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

Judul Karya Ilmiah (Artikel)	:	Inhibitory Effect of Sodium Benzoate as Preservative Material in the Biogas Production in a Batch Anaerobic Digestion Process		
Nama Penulis	:	Indro Sumantri, **Luqman Buchori,** Didi Dwi Anggoro		
Jumlah Penulis	:	3 orang		
Status Pengusul	:	**Penulis Kedua**		
Identitas Jurnal Ilmiah	:	a. Nama Jurnal	:	Journal of Ecological Engineering
		b. Nomor ISSN	:	2299-8993
		c. Volume, nomor, bulan, tahun	:	Volume 21, No. 8, August 2020, pp. 120-128
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		e. DOI artikel (jika ada)	:	https://doi.org/10.12911/22998993/127005
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		g. Terindeks	:	SCOPUS (Q3), SJR (2019) = 0,31

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Prof. Dr. Ir. Abdullah, MS
NIP. 195512311983031014
(Bidang Ilmu/Unit kerja : Teknik Kimia/Universitas Diponegoro)

Reviewer 1

Prof. Dr. Ir. Bakti Jos, DEA
NIP. 196005011986031003
(Bidang Ilmu/Unit kerja : Teknik Kimia/Universitas Diponegoro)

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2. **Ruang lingkup dan kedalaman pembahasan:** Artikel ini berisi tentang pengaruh sodium benzoate sebagai bahan pengawet pada produksi biogas. Proses dilakukan di dalam reactor batch. Isi artikel masih di dalam ruang lingkup jurnal. Hasil penelitian disajikan dengan baik dan dibahas cukup mendalam. Pembahasan melibatkan 15 pustaka yang relevan dan mutakhir.
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Semarang,
Reviewer 1

Prof. Dr. Ir. Bakti Jos, DEA
NIP. 196005011986031003
(Bidang Ilmu/Unit kerja : Teknik Kimia/Universitas Diponegoro)

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d. Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	12			11,0
Total = 100%	**40**			**36,9**
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2. **Ruang lingkup dan kedalaman pembahasan:** Artikel berisi pengaruh sodium benzoate sebagai bahan pengawet pada produksi biogas di dalam reactor batch anaerobik. Pembahasan yang dilakukan cukup dalam. Terdapat 32 referensi, 15 diantaranya untuk pembahasan hasil.
3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:** Data pendukung cukup banyak begitu juga acuannya banyak dan mutakhir. Jumlah Pustaka ada 32 dan tiga belas citasi (13) diantaranya yang digunakan adalah baru (5 tahun terakhir). Hasil Turnitin artikel ini cukup rendah sebesar 8%. Artikel ini bebas dari plagiarisme.
4. **Kelengkapan unsur dan kualitas terbitan:** Artikel ini diterbitkan oleh penerbit Polish Society of Ecological Engineering (PTIE). Kualitas penerbit bagus dan masuk katagori Q3. Merupakan jurnal ilmiah internasional bereputasi yang sudah terindeks Scopus dan memiliki faktor dampak (SJR=0,31; 2020). Editorial board dari jurnal ini cukup banyak dan terdiri dari beberapa negara diantaranya Portugal, Ukraina, Italia, Yordania, Turki, China, Polandia, Spanyol, Malaysia, USA. Dalam satu terbitan, terdapat penulis lebih dari 5 negara.

Semarang,
Reviewer 2

Prof. Dr. Ir. Abdullah, MS
NIP. 195512311983031014
(Bidang Ilmu/Unit kerja : Teknik Kimia/Universitas Diponegoro)

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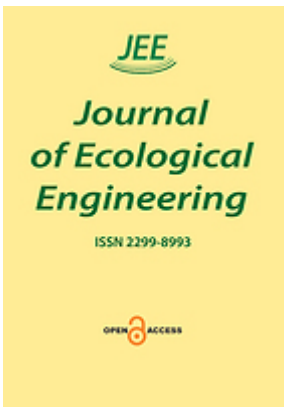

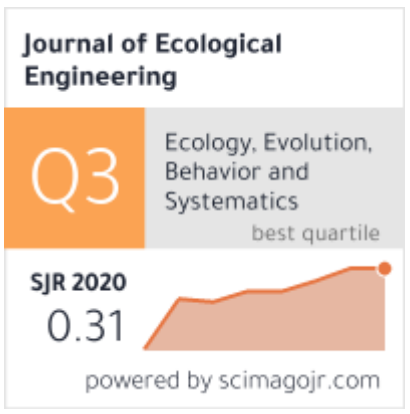

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Inhibitory Effect of Sodium Benzoate as Preservative Material in the Biogas Production in a Batch Anaerobic Digestion Process

Indro Sumantri[1*], Luqman Buchori[1], Didi Dwi Anggoro[1]

[1] Department of Chemical Engineering, Faculty of Engineering, Universitas Diponegoro, Semarang, Indonesia
* Corresponding author's e-mail: indrotekim@yahoo.com

ABSTRACT
Sodium benzoate has been used a food preservative worldwide. The effect of sodium benzoate as a preservative in the wastewater treatment was examined from the biogas formation viewpoint. The research was conducted in batch mode reactor systems employing various ratios of activated sludge and solution of sodium benzoate volume. The MLSS of activated sludge used was 12 g/L, while the volume ratios of activated sludge and sodium benzoate ranged from 0 to 100%. The concentrations of sodium benzoate used were 50, 100, and 200 mg/L. The biogas samples were measured every two days for 60 days. The results showed that the volume ratio of activated sludge and sodium benzoate of 60% and 40% was a turning point where the existence of sodium benzoate influenced the formation of biogas. There were significant reductions of biogas formation from 200.6 mL to 66.6 mL, 159.8 mL to 66.0 mL and 130.2 mL to 54.0 mL for the initial SB concentrations of 50, 100, and 200 mg/L. The kinetic parameters of the Modified Gompertz equation exhibited the greatest degree of confidence equal to 95%.

Keywords: sodium benzoate, anaerobic, biogas, batch, Gompertz equation.

INTRODUCTION

Fresh product consumption has been increased in order to meet the consumer's demand of the healthy food. Unfortunately, the freshness and safety of fresh food product is strongly influenced by their microbial sensitivity to pathogenic bacteria (Chen et al., 2019). The effort to prevent food from deterioration can be conducted through several technologies, one of the ways is by the addition of food preservatives. The objective of the introduction of preservative substances is not only to eliminate the microbial activities to damage the food nutrients, but also to extend the life period of the food (Arias et al., 2019). Basically, the preservative agents inhibit the yeast and mold growth. The most commonly applied preservative agents in the food products are benzoic and sorbic acids and their salts of sodium, potassium and calcium (Piper and Piper, 2017). These preservatives are effective against the growth of a wide range of bacteria (Tfouni and Toledo, 2002a). Beside these substances, another group applied as a preservative agent of food product and also pharmaceuticals are parabens. Parabens are substances of *p*-hydroxybenzoic acid, with alkyl substituents ranging from methyl to pentyl or benzyl groups. The application of parabens as a preservative is popular because they are effective in inhibiting the activity of a wide broad spectrum of yeasts, molds and bacteria, chemical stability, having low production cost and no perceptible odor or taste (Błędzka et al., 2014). However, a disadvantage of using these chemical substances as preservative has been reported, at low doses. Benzoates trigger allergic reaction in some groups of humans (Jacob et al., 2016). Due to these disadvantages, the amount of benzoates and sorbates addition salts as simple preservatives which consumed by world population must be considered to prevent the adverse effects (Piper and Piper, 2017).

Sodium benzoate (SB) is widely used in food products, especially as complement food/seasoning such as: chili sauce, ketchup, tomato sauce, carbonated drinks, etc. (Sumantri et al., 2015)

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Effect of Surfactant Properties on the Performance of Forward Osmosis Membrane Process

Kaiwit Ruengruehan[1], Seoktae Kang[2], Nirawan Sanphoti[3], Sutha Khaodhiar[1*]

[1] Department of Environmental Engineering, Faculty of Engineering, Chulalongkorn University Phayathai Rd., Wangmai Pratumwan, Bangkok 10330, Thailand

[2] Department of Civil and Environmental Engineering, KAIST, Daejeon, 34141, Republic of Korea

[3] Department of Community Health Faculty of Public Health, Kasetsart University, Chalermphrakiat Sakon Nakhon Province Campus, Thailand

* Corresponding author's e-mail: sutha.k@chula.ac.th

ABSTRACT

Wastewater treatments such as forward osmosis (FO) can be widely applied to separate or the reject substances from secondary treated effluents. Experimental studies have investigated the influence of membrane fouling and operating conditions. The performance of FO is affected by membrane fouling characteristics, composition of the feed solution and operating conditions. The experiments were performed using an osmotic membrane (FO-4040) to investigate the influences of operating conditions on water flux and reverse salt selectivity. The surfactant content, cross-flow velocity, and pH of the feed solution were systematically investigated for their effects on FO performance. The results showed that higher cross-flow velocities, increase of the pH of the feed solution, and adding surfactant into the feed solution yielded higher water fluxes. Reverse salt selectivity also increased after adding a surfactant to the feed solution but showed no significant increase at higher surfactant concentrations.

Keywords: omotically-membrane process; anionic surfactant; nonionic surfactant

INTRODUCTION

Forward osmotic (FO) membrane processes utilize the differences in solution concentration to generate an osmotic pressure gradient as the driving force. Diffusion in water molecules continually occurs across a semipermeable membrane from a less concentrated feed solution to a highly concentrated draw solution (She et al., 2012). The semipermeable membrane allows the water molecules and a small amount of salt to pass through, while most solute molecules and particulates are rejected (Mi et al., 2008). The advantages of the forward osmosis membrane process are that it can be used at low or zero hydraulic pressure, with high rejection in a wide range of pollutants. Forward osmosis can also be widely applied in many fields, such as water treatment, wastewater treatment, water reuse, brackish groundwater and seawater desalination (Mi et al., 2008; Cath et al., 2006; Yuan et al., 2010). As with other separation processes, many factors hinder the performance of forward osmosis, including solution properties, membrane properties, concentration polarization, and especially membrane fouling (Cath et al., 2006; Klaysom et al., 2013). Municipal wastewater contains a variety of organic and inorganic substances, and particulates from domestic sources include some toxic elements (Lutchmiah et al., 2014). Several studies found that the accumulation and interactions between the properties of the membrane and the properties of the foulant are the main causes of flux decline (Lee et al., 2005). Membrane fouling occurs due to the accumulation of colloidal particles on the osmotic membrane that generate cake enhanced osmotic pressure (CEOP) close to the membrane surface, resulting in flux decline in the forward osmosis process (Boo et al.,2012; Zhao et al., 2012; Valladares et al., 2011).

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Estimation of Potential of Agriculture Biogas Production in the Biała Podlaska County (Poland)

Alina Kowalczyk-Juśko[1], Klaudia Mazur[2], Michał Maciąg[2], Patrycja Pochwatka[1], Agnieszka Listosz[1], Andrzej Mazur[1]

[1] University of Life Sciences in Lublin, Department of Environmental Engineering and Geodesy, Leszczyńskiego 7, 20-069 Lublin, Poland

[2] University of Agriculture in Krakow, Faculty of Environmental Engineering and Land Surveying, Mickiewicza 24/28, 30-059 Kraków, Poland

* Corresponding author's e-mail: amazur70@op.pl

ABSTRACT

By analyzing the resources of the economic infrastructure (distilleries, diaries, fruit and vegetable processing and meat processing factories) of the Biała Podlaska County, the possibilities of the biomass obtaining and creating the biogas plants basing on the agri-food industry waste were estimated. The stocking of animals was the basis for the assessment of manure and slurry resources that can be subjected to the methane fermentation process. On the basis of the data concerning the surface of the wastelands, located on the Biała Podlaska County territory, the possibilities of the biomass from special crops were specified. In the Biała Podlaska County, it was established that there are possibilities for obtaining the biomass for the biogas production: from livestock production (1 475 272 GJ/year), maize cropping in marginal lands (172 875 GJ/year) and wastes and by-products from food industry (51 081 GJ/year). The estimated potential of biogas allows for the construction of several agricultural biogas plants with a capacity of 1 MW_e each, often built in Poland. The usage of the identified resources enabling the improvement of the energetic safety and also can contribute to the sustainable development of rural areas and agriculture.

Keywords: renewable energy sources, biogas, biogas plant, substrates

INTRODUCTION

The development of civilization, the increase in energy demand, with the simultaneous decrease in fossil energy resources force the search for alternative solutions in the form of renewable energy sources (RES) [Czekała et al., 2018].

The importance of renewable energy sources for the energy security of regions and the country is continuously growing, and their additional advantage is the improvement of the energy supply to the areas with poor energy infrastructure [Bigili et al., 2017]. The use of renewable energy sources has social, economic, and environmental effects, most of which are beneficial, provided that eco-energy systems are planned and used rationally [Ramos-Suárez, 2019; Safieddin Ardebili, 2020].

Energy planning on a commune, county or voivodship level is an essential element of the development of this sector, because the wrong location of the investment may arouse social protests, generate high costs – primarily related to the transport of raw materials, and also cause the emissions (noise, pollution, exhaust fumes), which will affect the deterioration of the quality of the environment [Piwowar et al., 2016].

In Poland, the use of biomass for the production of electricity and heat has the largest share in the matrix of RES [Dach et al., 2014]. Biomass can be used in thermochemical processes (combustion, gasification, pyrolysis) or biochemical processes, such as anaerobic fermentation, during which biogas is produced [Nunes et al., 2020]. Biogas is a mixture of gases, commonly forming in the environment, arising in the anaerobic