Effect Of River Water Quality Standards Of Coagulant Dose Komering Alumununium Sulphate Water Conditions At The Time Tide Water And Low Water

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Abstract-coagulationis the process of adding certain chemicals into the water. Chemicals used in coagulation is a coagulant. Coagulant function of which is to reduce turbidity, color and odor in the water that affect water quality. Material selection of coagulants and appropriate dosing can produce clean water in accordance with the standard provisions. The method used in this research is the experimental method, namely by conducting an experiment to get the results that show the relationship between a variable dose of coagulant, turbidity and pH content. This research was conducted with Jar test test is an experiment that serves to determine the optimal dose to get the quality of water refers to the Minister of Health Kep 907/2002, namely to turbidity <5 NTU and the resulting pH between 6,5 to 8,5.The purpose of this study was to determine the water quality by using alum coagulant to the raw water from the river Ogan. Testing Jar tests were performed with raw water turbidity and pH of the conditions of tide and low tide. Terms clean water processed Jurug IPA refers to KepMenkes 907/2002, namely to turbidity <5 NTU and the resulting pH between 6.5 to 8.5. From the test results obtained Jar tests optimum dose alum coagulant consumption of 0.05 gr / l to 4.9 NTU turbidity containing pH 6.5 for tidal river water conditions and alum coagulant optimum dose of 0.07 g / l with a turbidity of 5, 0 NTU containing pH 6.5 for Receding water conditions.

Keywords: optimum dose, type of coagulant, the raw water quality, jar test

Introduction

Clean water is a vital necessity for all mankind. Because of all the activities of people in various aspects of life of any need clean water. The availability of clean water is essential to support a healthy life. Especially in urban areas is very high population growth rate is felt increasingly difficult to get clean water that meets the health requirements. So actually it is theoretically not be difficult for the government, especially for the PT.Pertamina (Persero) Plaju to meet the needs of the surrounding community as well as for the needs of the plant itself.

PT.Pertamina (Persero) has its own special part to treat the raw water taken from the river intake komering, of course, with differences in the quality of raw water taken with the other intake like, of rivers and river musi ogan. The influence of the quality of raw water can be caused by factors inatake geographic location, their industrial or factory or settlements that were around the intake.

The main difficulty faced by water deposition process is to determine the optimum levels of precipitating agent or a coagulant (aluminum sulfate), due to the addition of precipitating agent (aluminum sulfate) are not always correlated linearly with the turbidity of the water in the final stages of coagulation process. Conditions tides and ebb raw water stream komering also affect the quality of the raw water with different pH and turbidity are different, and therefore the need to do research and the testing of raw water with before and after the addition of aluminum sulfate by jar-test and analysis of a complete water and of course there are differences in doses of aluminum sulphate on the tide to low tide conditions. Water treatment is a technical effort made to provide protection of water sources with improved quality of home water until a desired quality in order to secure the environment in the area used by PT. Pertamina (Persero) Plaju.

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The quality of water in this case include the physical and chemical circumstances that may affect water availability for human life, agriculture, industry, recreation and other water utilization. Asdak (2004: 497). In the Government Regulation 82 of 2001, the water quality parameters determined through testing of physical and chemical parameters.

Many ways of processing that can be applied in managing water resources, especially surface water sources. In the treatment of surface water, one of which is a chemical process (chemical process) in the form of coagulation. Some things to keep in mind with regard to the coagulation process is a coagulation theory knowledge, the type of coagulant, particle type and quality of raw water.

Type coagulant is one factor to consider in the process of coagulation. Type of the coagulant include alum (Al2SO4), Poly Aluminum Cloride (PAC), TOPAC, moringa seeds and many more types of coagulants that can be used, but the type of coagulant that is often used is alum sulphate is often called "alum" (Al2SO4).

As the times and the demands of science and technology berkembangannya are easy, quick, effective and economical, the use of the type of coagulant alum (Al2SO4) is expected to replace Poly Aluminum Cloride coagulant (PAC) would advance with research and experimental trials on its use.

Knowledge of particular chemical process of coagulation with alum coagulant types (Al2SO4), is expected to be controlled as well as achieve the desired targets by considering aspects of quality of water produced using alum coagulant.

The use of a coagulant (Al2SO4) visits of the price compared to other coagulants are relatively economical or cheap and easy pengguaannya for various - types of raw water.

Coagulants

Coagulant / Coagulation isthe destabilization of colloidal and suspended particles in the raw water for their mixing evenly with certain chemical compounds (coagulant) with rapid stirring.While flocculation is a process to accelerate clotting particles with very slow stirring. Coagulation is a colloidal particle coagulation process for adding chemicals so that the particles are neutral and form deposits for their gravitational forces.

Broadly speaking floc formation mechanism consists of four stages, namely:

1. Stage destabilasi colloidal particles
2. Phase formation of colloidal particles
3. Phase merger mikroflok
4. Stage mikroflok formation.

Several types of coagulants that can be used in the processing of raw water into clean water are:

A. aluminum sulfate

Aluminum sulfate is a kind of coagulant with the chemical formula Al2SO4, 11H2O, 14H2O or 18H2O, generally used is 18 H2O. Aluminum sulfate is derived in liquid form with a concentration of 5-20%. The content of Al2O3 alum ranging between 11-17% depending on the amount of crystalline water varying from. Good for powder or liquid, determined alum quality of Al2O3 content. The reaction can be written alum solution .:

Al (SO) → 2 Al + 3 + 3 (SO) -2 H2O → H + + OH-

Next :

2AL + 3 + 6OH- → 2AL (OH) 3

Additionally, it will be produced acid:

3 (SO4) -2 + 6H + → 3H2SO4

B. PAC (Polyaluminium chloride)

Al other compounds that are essential for coagulation is Polyaluminium chloride (PAC), Aln (OH) mCl3n-m. There are several ways that are patented to make polyaluminium chloride can be generated from the partial hydrolysis of aluminum chloride, as shown in the following reaction:

n AlCl3 + m OH-. m Na + → Al n (OH) m Cl3n-m

+ M Na + + m Cl

C. Compound Iron

For iron compounds, the same types of hydrolysis can take place such as:

Fe3 + + 3H2O → Fe (OH) 3 + 3H +

The above reaction H + followed by reaction with alkalinity. There is also a hydrated ferric ion such as: [Fe (H2O) 6] 3+.

Aluminum Sulfate (Al2SO4)

Aluminiumsulfat (Al2 (SO4) 3.14.H2O) derived in liquid form with a concentration of 5-20%. The content of Al2O3 alum ranging between 11-17% depending on the amount of water crystals that vary from 13-18. Good for powder or liquid, determined alum quality of Al2O3 content.

Aluminum sulfate is a derivative of aluminum which is most widely used and commercially available in powder and liquid. Alum largely insoluble at pH values between 5-7. At pH ≤ 5, alum reduce the aluminum ions are formed. At pH ≥ 7, alum reduces become aluminate ion.

Research Method

The variables that need to be obtained in this study is the river discharge komering intakes, turbidity (NTU), pH, coagulant dose use of materials (ppm), the optimum dose of coagulant material usage by type of alum with Jar test method tests on air intake komering river.

The first research procedure is to determine the optimum dose of coagulant that is the way take samples of raw water as much as ± 10 liters with different sampling days on 7 and 11 August 2019 when the river water and water tides ebb for a real comparison, and put in a glass beaker until the respective -masing 1 liter mark. Take raw water samples, measuring turbiditi and pH of raw water. Put the alarm on each mixer in the jar test tool. Then added a solution of aluminum sulfate 1% holding 1 liter of distilled water used as a dose of aluminum sulphate into each beaker with varying doses. A: 0.02 g / liter B: 0.03 g / l, C: 0.03 g / l, D: 0.04 g / l, E: 0.05 g / l and F: 0.07 gr / lt (20: 30: 40: 50: 60: 70 ppm). Lower the mixer and adjust the position of the stirrer so it does not touch the beaker and set the rotation speed of 130-150 rpm for 1 minute and then lower rotation speed to 50 rpm for 20 minutes and 0 rpm for 15 minutes. Pipette supernatant water (the liquid part of the most central nodes) in each beaker and insert the tube into

turbiditi clean and note turbiditinya. Then take 60 ml of the supernatant water before using 100 ml glass beaker and then measuring the pH of the water in each beaker. Note the results obtained and grab turbiditinya water quality is good but the pH value is not too low, this is the optimum dose. Water test results refer to KepMenkes 907/2002, are eligible: Turbidity <5 ppm and a pH of 6.5 to 8.5.

Results And Discussion

In research presented how different raw water quality of the river during high tide and at low tide with the help of a coagulant to the flocculation method *jar test.*

A. State Turbidity (NTU) and the pH Initial Raw Water

NO	sample River	Sample Collection Date	pH	Turbidity (NTU)
1	Tide	7/08 / 2019	7.5	36.6
		9/08/2019	7.4	34.2
		11/08/2019	7.6	33.3
2	Low tide	7/08/E2019	7.0	50.7
		9/08/2019	6.8	53.2
		11/08/2019	6.9	48.8

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B. **Effect of Aluminum Sulfate Coagulant Against River Water**

1.tide water Conditions

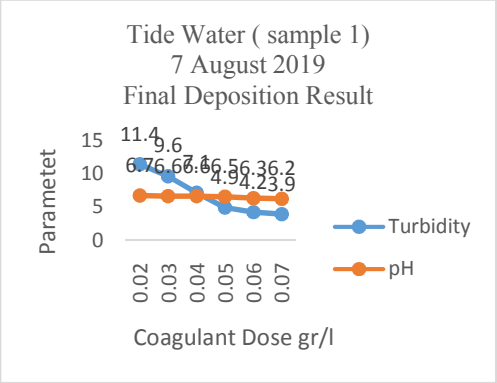

Figure 3.1 Graph dose effect of aluminum sulfate to the raw water At the Tide (sample 1)

So, from the experimental results obtained Figure 3.1 The optimum dosage for aluminum sulfate coagulant clean water that meets the criteria in accordance with the standard is 0.05 g / l (50 ppm) with Turbidity: 4.9 NTU and pH: 6.5.

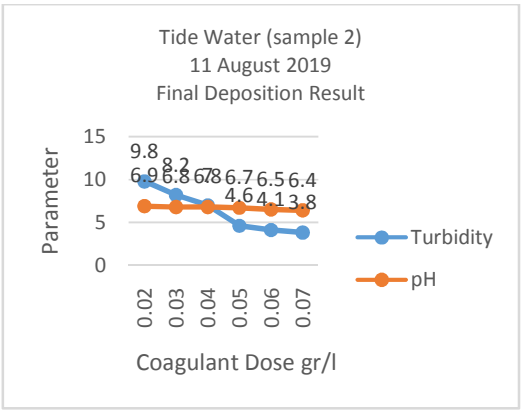

Figure 3.2 Graph dose effect of aluminum sulfate to the raw water At the Tide (sample 2)

So, from the experimental results Figure 3.2 (sample 2) obtained the optimum dosage for aluminum sulfate coagulant clean water that meets the criteria in accordance with the standard is 0.05 g / l (50 ppm) where Turbidity: 4.6 NTU and pH: 6.7

1. Receding Water Conditions

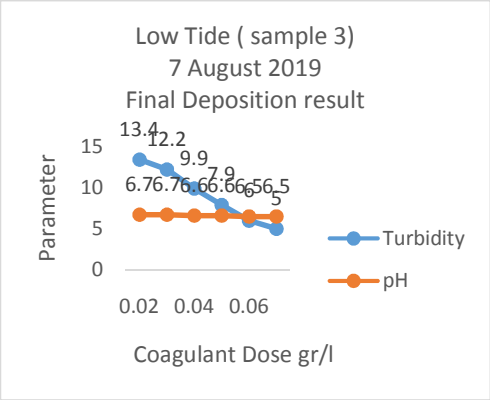

Figure 3.3 Graph dose effect of aluminum sulfate to the raw water at low tide (sample 3)

So, from the experimental results Figure 3.3. (Sample 3) obtained the optimum dosage for aluminum sulfate coagulant that meet the criteria in accordance with the provisions of the standard is 0.07 g / l (70 ppm) with Turbidity: 5.0 NTU and pH: 6.5.

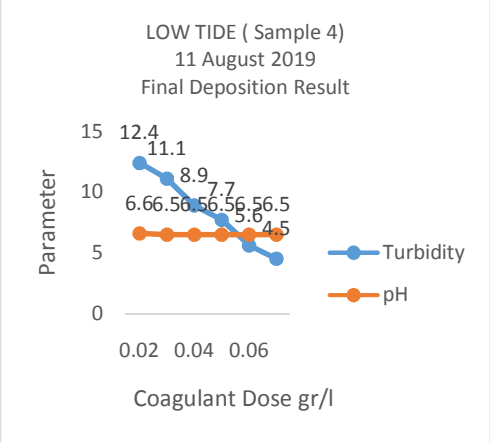

Figure 3.4 Graph dose effect of aluminum sulfate to the raw water at low tide (sample 4)

So, from the experimental results in Figure 3.4 (sample 4) obtained the optimum dosage for aluminum sulfate coagulant which meets the standard requirements krsesuai is 0.07 g / l (70 ppm) where Turbidity 4.5 NTU and pH: 6.5.

C. Comparative Results

Specification	Sample Tide (08/07/19)	Receding Water Sample (08/07/19)	Sample tide (11/08/19)	Sample tide (08/11/19)
Optimum dose of coagulan Al2SO4	0.05 gr / l	0.07 gr / l	0.05 gr / l	0.07 gr / l
pH (6.5-8.5)	6.5	6.5	6.7	6.5

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Turbidity (NTU) <5 ppm	4.9	5.0	4.6	4.5

Conclusion

Based on research that has been done, it can be concluded The big difference in the quality of pH and Turbidity (NTU) of river water during high tide conditions and low tide conditions. At low tide Turbidity (NTU) of the river is much more turbid than the river water at high tide conditions. With a difference Turbidity (NTU) that occur in river water conditions of ups and downs, for optimum dose used is also different to get Turbidity <5 ppm and for the optimum dose for the river at high tide the water is 0.05 g / l (pH: 6.5 and Turbidity: 4.9 ppm) and for the optimum dose of the river at low tide the water is 0.07 g / l (pH: 6.5 and Turbidity: 5.0 ppm).

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