Decreasing of Turbidity Using Alum on Surface Water in Ijobalit Village, Labuan Haji Subdistrict, Lombok Timur District

Sutik Meru[1], R. Azizah[2]
[1,2]Department of Enviromental Health, Faculty of Public Health, Airlangga University, Indonesia.
Email: sutik1971@gmail.com (corresponding author), azizah@fkm.unair.ac.id

Abstract
In general, surface water is not clear enough because it contains dirt or fine particles derived from various sources such as household waste and industrial waste. One step in the processing of river water into drinking water is by eliminating the turbidity of river water. Turbidity of water can be removed by adding a chemical material called coagulant. Coagulant serves to bind the particles or impurities contained in the water into clumps that have a larger size so that more quickly settles. One type of coagulant commonly used is aluminum sulfate or often called alum. The purpose of this study is to measure the initial turbidity to the end and analyze the alum affix effectively reduce the level of surface water turbidity in Ijobalit Village. The type of research used was comparative research (comparison). The design of this research used the design of quasi experiments or time series design. Sampling method used in this research was grab sampling method. Sampling was conducted October 2010 at Location Tour Valley Green Ijobalit Village and location of Parameter Inspection at Water Quality Inspection laboratory (PKA) of Health Office of East Lombok District. The result showed that the average turbidity level was 6 days (33.33 NTU) and the turbidity level had exceeded the Standard of Clean Water Quality, Mean baseline 6 days of turbidity with 10 ml of alum variation in 1000 ml of sample water (25.50 NTU), giving 20 ml of alum variations in 1000 ml of sample water (17.83 NTU), and giving 30 ml of alum variations in 1000 ml of sample water (11.50 NTU) has exceeded the quality standard, it can be concluded that there is influence affixing alum variations on surface water in Ijobalit Village.

Keywords*: Turbidity, Surface water, Aluminum sulfate*

I. INTRODUCTION

Water is an essential need for living things. Life on earth desperately needs water but water used for survival must qualify as water that is eligible for use, the requirement is regulated in government regulations. Among the water drinking feasibility requirements are iron and manganese content as well as turbidity in water where these three parameters appear in certain amounts visible. One of the process of water treatment is the process of coagulation by adding a substance called coagulant (Efendi, 2003).

Clean water becomes one of the basic needs for human life. Clean water that meets the standards or requirements of health is drinking water that is odorless, colorless and tasteless and meets the required quality standards. The improvement of the quality of clean water by doing the processing is absolutely necessary especially when the water comes from surface water. In general, relay water surface quality is lower when compared with other sources (Udin, 1990).

Some considerations in the provision of clean water that meets health requirements in terms of physical, chemical, and bacteria in the implementation of technical and economic require expert and high cost. But there are some simple ways individually (household) that require less expensive cost in water treatment into clean water, such as the use of alum to reduce surface water turbidity.

As it is well known that surface water is generally not quite clear because it contains dirt or fine particles that come from various sources such as household waste and industrial waste. One step in the processing of river water into drinking water is by eliminating the turbidity of river water. Turbidity of water can be removed by adding a chemical material called coagulant. Coagulant serves to bind the particles or impurities contained in the water into clumps that have a larger size so that more quickly settles. One type of coagulant commonly used is aluminium sulfate $Al_2(SO_4)_3$ or often called alum.

Coagulation / flocculation is a process of agglomerating fine particles that can not be precipitated by gravity, into larger particles that can be precipitated, by adding coagulation materials. In the water treatment principle, commonly used coagulant ingredients include Tawas ($Al_2(SO_4)_3$), Ferro Sulfate ($FeSO_4$), Sodium Aluminate ($NaAl(OH)_4$), Ferrite Sulphate ($Fe_2(SO_4)_3$), Fero Chloride ($FeCl_3$), Ferry Chlorida ($FeCl_3$). (MOH RI, 1991). In water treatment in this study, the author tries to use coagulant material in the form of Tawas, in addition to the many alum on the market, namely Coagulan Aid "(Coagulant Supplement) that serves to obtain the level of

turbidity that meets the requirements, precipitation (helping the function of coagulant materials) (Depkes RI, 1991).

Based on the standard value of quality for turbidity, turbidity level for clean water according to Minister of Health Regulation No. 416 Year 1990 About: Terms and Supervision of Water Quality stated that; for the turbidity parameter for clean water is 25 NTU, and the use of Aluminum Sulfate in reducing the turbidity of surface water.

II. METHODS

The type of research was comparative research that was the measurement of the variable to find the influence/difference to the treatment. The design of this research used the design of quasi experiments or time series design. Sampling method used in this research was grab sampling method, which was sampling of river water representing water situation in a place at certain time but the taking is not united. Sampling was conducted October 2010 at Location Tour Valley Green Ijobalit Village with turbidity parameter and location of Parameter Inspection at Water Quality Inspection laboratory (PKA) of Health Office of Lombok Timur District.

III. RESULTS

Turbidity Measurement of Surface Water

Table 1. Results of Turbidity Measurement of Surface Water in Ijobalit Village

Number	Date of Sampling	Level of turbidity Early (inlet) (NTU)	after alum affixing (NTU)			Water Quality Standards (Permenkes 416/1990)
			10 ml	20 ml	30 ml	
1	8/11/2010	32	26	18	12	25 NTU
2	9/11/2010	35	26	19	11	25 NTU
3	10/11/2010	34	25	18	12	25 NTU
4	11/11/2010	34	26	17	10	25 NTU
5	12/11/2010	33	26	18	13	25 NTU
6	13/11/2010	32	24	17	11	25 NTU
Average levels of turbidity in 6 days		33.33	25.50	17.83	11.50	

From the table above it can be seen that the initial turbidity of surface water on first day (32 NTU), second day (35 NTU), third day (34 NTU), fourth day (34 NTU), fifth day (33 NTU), sixth day (32 NTU), with an average initial turbidity level of 6 days (33.33 NTU).

The final turbidity of surface water with giving 10 ml with alum variation in 1000 ml of sample water, on first day (26 NTU), second day (26 NTU), third day (25 NTU), fourth day (26 NTU), fifth day (25 NTU), sixth day (24 NTU), with an average initial turbidity level of 6 days (25.50 NTU).

Levels of surface turbidity of surface turbidity with giving 20 ml with alum variation in 1000 of sample water, on first day (18 NTU), second day (19 NTU), third day (18 NTU), fourth day (17 NTU), fifth day (18 NTU), sixth day (17 NTU), with an average baseline is 6 days turbidity level (25.50 NTU).

The final turbidity of surface water with giving 30 ml with alum variation in 1000 of sample water, on first day (12 NTU), second day (11 NTU), third day (12 NTU), fourth day (10 NTU), fifth day (13 NTU), sixth day (11 NTU), with an average initial turbidity level of 6 days (11.50 NTU).

A. Decreasing of Water Turbidity After Affixing with Different of Alum Types

After the initial turbidity and final turbidity are known, the following is the decrease of turbidity after going through the processing with alum affixing. The decrease of turbidity of surface water in Ijobalit Village after through affixing of various alum variations are as follows:

B. Decreasing of turbidity in surface water after affixing with alum variation in 1000 ml of sample water

For a decreasing of turbidity in surface water after affixing with alum variation in 1000 ml of sample water can be seen in the following table:

Table 2. Percentage of Turbidity Decreasing After Affixing with Diffrerent of Alum Types (NTU)

Number	Date of Sampling	Percentage of Turbidity Decreasing After Affixing with Diffrerent of Alum Types (NTU)					
		10 ml	%	20 ml	%	30 ml	%
1	8/11/2010	6	18.75	14	43.75	20	62.50
2	9/11/2010	9	25.71	16	45.71	24	68.57
3	10/11/2010	9	26.47	16	47.06	22	64.71
4	11/11/2010	8	23.53	17	50,00	24	70.59
5	12/11/2010	7	21.21	15	45.45	20	60.61
6	13/11/2010	8	25.00	15	46.88	21	65.63
	Average	7.83	23.45	15.50	46.48	21.83	65.43

Based on the table 2, it is known that after surface water has affixed with 10 ml alum in 1000 ml of sample water, the decrease of turbidity on the first day was 6 NTU (18,75%), in second day was 9 NTU (25.71%), third day was 9 NTU (26.47%), fourth day was 8 NTU (23.53%), fifth day was 7 NTU, (23.53%), and turbidity decreasing in sixth day was 8 NTU, (25.00%) and the average decrease of turbidity was 7.83 NTU (23.45%).

After the surface water was affixed with 20 ml alum in 1000 ml of sample water, the decrease of turbidity on the first day was 14 NTU (43.75%), second day was 16 NTU (45.71%), third day was 16 NTU (47.06%), fourth day was 17 NTU (50.00%), decreasing of fifth day was 15 NTU, (45.45%), and turbidity decreasing of sixth day was 15 NTU, (46.88%) and the average decrease of turbidity was 15.50 NTU (46.48%).

After the surface water was affixed with alum 30 ml in 1000 ml of sample water, the turbidity decrease on the first day was 20 NTU (62.50%), second day was 24 NTU (68.57%), third day was 22 NTU (64.71%), fourth day was 24 NTU (70.59%), fifth day was 20 NTU, (60.61%), and turbidity decreasing in sixth day was 21 NTU, (65.63%) and the average decrease of turbidity was 21.83 NTU (65.43%).

IV. DISCUSSION

A. Measurement of initial Turbidity on Water Surface at Ijobalit Village

Based on table 1, it is obtained that the final surface turbidity when reviewed based on the quality standard for clean water, based on Regulation of Minister of Health Regulation no. 416 Year 1990 About Terms and Supervision of Water Quality of turbidity level is 25 NTU, then the water is not yet qualified as clean water.

The high turbidity of surface water is caused due to the floating materials. Turbidity of waters is generally caused by suspension particles such as clay, mud, dissolved organic materials, bacteria, plankton and other organisms. Turbidity of the waters describes the optical properties of water determined by the amount of light absorbed and emitted by the materials contained in water.

Turbidity that occurs in stagnant waters such as rivers is mostly caused by suspended material in the form of colloids and fine particles. High turbidity can lead to disturbed osmeregulasi system such as respiration and power see aquatic organisms and can inhibit the penetration of light into the water. The main effect of turbidity is a significant decrease of light penetration, so that the activity of photosynthesis of phytoplankton and algae decreases, consequently the productivity of waters becomes decreased.

B. Measurement of final Turbidity on Water Surface at Ijobalit Village

Based on table 2, showed the final turbidity when reviewed based on the quality standard for clean water of Regulation of Minister of Health Regulation no. 416 Year 1990 About Terms and Supervision Quality Water turbidity level is 25 NTU, then the water has been qualified as clean water. Addition of alum in turbid water causes the aluminum ion bonds negatively charged, resulting in coagulation reactions. In the process of coagulation is followed by sedimentation to form flock-flock Al(OH)3 which precipitates the gravity of the earth. (Djasio, 1984). The main group in the coagulation process is the optimum aluminate compound at neutral pH. If the pH is high or may be said to be lack of doses then the water will look like raw water because aluminate groups are not formed perfectly. However, if the pH is low or may be said to be overdose then the water will appear whitish because too much alum concentration tends to be white. In cartesian formed an open parabolic relationship, thus requiring proper dosage in the water purification process.

If these substances are dissolved in water, salt dissociation will occur into metal cations and anions. The metal ion will be a layer in the solution at a concentration lower than that of the water molecule, this is due to the strong posistive charge on the surface of the metal ion (hydratation) by forming a hexaquo molecule (is 6 adjacent adjacent water molecules) or called metal.

V. CONCLUSION

The average of initial turbidity level for 6 days (33.33 NTU) has exceeded the Clean Water Quality Standard. Mean baseline 6 days of turbidity with 10 ml of alum variation in 1000 ml of sample water (25.50 NTU), giving 20 ml of alum variations in 1000 ml of sample water (17.83 NTU), and giving 30 ml of alum variations in 1000 ml of sample water (11.50 NTU) has exceeded the quality standard of clean water. From the analysis results can be concluded that there is influence affixing alum variations on surface water in Ijobalit Village.

VI.SUGGESTION

It is expected that this research can be developed in subsequent research by utilizing alum as a material of turbidity decline so that the use of alum as an alternative so that the quality of clean water can be improved so that it can be used for everyday purposes, The need for more research on the use of other cheaper and friendly coagulant materials environment. It should be noted that stirring and precipitation because it is very influential on the removal of turbidity and need to be done variation of particle size to get the results of a larger turbidity removal. In addition it needs million developed research, and as one of the learning media, especially alternative materials for water treatment in High School Environmental Engineering and other universities.

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