International Journal of Innovation, Creativity and Change. www.ijicc.net
Special Edition: Safe Communities, 2020

The Decrease in BOD and COD in the Liquid Waste Industry Using Rapid Sand Filtration

Bambang Murwanto[a], Ferizal Masra[b], Daria Ginting[c], [a,b,c]Department of Environmental Health**,** Poltekkes Kemenkes Tanjung Karang, Sumatera, Indonesia, Email: [a]bam9murwanto@gmail.com

The tofu making industry represents an industry consisting of both small and medium-sized businesses and has a positive impact in economic terms. However, the impact of this industry is likely to be seen more negatively if the waste from the processing of tofu is not treated properly. Untreated waste will continue to have a detrimental impact on the environment, since the tofu industry wastewater discharge affects the Biological Oxygen Demand (BOD and Chemical Oxygen Demand (COD) parameters, and as such, contributes to river pollution. . This was reported by Bastian (2016) in Murwanto (2018), namely, that tofu industry wastewater pollution was occurring in the Mount Sulah suburb, Bandar Lampung City. The purpose of this study is to establish a viable way of treating tofu wastewater through the reduction of the BOD and COD levels cheaply using Appropriate Technology (TTG) Rapid Sand Filter. This research utilised a quasi-experiment with a one-group pre-test and post-test design (Factorial Design with a Control/Comparative Group) in which the discharge of tofu industry waste and sand filter thickness are independent variables and the decreasing levels of tofu industry waste (BOD and COD, H) were bound variables. The results of this study indicate a significant influence according to the height of the sand filter on the parameters of the BOD and COD levels in tofu wastewater, and the absence of a significant effect on the amount of water discharge decline. A (BOD) and (COD) parameters tofu liquid waste, this Quick Sand Filter can not be applied in the home of tofu as an Appropriate technology industry because of the Decrease in BOD, COD parameters, Because it is still outside the Threshold Value (NAV) 6 of 2014.

Keywords: *Tofu Waste, BOD, COD, Rapid Sand Filter.*

Introduction

Wastewater treatment technologies are key to preservation of the environment. Whatever kinds of domestic wastewater treatment technologies and industries are built must be operated and maintained by the local community. In order for the community to choose the right technology, they must have a general idea of the methods of the existing wastewater treatment system, with respect to the working principles of the application of these methods, the advantages, the losses and the cost factors. It is important to note that in industrial wastewater treatment, the prevention or suppression of the pollution load is kept to a minimum, namely through control of the production process itself.

The waste industry was founded to develop activities in the field of food that have positive and negative impacts on the environment. A positive impact on the community results from the food source itself, while the negative impact of the industry requires of knowledge of the waste matter which causes pollution and damages the environment — in this case, the environmental pollution in the form of solid waste disposal proceeds (from tofu) along with liquid waste. Most of the wastewater produced by industrial manufacturing is known as a viscous liquid that is separate from the so-called blob known as whey.

Waste liquid containing suspended and dissolved solids undergo physical, chemical and biological changes that produce toxic substances which encourage the growth of bacteria. The waste will change colour to dark brown and be foul-smelling. The foul odour can cause respiratory problems. If this waste is poured into the river it will contaminate and pollute the water, and when the water is subsequently used, it will cause itching, diarrhoea, and nausea.

One way to find out how great the pollution load is in wastewater is to measure the Biological Oxygen Demand (BOD) and the Chemical Oxygen Demand (COD) levels. The BOD refers to the amount of oxygen needed by microorganisms to oxidise organic compounds in the waste. The COD refers to the amount of oxygen required to oxidise organic compounds chemically (Alert and Sanitaka, 1984). Soy is a food source that can be obtained at a low price and is high in protein. The manufacturing process of soy produces either solid or liquid waste matter.

Waste represents left-over materials that have no economic value. The solid and liquid waste matter generated in the production processes of tofu and tempeh (whether in banana leaves or plastic) is in the form of suspended solids and dissolved organic matter, and contains protein and amino acids that may interfere with the environment. This is likely to affect the quality of water in residential neighbourhoods.

Monitoring of the environment involves measuring the components, or the environmental parameters, and is done periodically in order to detect changes in the environment due to project activities or household industries.

Producers do not always understand the need for hygiene and environmental sustainability, and if liquid waste treatment is not managed properly it can present a significant health and economic burden. The tofu and tempeh industry should be supported by both the Indonesian government and the community since these food sources are favoured at all levels of Indonesian society for their high nutritional value and accessibility.

Waste liquids resulting from these industries should be processed before being discharged into the environment. There must be a strong intention that waste does not pollute the environment, and that a healthy environment is maintained. Waste from the food processing industry is a fertile place for the breeding of microorganisms, especially pathogenic microbes. Pathogenic microbes that multiply in polluted water causes a variety of diseases, and most diseases are easily transmitted. Environmental sustainability depends on the quality of the environment itself, which is optimal for the survival of humans, animals, and plants in a region. The results of research conducted by Bastian (in Murwanto, 2018) showed that the average levels of COD in the manufacturing waste in the District of Gunung Sulah, Bandar Lampung was 4000mg / L and TSS with an average of 1150 mg / L; that is, they have exceeded the water quality standard of waste as required by Candy Environment No. 05, 2014. In other words, the presence of pollution was evidenced in the river. This was noted similarly in Article 4, in the Tikala District of Manado City (Abidjulu & Kolengan, 2016). It has also been noted in the river Gampong Reuloh, district and the Irian Jaya district of Aceh Besar.

An alternative waste treatment that may be viable is by using a filter in high variation sand.

Advanced Research methods

This research used a Quasi-experimental study design with a one group pre-test and post-test Factorial Design with a control group (Notoadmodjo, 2018). Know where Industrial Waste Discharge and thickness Sand Filters are Variables and Parameters Decrease Industrial Waste Know (BOD and COD) Variable Bound. One group pretest-posttest Factorial Design with Control Group / Appellant (Basuki, 2000), An experiment that uses more than one treatment or more by using two or more independent variables factor (Ariawan, 1998) to draft a combination between a high level of variance factor with sand filter and sample flow rate that came out after the screening, with designs such as the table below:

Table 1. Number of High Variance Sand Filters and Industrial Waste Samples Known to decrease waste pollution parameters

High Sand Filters	Samples debit Industrial Waste			Group Control
	(A)	(B)	(C)	
	36.46 ml / min	72.91 ml / min	145.83 ml / min	
(1) 1 m	A1	B1	C1	K1
(2) 1.2 m	A2	B2	C2	K2
(3) 1.3 m	A3	B3	C3	K3

Population Research

Industrial waste from Bandar Lampung was collected every morning at 09.00 am during the study.

Samples research

1. Number of Samples
   Based on Table 1 above, the sample size is nine units (A1 s / d C3) to control three pieces.
2. Subjects Samples
   With the number of subject sample with the control group, the number of replication (repetition) in this study was (Supriyadi, 2014);

$$(R-1)\ (t-1) \geq 15$$
$$(R-1)\ (9-1) \geq 15$$
$$(R-1)\ (8) \geq 15$$
$$8r-8 \geq 15$$
$$8r \geq 15 + 8$$
$$8r \geq 23$$
$$r \geq 23/8$$
$$r \geq 3$$

With: r = number of replication or duplication
t = the number of treatment or treatment by using the formula 3 times.

Then determine the replication of random Block Samples 1, 2 and replication 3.

Table 2. Randomisation of Block Samples 1

C2	A3	B2	K1
B3	C1	A1	K2
B1	A2	C3	K3

Table 3. Block Randomisation Sample 2

B1	B2	A3	K1
B3	C1	A1	K2
C3	A2	C2	K3

Table 3. Block Randomisation Sample 3

C1	B2	C2	K1
A1	B1	B3	K2
A2	C3	A3	K3

Research procedure

The step-by-step procedure of this study is as follows:

1. Test wastewater at 09.00am
2. Decrease levels of TSS for 2 hours
3. Perform processing/filtering of waste within variance parameters such as BOD, COD, TSS and pH, and the variance of sand thickness of 100 cm, 130 cm and 150 cm, according to the sample block specified above in each replication with a survey control
4. Perform laboratory testing of these parameters (BOD, COD, TSS and pH) in samples before and after treatment, in either the treatment group or a control group
5. Any replacement replication or repetition of the testing tool was held for cleaning/dewatering.

Data collection technique

Data from the laboratory studies of samples of industrial waste shows each sample block after each replication (repetition), then calculates the difference between before treatment and after treatment, in both the treatment and control groups.

Data analysis

1. Univariate analysis
   This analysis was done to determine the results of both treatment and control samples in each block of samples by computing the difference between the results before and after treatment (filtration).

2. Bivariate analysis
   A Bivariate analysis was conducted to determine the differences of each independent variable and the dependent variable, using computer data processing applications.

Results and Discussion

Univariate analysis

The results of the treatment parameters showed decreased levels of waste out of three repetitions (replication) with respective variances of water discharge of 36.46 ml / min, 72.91 ml / min and 145.83 ml / min and a height variance in the sand filter of each of 1, 1 m, 1.2 m and 1.3 m, in pre-test and post-test controls, with results as shown below.

1. The condition of each parameter based on the height of the sand filter

a. BOD parameters

   The downward trend in changes in levels of BOD (mg / l) on any increase in the height of rapid sand filter (Figure 1).

b. COD parameters

   Overview the downward trend in changes in the levels of COD (mg / l) on any increase in the height of the rapid sand filter (Figure 2).

2. The condition of each parameter based on the amount of water discharged

a. BOD parameters

   There is a rise in the levels of BOD (mg / l) on any increased discharge of wastewater out (Figure 3).

b. COD parameters

   In the COD (mg / l) and wastewater discharge variance this fluctuated on any increase in the height of the rapid sand filter (Figure 4).

Bivariate analysis

In analysing the effect of high and large sand filter systems on wastewater discharge, the researchers used a variant analysis difference test or Anova One Way, starting from an Anova test per group with BOD and COD as variables. The Anova test is then passed between the group as a whole from a selection of the most effective results.

a. High thickness influences the Sieving of the Sand and Water Discharge Against Parameter Changes of BOD

1) Model test

Statistical test results showed that the thickness parameters of the high BOD sand filter test results obtained the value of $F = 13.80$, p-value <0.0001, resulting in a decision to reject H0. Conclusions, and model significance showed $R2 = 86.34\%$. The model is thus able to explain the diversity of 86.34% BOD.

2) Examine differences based on the height of the sand.

H0: $\alpha 1 = \alpha 2 = \alpha 3 = \alpha 4$

H0: At least one of them is different

Statistical test results obtained the value of $F = 49.67$, p-value <0.0001, thus there was a decision to reject H0. In conclusion, the BOD at the four high sand treatments showed different significance.

Figure 4.5 shows the significance of the differences in the three treatment BOD values (1, 2, 3) compared to the controls (4) .There was no visible difference in the significance of the value of the BOD based treatments (1, 2, 3). The BOD value of the lowest in all three treatments was 1.3 m.

3) The magnitude of the difference in the debit test.

H0: $\beta 1 = \beta 2 = \beta 3 = \beta 4 = \beta 5 = 0$

H0: At least one of them is different

The results of the statistical test obtained $F = 0.4950$ p-value = 0, 0.6177, thus, the decision is that there is not enough evidence to reject H0. In conclusion, BOD on the third debit treatments showed no significant difference.

In Figure 4.6 above are generally visible, look no significance difference BOD value based treatment (1, 2, 3). BOD value of the lowest in all three treatments, namely Debit =147.83 ml / d.

4) Examine differences between sand and amount of discharge.

H0 (α β) jk = 0; for all jk

H0 (α β) jk ≠ 0; for all jk

Statistical test results obtained the value of F = 0,30 with a p-value =0.9302, thus, the decision is that there is not enough evidence to reject H0. In conclusion, the BOD on both types of treatments showed no significant difference.

b. High thickness influences the Sieving of the Sand and Water Discharge Against Parameter Changes of COD in Wastewater

1) Model test.

Statistical test results obtained the value of F = 3.19, p-value <0.0084, thus the decision was made to to reject H0. Conclusions and model significance were R2 = 59.40%. The model is thus able to explain the diversity of 59.40% COD.

2) Examine differences based on High Sand.

H0: α1 = α 2 = α 3 = α4

H0: At least one of them is different

The four high sand treatments showed different significance. Statistical test results obtained the value of F = 10.02, p-value = 0.0002, thus, there was a decision to reject H0.

3) The magnitude of the difference in the debit test.

H0: β1 = β2 = β3 = β4 = β5 = 0

H0: At least one of them is different

Statistical test results obtained the value of F = 0.06, p-value = 0,9387, therefore, the decision is that there is not enough evidence to reject H0. In conclusion, all three treatments of COD discharge showed no significant difference.

4) Examine differences in the sand and amount of discharge.

H0 (α β) jk = 0; for all jk

H0 (α β) jk ≠ 0; for all jk

Statistical test results obtained the value of F = 0.82 with a p-value =0.5641, thus, the decision is that there is not enough evidence to reject H0. In conclusion, COD in both types of treatments showed no significant difference.

Discussion

It is now known that untreated wastewater will pollute water especially if it is directly discharged into river systems.

1. **Effect of Altitude on Sieved Sand Against a Decline in BOD and COD Parameters in Industrial Wastewater**.

In the results of the univariate analysis above, where the high sand filter contributed to a decline of the parameters of BOD and COD, the difference was found to be meaningful. Thus, it can be interpreted that the higher the effectiveness of the sand filter the more decreased the levels of the BOD and COD parameters are. The sand filter system also contributed to a reduction in the COD levels in wastewater from the batik industry (Rahmah & Mulasari, 2016). Similarly, the rapid sand filter (silica sand) was instrumental in reducing levels of BOD and COD in Mitra Husada Hospital, Makassar (Ronny & Sham, 2018). The same thing happened in the district of Tebas, Sambas, West Kalimantan (Saenab, Henie, Al, Rohman, and Arifin, 2018).

According to these results, it appears that the higher the sand filter is the higher the process is for reducing the levels of BOD and COD. However, the installation of the rapid sand filter by researchers was not able to produce a reduction in the levels appropriate for the Threshold Limit Value (TLV) as mandated by the Regulation of the Minister of Environment. No. 5 in 2015, namely for the parameters BOD 150 ml / L and COD of 300 mg / L (Master, Environment, Graduate, and Diponegoro, 2006).

In relation to the above, it can be concluded that the use of a singular method for lowering wastewater toxins is not recommended. Several other studies combined the use of a sand filter with other materials and were found to be quite effective in reducing levels to below the TLV parameters (in accordance with the Regulation of the Minister of the Environment. No. 5, 2015). There has been research into the use of other materials, such as fibres and charcoal, in the Village Reuloh. In the Ingin Jaya district of Aceh Besar, coconut shell charcoal and hyacinth was used (Alimsyah, Alimsyah, and Damayanti, 2013). There was also research into water jasmine plants (Echinodourus palaefolius) using a combination of wetland and filtration construction (Dawn & Handajani, 2014). Methods of coagulation, sedimentation and filtration variance were considered (Rahmah & Mulasari, 2016) as well as the use of activated carbon, rice husk and zeolite (Dewi & Buchori, 2016) and (Fatahilah & Raharjo, 2007).

2. **Effect of Altitude on the Discharge of Wastewater and a Decline in BOD and COD Parameters**

The results of the univariate analysis of the parameters of BOD and COD levels in wastewater discharge illustrates that the higher the water flow, the more the levels of BOD and COD decline. The results of the bivariate analysis showed that the three parameters of BOD and

COD did not differ significantly. In other words, higher water flow causes a change in the parameters of BOD and COD.

The same thing happens with the water discharge variance, which also depends on the filtration elements, such as quartz sand. As described above, a combined use of materials as a filtration method is indicated by this research and is therefore highly recommended. For example, Multi Soil Layering (MSL) may be viable for use which is a method using soil andosol, zeolite, gravel, and charcoal as well as a source of oxygen aeration (Irmanto & Suyata 2008) and activated charcoal from coffee grounds (Irmanto & Suyata, 2009).

3. Effect of Altitude on Sand and Wastewater Discharge on the BOD and COD Parameters of Industrial Wastewater

The results of the statistical test showed that there is no significant difference in the effect of different heights of sand and wastewater debits. This happens when the flow of water is reversed; where there is a greater flow of water, greater levels of BOD and COD from the fermentation process are seen. As previously mentioned, there are other methods for consideration, such as electrochemical methods (Woodford, 2015), photoreduction methods (Transactions & Society, 2010), the use of active carbon (Purnawan & Martini, 2014); and by administering Chlorella Sp. which has been found to reduce levels of COD (Istirokhatun, Aulia, and Utomo, 2017).

In order to achieve decreased levels of BOD, COD, and other compounds from tofu waste, there are many useful alternative forms of filtration and waste management, in addition to the conventional methods, as described above. Some alternatives, for example, are that waste is processed into alternative energy (Ridhuan, 2016), (Mathla, Anwar, Pure, Min, and Dahlan, 2019), (Ristianingsih, Dharmawan, and Princess, 2018), (Widayat & Hadiyanto, 2016), (Ristianingsih et al., 2018), (Sally, 2015). There are other benefits, such as increasing the rate of plant growth (in spinach) (Siswoyo & Hermana, 2017); bioethanol for Bali Cattle waste (Sar, Astuti, and Asi, 2016); as a substitute for White Oyster mushroom growth (Alfisyah & Susanto, 2014), and even for electrical energy (Purwono, Hermawan, and Hadiyanto, 2015).

Conclusion

Several conclusions can be drawn from the results of these studies, as follows: There is a highly significant influence between the levels of the sand filter in decreasing BOD and COD. There is no significant effect of a high flow of water on the declining levels of BOD and COD. There is no significant effect between high sand levels and high water flow in decreasing BOD and COD levels. Follow up research which looks at the utilisation of a modified sand filter (quartz sand) is suggested, or filtration with another layer, such as charcoal, zeolites, fibres, activated carbon, and rice husk. Other studies may also consider using water without any plants, or by combining them with a variance method listed above (item 1); for example, with water hyacinth, water jasmine plants (Echinodourus palaefolius) in wetland construction.

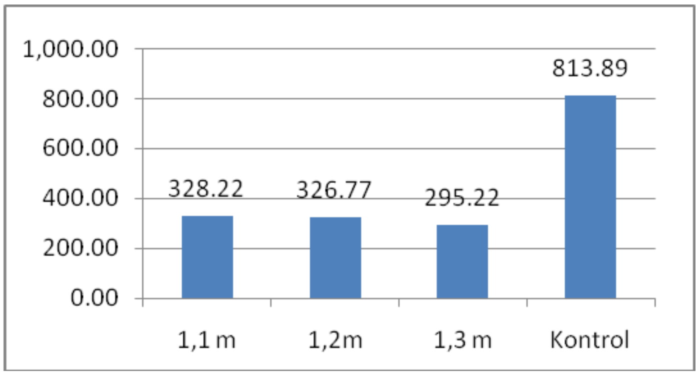

Figure 1. Changes in levels of BOD (Mg / L) Against Variance of Highly Sieved Sand

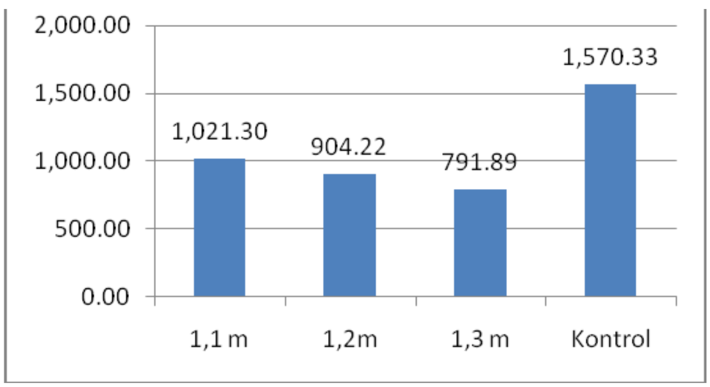

Figure 2. Changes in state of the COD (mg / l) to height variance filter sand filter

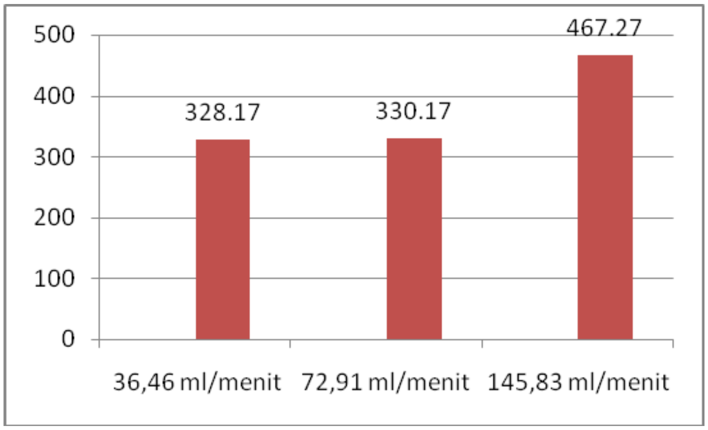

Figure 3. Changes in state of BOD levels (mg / l) to variance filter water discharge magnitude.

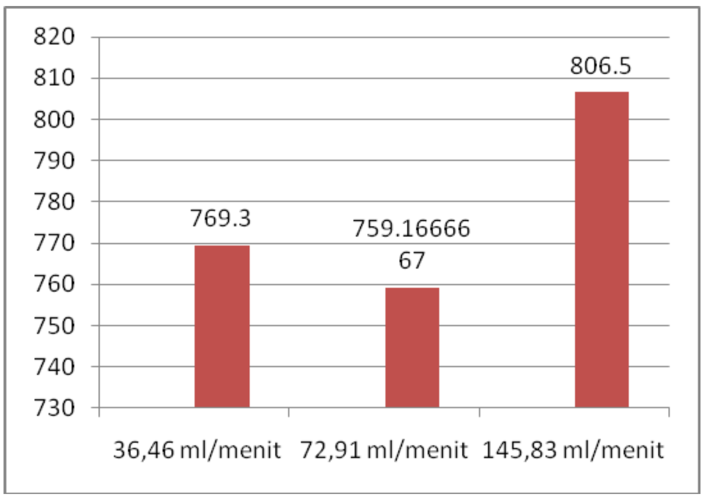

Figure 4. Changes in state of the COD (mg / l) to variance filter water discharge magnitude.

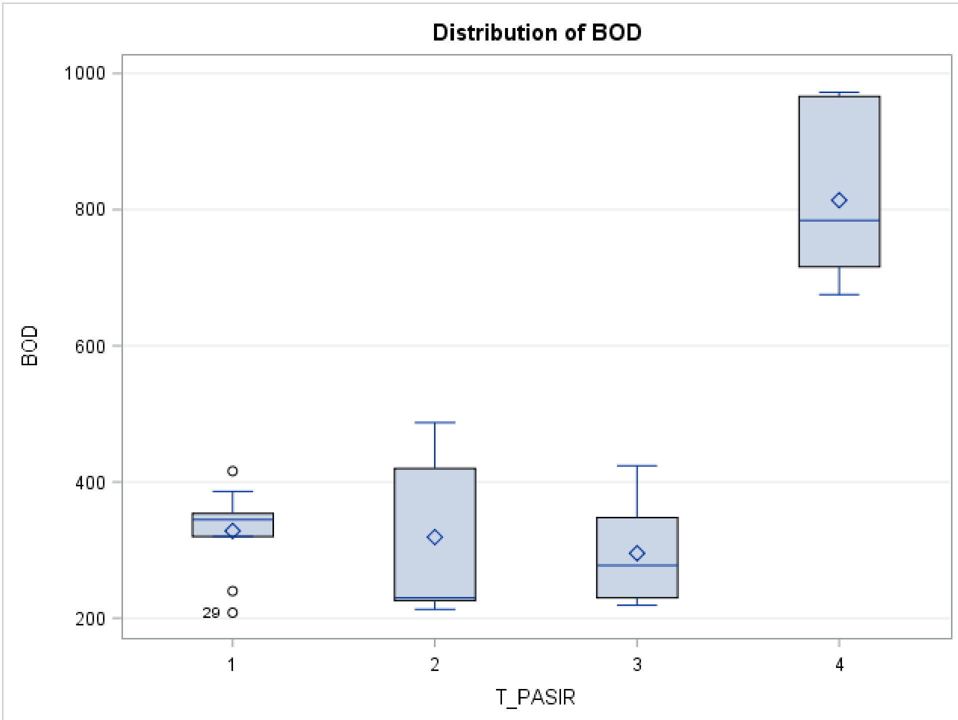

Figure 5. Graph Plot Differences BPX BOD levels (mg / L) Dimensions Height

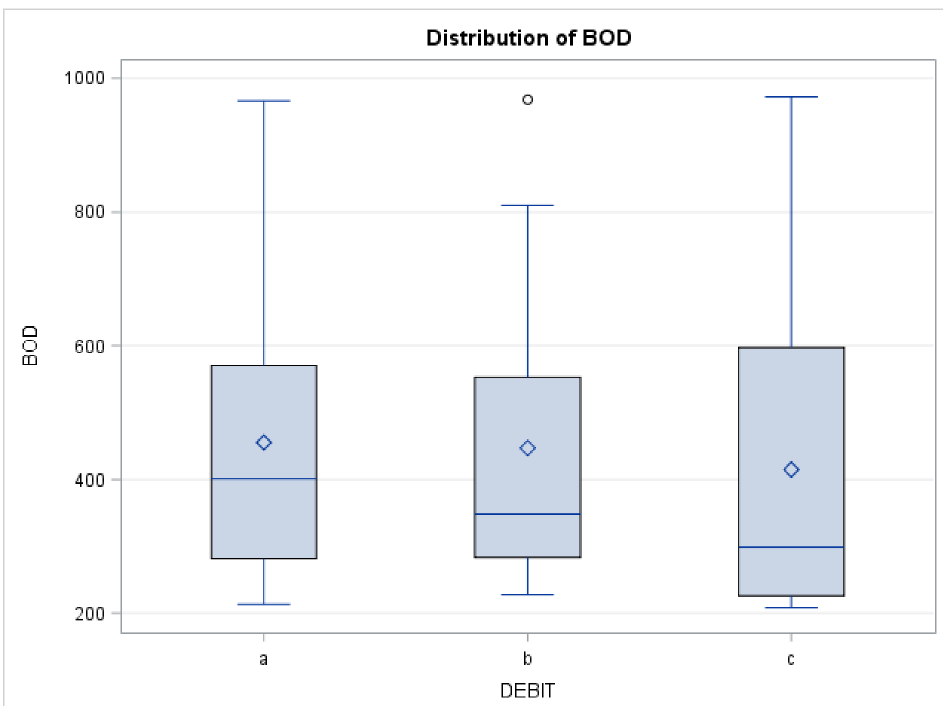

Figure 6. Graph BPX Plot Differences BOD levels (mg / L) Dimensions Water Discharge.

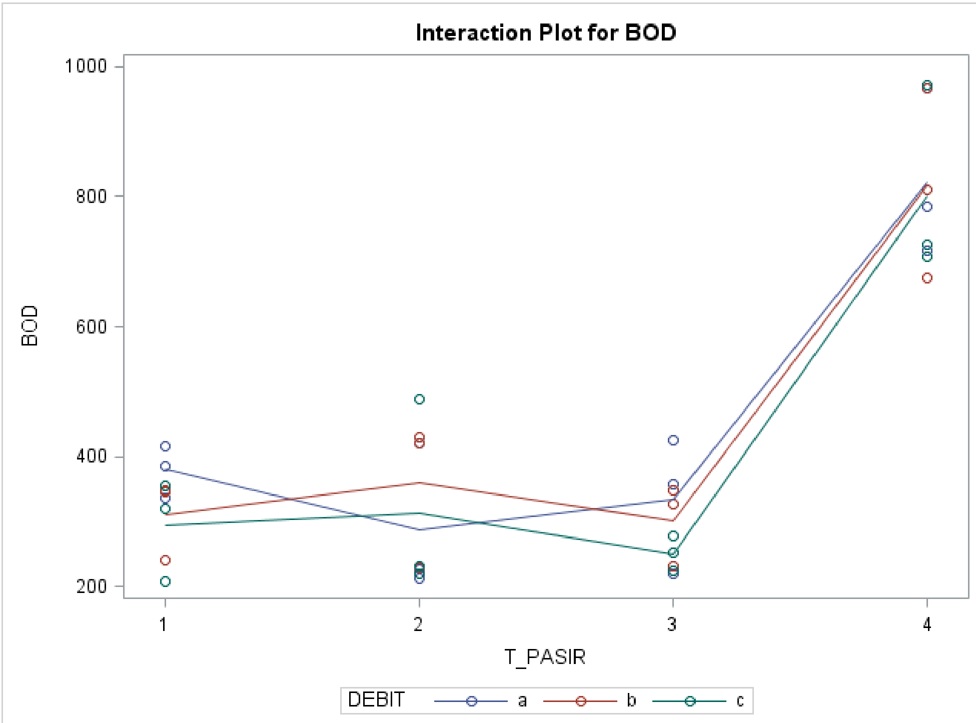

Figure 7. Graph Interaction Plot Differences BOD levels (mg / L) by Dimension High Sand and Water Discharge

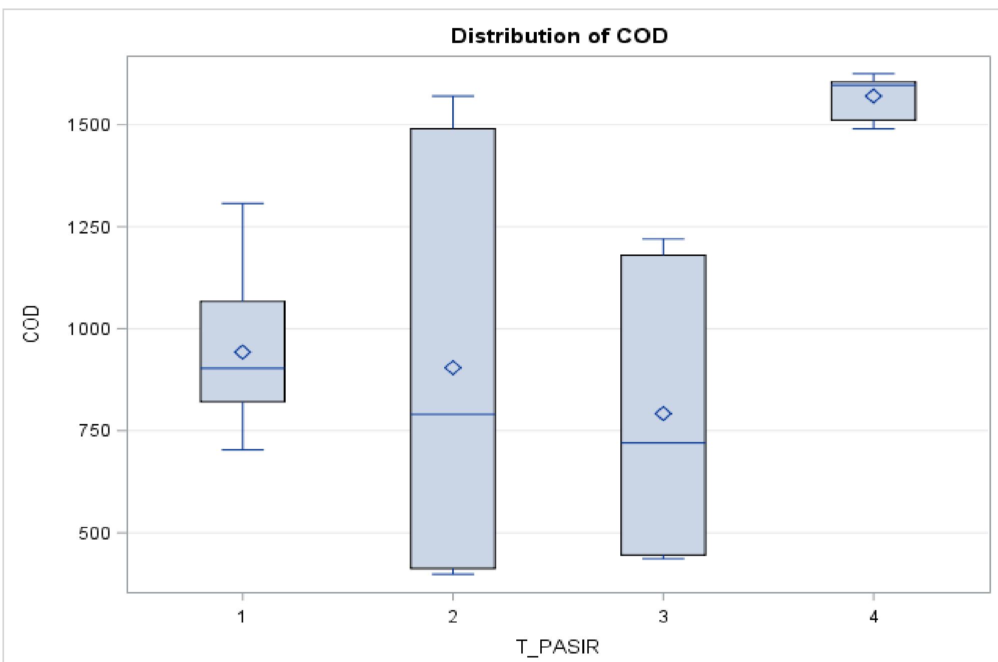

Figure 8. Graph Plot BPX difference while the COD (mg / L) Dimensions Height Sand

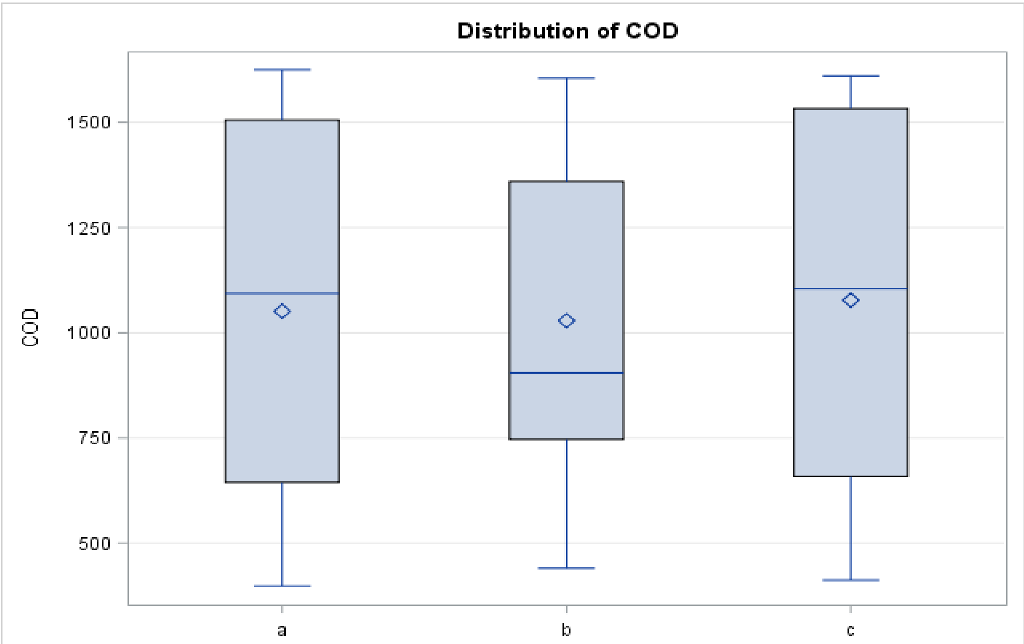

Figure 9. Graph Plot BPX difference while the COD (mg / L) Water discharge Dimensions

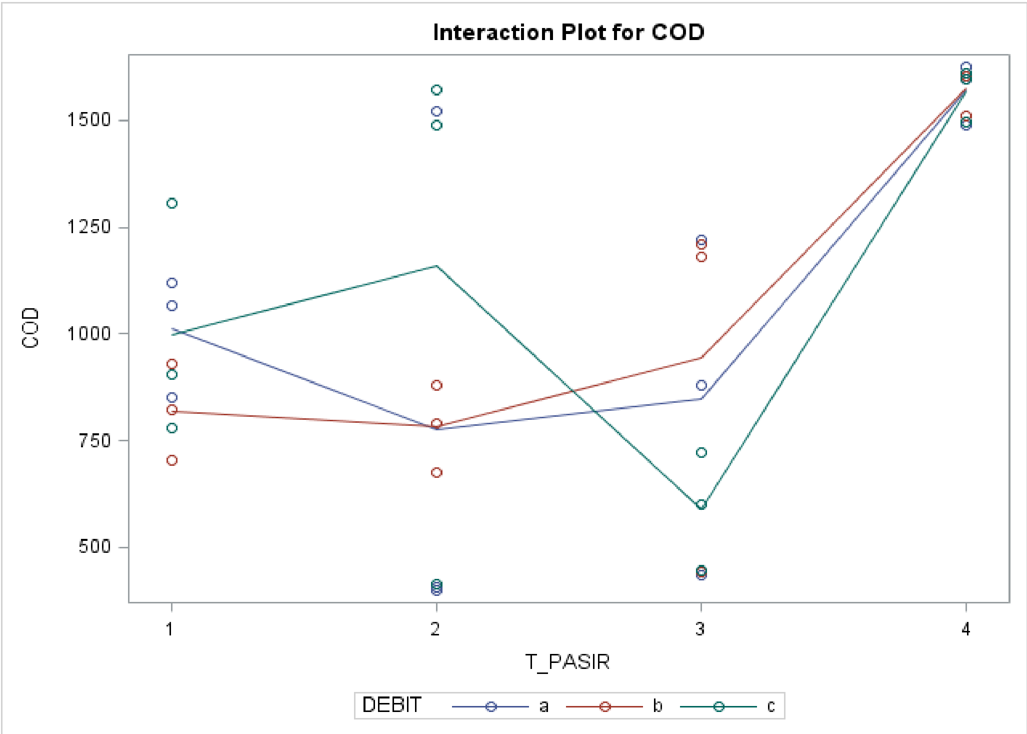

Figure 10. Plot Graph difference Interaction in the COD (mg / L) Dimensions based on high Debit Sand and Water.

REFERENCES

Abidjulu, J., & Kolengan, HSJ (2016). Effect of Liquid Waste Know Against River Water Quality Paal 4 Districts Tikala Manado. 9 (1), 35-40.

Alert and Sanitaka. (1984). Water Research Methods. National Enterprises.

Alfisyah, YI, and Susanto, A. (2014). SUBSTITUTION EFFECT OF INDUSTRIAL WASTE KNOW THE PLANTING MEDIA ON THE GROWTH AND PRODUCTION OF WHITE OYSTER MUSHROOM (Pleurotus ostreatus) AS BIOLOGICAL RESOURCES. BIOEDUKASI (Journal of Biological Education), 5 (1). https://doi.org/10.24127/bioedukasi.v5i1.250

Alimsyah, A., Alimsyah, A., & Damayanti, A. (2013). Coconut Shell Charcoal usage and water hyacinth for Wastewater Treatment Know-Varying concentrations. ITS Engineering Journal, 2 (1), D6-D9. https://doi.org/10.12962/j23373539.v2i1.3170

Ariawan, I. (1998). Large and Method Sample In Health Research. Jakarta: Department of Biostatistics and Population, Faculty of Public Health, University of Indonesia.

Basuki, B. (2000). Case Method Application Control. Jakarta: Department of Community Medicine, University of Indonesia faculty Kedoteran.

Dewi, YS, & Buchori, Y. (2016). Decrease Cod, Tss In Waste Water Filtration Media Combination Know Using Quartz, Activated Carbon, Zeolite And Rice Husk. Scientific Journal Satya Negara Indonesia, 9 (1), 74-80.

Dawn, A., & Handajani, M. (2014). Subsurface HORIZONTAL FLOW WITH THE USE Typha angustifolia wetland EFFICIENCY OF ORGANIC REMOVAL FROM Soybean Curd Wastewater Horizontal Subsurface Flow BY INDUSTRY IN USING Typha angustifolia wetland. 20, 78-87.

Fatahilah, & Raharjo, I. (2007). The use of activated carbon and zeolite as an adsorbent component rapid sand filter (a simple technology applications in the water purification process). Zeolite Indonesian Journal, 6 (2), 43-46.

Irmanto, I., & Suyata, S. (2008). Bod And Cod decline in textile industrial waste in Pekalongan With Multi Soil Layering Method. Molecular, 3 (2), 98. https://doi.org/10.20884/1.jm.2008.3.2.54

Irmanto, I., & Suyata, S. (2009). Decreased levels of ammonia, nitrite, and nitrate Tofu Liquid Waste Using Active Charcoal From Coffee Dregs. Molecules, 4 (2), 105. https://doi.org/10.20884/1.jm.2009.4.2.68

Istirokhatun, T., Aulia, M., & Utomo, S. (2017). Potential Chlorella Sp. for Opting COD and nitrates in wastewater Know. Precipitation journal *Media Communication and Environmental Engineering Development*, 14 (2), 88. https://doi.org/10.14710/presipitasi.v14i2.88-96

Masters, P., Environment, I., MSc, P., & Diponegoro, U. (2006). Know Using Wastewater Treatment. 1.

Mathla, U., Anwar, UL, Pure, T., Min, P., & Dahlan, DL (2019). Utilization of liquid waste into biogas in the Industry Know. 4 (4), 541-546. https://doi.org/10.30653/002.201944.191

Murwanto, B. (2018). Effectiveness of Poly Aluminum Chloride coagulant type According Variance Dose and Time Agitation against Decline Parameter Liquid Waste Know. Journal of Health, 9 (1), 143. https://doi.org/10.26630/jk.v9i1.771

Notoadmodjo, S. (2018). Health Research Methodology (Third). Jakarta: PT. Rineka Reserved.

Purnawan, C., & Martini, T. (2014). PROTEIN CONTENT WASTE REDUCTION TO KNOW WITH THE USE OF CARBON bagasse activated (Protein Reduction of Tofu Wastewater Using Activated Carbon Bagasse). Journal of Human and Environment, 21 (2), 143-148. https://doi.org/10.22146/jml.18537

Purwono, Hermawan, and Hadiyanto. (2015). In the Liquid Waste Processing Industry Know To. Precipitation Journal, 12 (2), 57-65.

Rahmah, R., & Mulasari, SA (2016). Method Effect of Coagulation, Sedimentation and Filtration Variation Levels Decline Against Tss, Cod And Colour In Liquid Waste Batik. CHEMICA: Journal of Chemical Engineering, 2 (1), 7. https://doi.org/10.26555/chemica.v2i1.4560

Ridhuan, K. (2016). Liquid Waste Processing Know As Alternative Energy Biogas is environmentally friendly. Turbo *: Journal of Mechanical Engineering Study Program*, 1 (1), 1-9. https://doi.org/10.24127/trb.v1i1.81

Ristianingsih, D., Darmawan, AH, & Daughter, EIK (2018). Sustainability Analysis of the Rural Biogas Waste Know (Case Study Kalisari In the village, Banyumas). Journal of Environmental Science, 16 (2), 104. https://doi.org/10.14710/jil.16.2.104-112

Ronny, and Sham, DM (2018). Application Technology Silica Sand Filters and Activated Carbon to Reduce Levels of BOD and COD wastewater Mitra Husada Hospital Makassar. Hygiene Journal, 4 (2), 1-5.

Saenab, S., Henie, M., Al, I., Rohman, F., & Arifin, AN (2018). Liquid Waste utilization Know As Organic Liquid Fertilizer (POC) Program to Support Lorong Garden (Loose) Makassar. Proceedings of the National Seminar Megabiodiversitas Indonesia, (April), 31-38.

Sally, Wek (2015). For Household Industrial Scale In Banten. Potential Liquid Waste Utilization, 43-53.

Sar, DD., Astuti, M., & Asi, L.. (2016). Effect of Supplemental Form Feed Tofu Dregs and Waste Bioethanol is made from cassava (Manihot utilissima) Toward Appearance Bali cattle (Bos Waste As Feed Supplement On Performance Of Bali Cattle (Bos sondaicus). Bulletin of Animal Husbandry, 40 (2), 107-112.

Siswoyo, E., & Hermana, J. (2017). Effect of Industrial Wastewater Plant Growth Rate To Know To Pull Spinach (Amaranthus tricolour). Journal of Environmental Science & Technology, 9 (2), 105-113. https://doi.org/10.20885/jstl.vol9.iss2.art4

Supriyadi. (2014). Statitik Health. Jakarta: Salemba Medika.

Transactions, ECS, & Society, TE (2010). *小 國 英 一) 浜 野 由 花子2) 渡 邉 俊 司2) 寺 澤 富 久 恵2) 関 義 元2) 関 昇 子2) 植草 義 史2)*, 11 (9), 21-24.

Widayat, W., & Hadiyanto, H. (2016). UTILIZATION OF INDUSTRIAL WASTE KNOW FOR BIOMASS PRODUCTION Sp microalgae Nannochloropsis RAW MATERIALS AS BIODIESEL. The reactor, 15 (4), 253. https://doi.org/10.14710/reaktor.15.4.253-260

Woodford, KO (2015). No.*主 観 的 健康 感 を 中心 と し た 在 宅 高 齢 者 に お け る 健康 関 連 指標 に 関 す る 共 分散 構造 分析title*, 10 (1), 74-81.