prominent reactor design is the single stage process and it has been widely used in various applications. However, its disadvantage of low efficiency has been highlighted [9].

In recent research of anaerobic digestion systems, organic matter/compound is converted into biogas, a mixture of gaseous compounds, mainly methane (CH_4) and carbon dioxide (CO_2), through acid fermentation and volatile fatty acids (VFAs) degradation, and through the activity of two groups of microorganisms: acid and methane-forming bacterial biomass [10]. In a reactor single system or one-stage anaerobic digestion, two type of microorganisms are kept together in a balance situation, which is delicate, due to both groups differ in terms of physiology widely, nutritional requirements, growth kinetics, and sensitivity towards environmental conditions [11].

Proceedings of 2nd International Conference on Chemical Process and Product Engineering (ICCPPE) 2019
AIP Conf. Proc. 2197, 030010-1–030010-6; https://doi.org/10.1063/1.5140902
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

Dessy Ariyanti[1, a)], Aprilina Purbasari[1, b)], Marissa Widiyanti[1, c)] and Wei Gao[2, d)]

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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