

The Effectiveness Of Lime Addition To The Decrease Of Phosphate Levels On Liquid Waste At ** A ** Hospital Bengkulu City

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Abstract : *The hospital is a health service institution with core activities of preventive, curative, rehabilitative and promotive service. In general, the main function of the hospital is to provide need of health care and recovery. According to the Decree of the Minister of Health of the Republic of Indonesia No: 983 / Menkes / SK / XI / 1992, the duty of public hospitals is to implement health efforts in an efficient and effective manner by prioritizing healing and maintenance efforts that are carried out in a harmonious and integrated manner with efforts to improve and prevent and implement referrals. These activities will have positive and negative impacts. The purpose of the study was to find out the decrease in phosphate levels of hospital wastewater before and after treatment. The type of research used is pure experiment (True Experimental) with the Pre-Post test experimental design, namely the research conducted before and after treatment. The addition of 0.5 mg / l calcium oxide can reduce Phosphate levels up to 73.3%. Addition of 0.7 mg / l calcium oxide can reduce Phosphate content up to 83.0%. Addition of 1.0 mg / l calcium oxide can reduce Phosphate levels up to 91.88%. From the Kruskal wallis test, it can be seen that the value of $p < 0.05$ so that there is a difference in each treatment to the decrease in Phosphate levels in hospital wastewater using a dose variation of calcium oxide.*

Keywords: *calcium oxide, Phosphate, Hospital Liquid Waste*

I. INTRODUCTION

Surfactants are the main component in detergents and have chemical chains that are difficult to degrade (decompose) in nature. At first, surfactants were only used as the main

ingredient of detergent. However, it is effective in cleaning up dirt, so it is widely used as another washing material. Surfactant is a surface tension-lowering active compound that can be produced through chemical and biochemical synthesis.

The active matters possessed by surfactants can reduce surface tension, interface tension and improve the stability of the emulsion system. This makes surfactants widely used in various industries, such as the soaps industry, detergents, cosmetics products and personal care products, pharmaceuticals, food, paint and coatings, paper, textiles, mining and petroleum industries, and so on.

With the widespread use of detergents, the risks to human health and environmental health are also increasingly vulnerable. Waste produced from detergent can have adverse effects on the environment which will further disrupt or affect people's lives.

Based on the above background, the problem formulated in this study is "can lime reduce phosphate levels in hospital wastewater"?

II. AIM

As for the purpose of the study entitled Effectiveness of Lime Addition to Decrease Phosphate Levels in "A" Bengkulu Home Liquid Waste, namely: Known decrease in phosphate levels of hospital wastewater before and after treatment.

The type of research used is pure experiment (True Experimental) with the Pre-Post test experimental design, namely the research conducted before and after treatment. Then look for differences between measurements of both, and this difference is considered as a result of treatment.

III. RESULT

1. Univariate Analysis

Univariate analysis aims to describe the results of phosphate levels measurement. The results of examination of phosphate levels can be seen in the table below:

Table 5.1 Phosphate Level Examination

Treatment	Size	Phosphate Level (mg/l)		% Decrease
		Before	After	
Calcium Oxide	0,5	21,8	5,82	73,3 %
	0,7	21,8	3,70	83,0 %
	1,0	21,8	1,77	91,88 %

Based on table 5.1, each level of phosphate before treatment was 21.8 mg / l, so from the 3 treatments the highest reduction was located in the treatment of Phosphate Dosage 1.0 mg / l with a percentage decrease of 91.88%.

2. Bivariate analysis

Bivariate analysis was used to determine the difference in the level of phosphate reduction in each treatment using the Kruskal Wallis test.

a. Kruskal Wallis decreased levels of Phosphate

The results of the kruskal wallis test the difference in each treatment by using the amount of lime variation on the decrease in test phosphate can be seen as follows:

Table 5.2 Result of *Kruskal Wallis Test of Phosphate Levels*

	Phosphate
Chi-Square	14.118
df	3
Asymp. Sig.	0,003

Table 4.2, from the Kruskal wallis test, it can be seen the value of $p < 0.05$ so that there is a difference in each treatment against the decrease in phosphate levels in hospital wastewater using a variety of lime doses.

Tabel 5.3 Result of Mann–Whitney Test Comparison to Every Treatment

	Treatment	Test	
Calx	0,5 gr – 0,7 gr	Mann-Whitney U	0,000
	05 gr – 1 gr	WILXOCON w	10,000
	0,7 gr – 1 gr	Z	-2,309
		Asymp. Sig. (2-tailed)	0,021
		Exact Sig. (2*(1-tailed Sig.))	0,029 ^a

Table 5.3 is the result of statistical calculations using Mann-Whitney.

Decision results are based on Asymp probability values. Sig. (2-tailed), 1) if the Asymp probability value. Sig. (2-tailed) > 0.05 , then H_0 is accepted, 2) if the Asymp probability value. Sig. (2-tailed) < 0.05 , then H_0 is rejected. based on the results above, the results with each treatment have a significant difference.

IV. DISCUSSION

Based on the Mann-Whitney test results from the results of the decision based on the Asymp probability value. Sig. (2-tailed), 1) if the Asymp probability value. Sig. (2-tailed) > 0.05 , then H_0 is accepted, 2) if

the Asymp probability value. Sig. (2-tailed) < 0.05 , then H_0 is rejected. based on the results above, the results with each treatment have a significant difference.

1. Decrease in Phosphate Using Calcium Oxide

Based on table 5.1, each level of Phosphate before treatment was 21.8 mg / l, so from the 3 treatments the highest percentage reduction was located in Phosphate Dosage 1.0 mg / l with a percentage reduction of 91.88%.

From the Mann-Whitney test results on each treatment has a significant difference can be seen p value < 0.05 . These results indicate that calcium oxide affects the decrease in Phosphate levels in hospital wastewater. Calcium oxide is generally calx (lime) in two forms, CaO and Ca (OH) 2. CaO is a material that is easily soluble in water and produces a hydroxyl group, Ca (OH) 2. which is alkaline and accompanied by high heat. According to Tarmiji, 1986, the use of lime, among others, in the field of environmental health for the treatment of dirty water, wastewater and other industries.

According to the active group content detergents are classified as hard and soft type detergents. Hard type

detergents are difficult to destroy by microorganisms even though the detergent material is removed as a result the substance is still active. This type causes water pollution. One example is Alkyl Benzene Sulfonate (ABS). Whereas the soft type detergent, the surface tension reducing material is easily damaged by microorganisms, so it is no longer active after use, for example Lauril Sulphate or Lauril Alkyl Sulfonate. (LAS).

Detergent was originally known as cleaning clothes, but is now widespread and added in various forms of products such as personal cleaning products (shampoo, hand washing soap), laundry as a laundry is the most popular detergent product in the community, dishwashing products as a good household appliance for manual use or dishwasher, household cleaner as a home cleaner such as floor cleaning, cleaning porcelain, plastic, metal, glassware (Arifin, 2008).

The detergent's ability to remove various impurities that stick to the fabric or other objects, reduce the presence of germs and bacteria that cause infection and increase the life of cloth, carpet, household appliances and other home appliances, no doubt.

Because of the many benefits of using detergent, it becomes an important part that cannot be separated from the lives of modern society.

Without reducing the meaning of detergent benefits in meeting daily needs, it must be recognized that chemicals used in detergents can have a negative impact on both health and the environment. Two of the most important ingredients of detergent forming are surfactants and builders (Arifin, M. 2008), identified as having a direct and indirect influence on humans and their environment.

Another study conducted at the Sangsang Pit Mine Pt. Borneo Diva Kencana, Siluq Ngurai District, West Kutai Regency, East Kalimantan Province. The results showed the use of effective quicklime doses for the treatment of acid mine drainage in Sangsang Pit, namely by using 2 grams of lime for 1 liter of water and increasing the pH parameters and can reduce the content of TSS (Total Suspended Solid), iron (Fe) and manganese (Mn) parameters.

This research is in line with what was done by Soni Triyoko Hospital in Dr. Soeradji Tirtonegoro Klaten and to find an effective dose to

decrease phosphate levels of liquid waste, using a 2% lime solution with a variety of doses of 15 ml / l, 20 ml / l, 30 ml / l, 35 ml / l, and 40 ml / l. This research is a quasi-experimental design with a pretest-posttest design. With the control group (randomized control-group pretest-posttest design). The independent variables in this study is the effectiveness of the lime solution dose and the dependent variable is the decrease in phosphate levels of liquid waste. Based on the results of the research and data analysis, it can be concluded that there are significant differences treatment statistic giving 2% lime solution from various doses used. the most effective dose is 30 ml / l, while the optimum dose to be applied in the field is 28ml / l.

V. CONCLUSION

A. Conclusions

From the results of the research that has been done, conclusions can be drawn as follows:

1. Adding 0.5 mg / l calcium oxide can reduce Phosphate levels up to 73.3%
2. Adding 0.7 mg / l calcium oxide can reduce Phosphate levels up to 83.0%
3. Adding 1.0 mg / l calcium oxide can reduce Phosphate levels up to 91.88%
4. Adding calcium oxide 1.0 mg / l liter is the most effective.

B. Suggestions

For the knowledge of educational / academic institutions : Can be applied to treat laboratory chemical liquid waste, and can be used as learning material in PAPLC courses (water treatment and wastewater treatment).

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