***LAUNDRY* BUSINESS CHARACTERISTICS AND DETERGENT LEVELS (MBAS)**

***LAUNDRY* LIQUID WASTE EFFLUEN IN THE IRINGMULYO VILLAGE**

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**ABSTRACT**

*Laundry* cleaning services have a positive economic impact by opening up jobs for the community and providing convenience for service users, but on the other hand can also have a negative impact on environmental quality degradation. This study aims to determine the characteristics of *laundry* business and MBAS effluent levels of *laundry* liquid waste in Iringmulyo Village. Data is collected by interview, questionnaire and liquid waste sampling. The data obtained in the form of *laundry* business characteristics were analyzed descriptively, while the effluent of liquid waste was measured in MBAS levels. The results showed that all *laundry* businesses do not yet have business licenses and WWTP (Wastewater Treatment Plant), because there are no local laws and regulations governing these businesses. Examination of *laundry* liquid waste samples at effluent has MBAS levels ranging from 0.1 - 3 mg / L. This level still meets the quality standard according to PermenLH No. 5 of 2014. Pollution of liquid waste from *laundry* can be minimized by making WWTP (Wastewater Treatment Plant) and making laws and regulations governing the operation of the business.

**Keywords:  detergent, effluent *, laundry ,*liquid waste, MBAS**

**INTRODUCTION**

The rapid increase in population causes an increase in the need for goods and services. One of the service needs that is currently increasing is *laundry* cleaning services. *Laundry* cleaning serviceswhich are currently popping up, have a positive economic impact because they can open jobs for the community and make it easy for users of these services, but besides having a positive impact these *laundry* business activities can have a negative impact, namely a decrease in environmental quality. *Laundry* waste in the form of detergent liquid in large quantities risks contaminating ground water quality, if it is discharged into the environment continuously without prior treatment, and is only absorbed into the soil or drainage that is nearby then within a certain period of time it could potentially cause pollution to the environment especially at water body.

Liquid waste generated by the *laundry*business comes from detergents used during the *laundry*washing process . Detergents generally contain surfactants. The surfactant in detergent functions as a wetting agent that causes a decrease in the surface tension of the water, with a decrease in the surface tension of the water so water can more easily seep into washed clothes. Surfactants ( *surface active agents*) or *wetting agents*(*wetting agents*) are organic substances that act as active ingredients in detergents, soaps, and shampoos (Effendi, 2003). Apart from the detergent surfactant, it also contains a *builder*. *The builder's*function is to increase the washing efficiency of surfactants by deactivating minerals that cause water hardness.

The increasing use of detergent will have an impact on the amount of liquid waste produced, and if the degradation process does not run in balance will result in the accumulation of surfactants in water bodies, causing water silting problems, hampered oxygen transfer. This condition causes the aerobic decomposition process to be disrupted and has an impact on the rate of biodegradation running very slowly. This condition allows the formation of intermediate compounds and can form chlorobenzene compounds which are toxic to aquatic organisms and at a critical point resulting in the death of aquatic organisms and decreased environmental aesthetics due to the generation of odors and abundant foam. Suharjono (2010) in his research argues that although it is biodegradable, LAS (Linear Alkylbenzene Sulfonate) is toxic to aquatic organisms and takes several days to biodegrade as a whole.

              Liquid waste is one form of waste that is generally produced by industry which in its process uses a lot of water. The resulting liquid waste as a source of environmental pollutants depends on the amount, type and quality of the pollutants it contains, both physical, chemical and biological as well as the quality and quantity of the environment as recipients (Ginting, 1995).

Efforts that can be made to overcome the pollution problems that can be caused by *laundry* liquid waste is to curb all existing *laundry* businesses by controlling the resulting wastewater, as a first step in formulating these efforts, information on effluent MBAS levels and conditions of *laundry* business characteristics need to be well available and comprehensive. This study will analyze based on these data in order to formulate an optimal *laundry* liquid waste control strategy in accordance with the characteristics of the *laundry* business in Iringmulyo Village.

**METHODOLOGY**

This research was conducted in March to June 2019 in the Iringmulyo Village of Metro District. The type of research used in this study is the type of explanatory research (explanatory research) with survey methods, interviews, questionnaires and measurements. This study aims to look at the characteristics of the *laundry* business and the measurement of MBAS levels in effluents from the washing process activities in the form of *laundry* liquid waste in 10 *laundry* businesses in Iringmulyo Urban Village.

Iringmulyo Village is one of the villages in Metro City which has the most *laundry* business activities compared to other urban villages in Metro City, because Iringmulyo Village is an educational center that makes this area a densely populated place, especially among students in the Metro City and also regions which borders directly with East Lampung Regency which makes this village a bustling community activity. Analysis of the data obtained related to the characteristics of the *laundry* business was carried out descriptively and the effluent of *laundry* liquid waste was MBAS levels carried out by measurements in the laboratory. The measurement results are compared with the quality standard used, namely Minister of Environment Regulation No. 5 of 2014 concerning Wastewater Quality Standards. Laboratory measurements of MBAS levels were carried out at the Lampung Provincial Environmental Agency Laboratory. The location of *laundry* liquid waste sampling is 10 *laundry* businesses in Iringmulyo Village. Determination of MBAS (surfactant) levels is carried out in accordance with the *Standard Methods for the Examination of Water and Waste Water procedures* (Arneli, 2010, Justitia, 2015), namely:

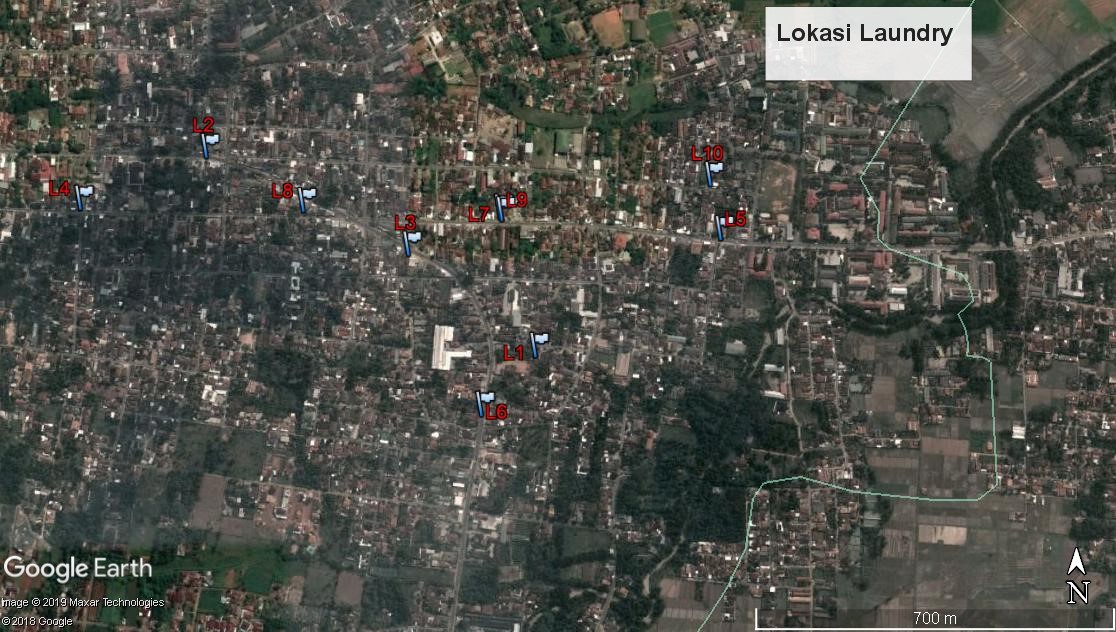
1. As much as 50 mL of seawater sample is put into a separating funnel, a few drops of 30% H2O2 are added, then the solution is shaken, a few drops of 0.01 N NaOH are added and a few drops of phenolphthalein are formed, to form a pink color.
2. A few drops of 0.02 N H2SO4 solution is added to the solution while being shaken until the pink color disappears, then 10 mL of methylene blue is added to complex the anionic surfactant and beaten for half a minute.
3. The sample solution was extracted with 10 mL chloroform, extraction was repeated twice using 5 mL chloroform (CHCl3). The collected chloroform phase was extracted again with 2 mL washing solution. The chloroform phase is flowed into a 25 mL volumetric flask, the volume is adjusted to the limit mark with chloroform. This analysis is duplicated for each sample solution.
4. Determination of anionic surfactant by spectrophotometric method at wavelength 652 nm, where cationic methylene blue dyes are associated with anionic surfactants to form *Methylene Blue Active Substances*(MBAS) complex .

**RESULTS AND DISCUSSION**

Iringmulyo Villageis one of the villages in the Metro Eastern District, Metro City. Iringmulyo Villagehas an area of ​​1.89 Km 2. Iringmulyo Villagetopography is in the form of alluvial plains. The height of the area ranges from 5-100 asl and  has a   slope of 0%-15%. The inhabitants of Iringmulyo Villageconsist of various heterogeneous ethnic groups. In 2017 Iringmulyo village has a population of 15 021 inhabitants with a population density of 7948 people/km 2.Judging from the level of education of population in Sub Iringmulyo consists of SD (1612 inhabitants), junior (1827 inhabitants), SMA/SMK (4167 inhabitants), Academy (1951 inhabitants). (BPS City of Metro, 2018).

Iringmulyo Village is one of the villages in Metro City which is the center of education because in this Village there are two of the largest tertiary institutions in the City of Metro namely Muhammadiyah University and STAIN Jurai Siwo and there are many other educational and other activities in this village. Community activities and the high demand for clothes washing services in this Kelurahan have made *laundry* cleaning services develop rapidly to meet people's demand for these services. The number of *laundry* business services that are currently developing in this Kelurahan if not regulated by the local government in the process of its operations, within a certain period of time can cause problems to the environment that is a decrease in environmental quality in the presence of liquid waste generated from the washing process. The distribution of *laundry* business in Iringmulyo Village can be seen in Figure 1.

Figure 1. Map of The Distribution of *Laundry*Business in Iringmulyo Village



Bussiness of *Laundry*cleaning services as well as the length of time these businesses carry out operational activities in Iringmulyo Village can be seen in Table 1.

Table 1. Laundry business services and laundry business duration in Iringmulyo Village in 2019

|  |  |  |
| --- | --- | --- |
| NO | *LAUNDRY*NAME | LONG BUSINESS |
|  |
| 1 | (L1) | 5 years |  |
| 2 | (L2) | 3 years |  |
| 3 | (L3) | 1 year |  |
| 4 | (L4) | 5 years |  |
| 5 | (L5) | 5 years |  |
| 6 | (L6) | 2 years |  |
| 7 | (L7) | 1 year |  |
| 8 | (L8) | 1 year |  |
| 9 | (L9) | 1 year |  |
| 10 | (L10) | 5 years |  |

**Laundry Business Characteristics**

*Laundry* business characteristics are presented in the form of a frequency distribution table. Based on Table 2, the results of the tabulation of questionnaires and interviews about the characteristics of *laundry* services in Iringmulyo Urban Village, the results obtained, based on the length of business of all existing *laundry* businesses are classified as household businesses owned by individuals, with operational time intervals ranging from 1-6 years*. Laundry* cleaning services in Iringmulyo Village are still running for <10 years on average. The length of a business is the length of time someone has pursued a business. The length of a business is the time an entrepreneur has spent in running his business. The length of effort determines experience, the longer the business, the better the quality of the business. This research emphasizes the length of business that has been carried out with the amount of liquid waste generated and discharged into sewers or bodies of water, the longer the business, the more waste is discharged into ditches or bodies of water.

The results obtained that 100% of all laundry businesses that do not have a business permit, while according to PP No. 27 of 2012 concerning environmental permits, business licenses or permits are instruments of environmental law that have a preventive nature, namely to control environmental impacts, this is because there are no rules made by local governments regarding the implementation of *laundry* business activities.

The average amount of *laundry* that is produced per day is related to the length of time that the *laundry* business has been established, the longer the business has been established, the greater the amount of laundry and the amount of liquid waste generated and discharged into the drainage canal. Water needs for the *laundry* industry on average 15 L to process 1 kg of clothing and produce about 400 m3 of liquid waste per day (Ciabatti 2009 in Nasir, S 2013). *Laundry* business that has been running for 5 years or more then the amount of laundry produced is on average above 30 kg per day, with the amount of liquid waste produced 20,000 m3, while businesses under 5 years with the amount of *laundry* <30 kg per day, then the amount liquid waste generated will be less, but even though the liquid waste generated is small because the liquid waste generated by the *laundry* business in the form of detergents that contain chemical elements in it such as surfactants must still be considered in the management of liquid waste. Surfactant as the main component in detergents has a chemical chain that is difficult to be degraded by nature (Widiyani, 2010). Examples of surfactants, one of which is from the *quaternary ammonium* group that can form nitrosamine compounds, this is dangerous because these compounds are carcinogenic or can trigger cancer if accumulated over a long time in the body. Additives for example *sodium lauryl sulfate* (SLS) compounds are known to cause skin irritation, slow the healing process and cause cataracts in adult eyes. The presence of foam closes the surface of the water so that limited air and water contact results in a decrease in the amount of dissolved oxygen. This will cause aquatic organisms to lack oxygen and can cause death (Ahsan, 2005).

There is no significant difference between the use of liquid type detergent and powder type dertergen in the MBAS level inspection, because the detergent used is a factory detergent that has received an SNI permit and has been environmentally friendly. Research conducted by Ardiyanto, P., et al in Muktiharjo Village in 2016, found that the use of detergents from self-concoctions that do not yet have SNI showed a high MBAS level of 33.9 mg/l, this has already exceeded the quality standard. This research although MBAS levels in liquid waste still meet quality standards, but it is feared that liquid waste that still contains chemicals and is discharged into the environment continuously, especially for *laundry*, which washing clothes> 50 kg per day without prior processing can pollute the environment. Based on the detergent on the market, it can be powder detergent and liquid detergent. In general, these two types of detergents have the same function. The thing that distinguishes the two is the form. Initially, liquid detergents are more widely used in cleaning kitchen utensils. But along with the times, liquid detergents are widely applied to industrial needs and cleaning clothes. This is because liquid detergents are easier to handle and more practical in their use (Fauziah, 2010), although economically liquid detergents are more expensive than powder detergents.

Based on the presence or absence of WWTP (Wastewater Treatment Plant), all *laundry*businesses do not have WWTP (Wastewater Treatment Plant) even though WWTP (Wastewater Treatment Plant) are simple because there are no local government regulations governing this business, so that in the implementation of the business, the resulting waste is not processed first and only flowed directly into the drainage channel, if this is done continuously for fear that within a certain period of time it could potentially can cause pollution to the environment.  The purpose of making WWTP (Wastewater Treatment Plant) is to filter and clean up polluted water from both domestic and industrial chemicals, treating domestic or industrial wastewater, so that the water can be reused according to their individual needs.

Table 2 . *Laundry*Business Characteristics

|  |  |  |
| --- | --- | --- |
| Question | Frequency (f=10) | Percentage (100%) |
| Long Standing Business |  |  |
| 1-5 years | 6 | 60% |
| > 5 years | 4 | 40% |
| Business license from the relevant department |  |  |
| Yes | 0 | 0% |
| Not | 10 | 100% |
| Washing is done on an average daily basis |  |  |
| < 30 kg | 6 | 60% |
| > 30 kg | 4 | 40% |
| The type of detergent used |  |  |
| Liquid | 4 | 40% |
| Powder | 6 | 60% |
| The presence or absence of WWTP |  |  |
| Yes | 0 | 0% |
| Not | 10 | 100% |
| Number of employees owned |  |  |
| 1 | 6 | 60% |
| > 1 | 4 | 40% |
| Work operational time per day |  |  |
| 9 hours | 4 | 40 % |
| <9 hours | 6 | 60% |

**Level of *Laundry*Effluent Liquid Waste MBAS**

Based on the results of the examination of liquid waste from the effluent of all *laundry* businesses conducted in the Department of Environment of Lampung Province, the results of all *laundry* liquid waste that have been inspected from all *laundry* businesses show that the results of MBAS levels still meet the quality standards for waste water based on PermenLH No 5 of 2014, namely the average range is 0.1 - 3 mg / L. The results of measurements of MBAS levels in the laundry effluent effluent can be seen in Table 3.

Table 3 . Results Of Measurement Of Mbas Levels in Effluent *Laundry*Liquid Waste

\* PermenLH No.5 of 2014 concerning Wastewater Quality Standards

Detergent residual wastewater produced in large volumes is very dangerous for the preservation of rivers and soils, where the water needs for the *laundry* industry on average require 15 L of water to process 1 kg of clothing and produce about 400 m3 of liquid waste per day (Ciabatti 2009 in Nasir, S 2013). Liquid waste discharged into the environment directly can cause disturbed natural balance that is soil pollution that can change soil pH, mineral content changes and nutrient disorders from the soil for plant life and polluted groundwater sources. Surfactants contained in detergents will reduce the breeding ability of aquatic organisms. Detergents also have a big role in reducing water quality. Laundry waste contains methylene blue active compound (MBAS) which is difficult to degrade and is dangerous for health and the environment (Prodjosantoso and Padmaningrum, 2011). According to the results of Makruf's research (2007) it is known that the surfactant concentration (MBAS) of 0.6 mg / l results in a significant change in the respiratory rate of tilapia. Suparjo (2010) research also found that detergent affects mortality and structural damage to gill tissue as an important respiration organ in tilapia *(Oreochromis niloticus)*, the higher detergent concentration is also the higher the mortality of tilapia.

The results of measurements that have been carried out on all laundry business effluents show the results still meet the quality standards according to PermenLH No.5 of 2014 concerning Wastewater Quality Standards, and at present there has not been any pollution caused by laundry liquid waste, but within a certain period of time it can have an impact bad for the environment, if the resulting liquid waste is discharged continuously into a body of water without any prior treatment.

**CONCLUSION AND SUGGESTIONS**

It was concluded that all laundry businesses in Iringmulyo of Metro City did not have a business permit and did not yet have an WWTP (Wastewater Treatment Plant) in running their business. The measurement results of MBAS levels in laundry effluent effluent still meet the quality standards (PermenLH No.5 of 2014 concerning Waste Water Quality Standards), however within a certain period of time it has the potential to cause pollution to the environment if not treated first before being discharged into drainage.

Laundry businesses are expected to be able to make a wastewater treatment plant before being discharged into the drainage flow. For the government to be able to make regional regulations governing laundry business and conduct supervision and coaching of all laundry business activities.

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