LEMBAR

HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*

KARYA ILMIAH : JURNAL ILMIAH*

Judul Jurnal Ilmiah (Artikel)	: Indonesia's Natural Zeolite as an Adsorbent for Toxic Gases in Shrimp Ponds	
Nama Penulis	: Didi Dwi Anggoro, **Indro Sumantri,** Luqman Buchori.	
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	: Vol. 22, Issue 6, Juni 2021
	d. Penerbit	: Polskie Towarzystwo Inzynierii Ekologicznej
	e. DOI artikel (jika ada)	: https://doi.org/10.12911/22998993/137921
	f. Alamat web Jurnal	: http://www.jeeng.net/Issue-6-2021,8481
	g. Terindeks di Scimagojr/Web of Science (**Q2**)	

Kategori Publikasi Jurnal Ilmiah : (beri ✓pada kategori yang tepat)	√	Jurnal Ilmiah Internasional / Internasional bereputasi
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c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	11	11	11,0
d. Kelengkapan unsur dan terbitan/jurnal (30%)	11	11	11,0
Total = (100%)	**36,5**	35,5	**36,0**
Nilai Pengusul = (0,4 x 36,0)/2 = 7,2			

Semarang, 18 Januari 2022

Reviewer 1

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

Reviewer 2

Prof. Dr. Ing. Suherman, ST, MT
NIP. 19760804 200012 1 002
(Bidang Ilmu/Unit Kerja : Teknik Kimia Universitas Diponegoro)

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Bidang Ilmu : Teknik Kimia

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b. **Ruang lingkup dan kedalaman pembahasan artikel (30%)**
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Indonesia's Natural Zeolite as an Adsorbent for Toxic Gases in Shrimp Ponds

Anggoro, Didi Dwi; Sumantri, Indro; Buchori, Luqman

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[a] Chemical Engineering Department, Universitas Diponegoro, Semarang, 50275, Indonesia

Abstract

The objective of this research was to produce safe water for shrimp by using zeolite as adsorbent to absorb unwanted substances ($NH_3$and H_2S). In particular, this study also aimed to design the shrimp pond water treatment equipment, effect of flow rate on zeolite ability to absorb toxic gases ($NH_3$and H_2S), and rate of absorption (K) and reaction (k). The adsorbent is zeolite which has adsorption properties, high surface area and pores suitable for water (3Å). Then, the concentration of ammonia, hydrogen sulfide was analyzed using Ammonia Test Kit and Hydrogen Sulphide of Hach Hydrogen Sulfide Test Kit. The materials used in this study were zeolite of Malang (East Java, Indonesia) and shrimp pond water. The best result of $NH_3$and H_2S adsorption obtained at a flow rate of 3 L·min^{-1}. The best adsorption constant value (K) achieved by a flow rate of 3 L·min^{-1}. On the basis of the best value of R^2, $NH_3$and H_2S adsorption, it can be classified in the first-order kinetic model with $R^2$of 0.9763 and a k value of 0.0007 hours^{-1}with a flow rate of 6 L·min^{-1}. From the data above, it can be calculated that the adsorbent needed in the adsorption of $NH_3$and H_2S in a scale shrimp pond requires 18 kg of Malang zeolite with a column height of 3.62 m of adsorbent, a diameter of 2.07 m, and a column volume of 12.21 m^3.

Author keywords

adsorption; ammonia; hydrogen sulphide; shrimp pond water; zeolite

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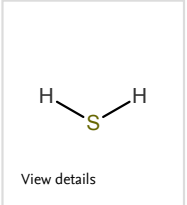

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Didi Dwi Anggoro, Indro Sumantri, Luqman Buchori

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Indonesia's Natural Zeolite as an Adsorbent for Toxic Gases in Shrimp Ponds

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ABSTRACT

The objective of this research was to produce safe water for shrimp by using zeolite as adsorbent to absorb unwanted substances (NH_3 and H_2S). In particular, this study also aimed to design the shrimp pond water treatment equipment, effect of flow rate on zeolite ability to absorb toxic gases (NH_3 and H_2S), and rate of absorption (K) and reaction (k). The adsorbent is zeolite which has adsorption properties, high surface area and pores suitable for water (3Å). Then, the concentration of ammonia, hydrogen sulfide was analyzed using Ammonia Test Kit and Hydrogen Sulphide of Hach Hydrogen Sulfide Test Kit. The materials used in this study were zeolite of Malang (East Java, Indonesia) and shrimp pond water. The best result of NH_3 and H_2S adsorption obtained at a flow rate of 3 L·min^{-1}. The best adsorption constant value (K) achieved by a flow rate of 3 L·min^{-1}. On the basis of the best value of R^2, NH_3 and H_2S adsorption, it can be classified in the first-order kinetic model with R^2 of 0.9763 and a k value of 0.0007 hours^{-1} with a flow rate of 6 L·min^{-1}. From the data above, it can be calculated that the adsorbent needed in the adsorption of NH_3 and H_2S in a scale shrimp pond requires 18 kg of Malang zeolite with a column height of 3.62 m of adsorbent, a diameter of 2.07 m, and a column volume of 12.21 m^3.

Keywords : shrimp pond water, adsorption, zeolite, ammonia, hydrogen sulphide

INTRODUCTION

Water is a major component in shrimp farming activities. Water will tend to decrease in quality as the water usage continues, while the quality of water used must be maintained (Ariadi et al., 2019). The problems appeared with the limitations of fresh water. The issues connected with water that must be addressed include turbidity, lack of dissolved oxygen, the presence of ammonia (NH_3) and others (Rahman et al., 2015). Failure of harvesting shrimp often experienced by shrimp farmers is one indication of the degradation of land quality and water supporting cultivation efforts, failure occurs as a result of neglect of the carrying capacity or ability of the pond as a medium of cultivation activities (Susetyaningsih et al., 2020).

The shrimp farming technology in general requires a good environment and can meet the physical, chemical, and biological requirements of cultivated commodities. The intensive shrimp cultivation with a high amount of feed has an impact on the increasing cultivation waste derived from leftover feed, feces and shrimp metabolites and when thrown out, it will pollute the environment, including the surrounding cultivation environment. In order to reduce intensive shrimp cultivation waste, technology is needed that can effectively reduce or degrade the remaining feed so that toxic compounds, especially organic materials and some compounds, such as ammonia (NH_3), Nitrite (NO_2) and Hydrogen Sulfide (H_2S), can interfere with the quality of pond water if excessive (Koyama et al., 2020; Farizky et al., 2020). These compounds can be decomposed using zeolite (Aly et al., 2016; Anggoro et al., 2019; Sumantri et al., 2020).

Zeolite is a group of minerals of various chemical compositions with different structures in which zeolites are characterized by porous structures. Zeolite has a special shape that

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Air Quality Assessment and Forecasting Using Neural Network Model

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ABSTRACT

Air pollution is a major obstacle faced by all countries which impacts the environment, public health, socioeconomics, and agriculture. In this study, the air pollutants in the city of Amman were presented and analyzed. Nonlinear Autoregressive Exogenous (NARX) model was used to forecast the daily average levels of pollutants in Amman, Jordan. The model was built using the MATLAB software. The model utilized a Marquardt–Levenberg learning algorithm. Its performance was presented using different indices, R^2 (Coefficient of Determination), R (Coefficient of Correlation), NMSE (Normalized Mean Square Error), and Plots representing network predictions vs original data. Historical measurements of air pollutants were obtained from 4 of the Ministry of Environment (MoEnv) air quality monitoring stations in Amman. The meteorological data representing three years (2015, 2016, and 2017) were used as predictors to train the Artificial Neural Network (ANN) while the data of the year 2018 were used to test it. The results showed good performance when forecasting SO_2, O_3, CO, and NO_2, and acceptable performance when forecasting Particulate Matter (PM10) at the given 4 locations.

Keywords: air pollutants, ANN, MATLAB, forecasting

INTRODUCTION

The industrial revolution was introduced in the mid of 19th century and brought along with it the age-of-smoke (Mosely, 2014) by presenting new sources of air pollution. The development of steam engine contributed massively in this revolution. Development of transportation, cultural behaviors of consumers, improved living standards, and working conditions were changed with noticeably rapid increment. Human beings emitted greater amount of carbon dioxide to the atmosphere in the past 150 years than they did for hundreds of thousands of years (Nunez, 2019). In 1952, the smog in London claimed 8000 peoples' lives (Renewable Resources Co, 2016). This event was caused by periods of cold weather along dense layers of airborne pollutants, mostly from coal plants in the city, an episode known by the name "Great Smog" (Mosely, 2014). According to the World Health Organization (WHO) report on ambient air pollution and health impacts, in 2016 bad outdoor air caused almost 4.2 million premature deaths globally. In the US, over 40% of the population are at risk of premature death in addition to the associated risks due to increased air pollution. Countries around the world are being more aware towards the adverse impacts of pollutions and gas emissions. For example, in 1990 the US Congress passed the Pollution Prevention Act (PPA) to reduce the amount of toxins released into the environment (Burnett, 1998). In 1992, an international convention, the United Nations Framework Convention on Climate Change (UNFCCC) or "Earth Summit" that aims mainly to accomplish stabilization of greenhouse gases (GHG) levels in the atmosphere at a concentration level that would avoid hazardous interactions with the environment. The Paris Agreement and the Kyoto Protocol are equally famous treaties towards the act of pollution prevention, as they are extensions to the Earth Summit (Ramakrishna, 2000).

Literature survey demonstrates that there are several approaches to forecast the air quality,

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Determination of Groundwater Vulnerability Using the DRASTIC Method in Ouargla Shallow Aquifer (Algerian Sahara)

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ABSTRACT

Groundwater is the main source for many uses around the city of Ouargla. In this study, the DRASTIC method was used to assess the vulnerability of the groundwater aquifer. Seven hydrogeological parameters of the model (D water depth, R efficient charging, A aquifer type, S soil type, T topography, I unsaturated zone and C hydraulic conductivity) were measured and mapped. The intrinsic vulnerability map of the shallow aquifer, using the DRASTIC method, shows a high to very high vulnerability to pollution; 91.6% of the study area has high vulnerability, 8.4% of it has very high vulnerability. The comparison of the DRASTIC maps with the land use map illustrates that the agglomerations and irrigated areas are the most vulnerable areas to pollution, due to the low depth of the aquifer and the infiltration of significant domestic and irrigation wastewater. The results show that the relationship coefficient between the DRASTIC index and nitrate concentration is R = 0.73. This indicates that the groundwater vulnerability mapping by using the DRASTIC method can be applied for sensible groundwater resources management and land-use planning in the study area.

Keywords: Ouargla, shallow aquifer, vulnerability, DRASTIC, land-use.

INTRODUCTION

The region of Ouargla has long suffered from the shallow aquifer water upwelling phenomena. This increase is largely due to the overexploitation of deep aquifers to meet the needs of irrigation and drinking water supply, and the direct discharge into the shallow aquifer of wastewater without treatment. In addition, natural constraints, such as the almost flat topography and the absence of an effective natural outlet, have accentuated the phenomenon of upwelling.

In the investigated area, numerous sources of groundwater contamination have been identified (Zeddouri, 2008; Bouselsal, 2017), such as the infiltration of domestic wastewater under the settlements and the excessive use of fertilizers in the agricultural areas. These multiple pollutants alter the quality of groundwater, if conditions are favorable. This paper presents a pollution vulnerability assessment using the DRASTIC approach. The aim was to create an effective model for the sustainable management and protection of groundwater resources in the study area.

PRESENTATION OF THE STUDY AREA

The Ouargla basin is located in a depression of Oued Miya (Algerian Sahara), delimited