



Analysis of Metal Content of Water Well of Aek Godang Village Community Using Electrolysis Method

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Abstract

Indonesia is a country that has a good source of clean water. But do not escape from water pollution caused by population density which is increasing from day to day. This has led to an increasing consumption of water as well as consumption of water in households and in industry. The presence of metals such as Fe (iron), Al (aluminum) and Cr (chromium) in the community's water can be a concern for the health of the residents of Aek Godang and its surroundings. Under these conditions, an experiment was carried out with the aim of analyzing the content of the population's water sources (dug well water, drilled well water, river water) using TDS and water electrolyze tools. The results of this study indicate that the water sources of the Aek Godang community have TDS levels of 24 mg/L and 23 mg/L so that it can be concluded that the water sources of the Aek Godang community are in the good category.

Keyword: Water; TDS; Elektrolyze

1. Introduction

Indonesia is one of the countries that has the largest human resources. Human resources that can affect the sustainability of the environment around humans. The environment must be kept clean and not damage it so that the relationship that occurs between living things and the environment can take place properly and be mutually beneficial. While water is a natural resource that is needed by all living things, especially humans. Because water has a very important function for the survival of living things, such as drinking, cooking and washing and other interests that use water for its use. For this reason, it is necessary for us to protect and preserve water so that it is kept clean.

As time goes by and as the population grows, the demand for water also increases, not only for daily needs but also for industrial and domestic needs. The construction of a factory as a

work area also requires a place or container to dispose of waste that is no longer used. The waste released by the industry can be in the form of hazardous metals, such as Fe (iron), Cr (chromium), and Al (aluminum). This is what causes water pollution, be it river water, sea water, or well water around the industry. High economic growth requires industrial development, both agro-industry and manufacturing industry. This means that more and more factories will be established, and there will be more potential for water pollution, both to river water, surface water and ground water around the industry.

In general, the process by which water pollution occurs can be grouped into two categories, namely: (1) The first category is pollution originating from direct contaminant sources, namely effluent originating from pollutant sources of factory waste or an activity and waste such as domestic liquid waste and feces and garbage. Pollution occurs because this waste flows directly into the water supply system (urban water supply system), such as rivers, canals, ditches/gutters. (2) Whereas the second category is pollution originating from indirect sources (indirect contaminant sources), namely contaminants that enter and move into the soil through cracks and pores of soil and rock due to contamination of surface water either from industrial and domestic waste.

The presence of iron (Fe) in clean water causes a metallic odor, gives rise to a red colloidal color (rust) in water due to oxidation by dissolved oxygen and can be toxic to humans. Likewise, the presence of chromium (Cr) which has high toxicity, the properties carried by this poison also result in acute poisoning and chronic poisoning, while the presence of aluminum (Al) can cause neurological disorders in humans.

Therefore the researchers conducted an experiment to analyze the metal content in water sources in the Aek Godang area. Where most people consume drinking water from rivers, water from dug wells, and water from drilled wells for their daily needs. This research was conducted to identify the levels of metals contained in the water source, whether the water is fit for consumption or cannot be consumed periodically and continuously. The aim of the study was to identify metal levels in the water sources of the Aek Godang community to find out whether the water used as a source of drinking water was suitable for consumption and safe for health. Thus it can be known whether the water in this area is polluted or not.

Water electrolysis is one way to see and decompose pollutant ions dissolved in water with an anode-cathode system. Water pollutants can be detected with a digital TDS meter. The higher the TDS (Total dissolved solids) number, the more substances will decompose in ppm (particles per milli-liter) units. The electric current makes the direct current source give a different charge to the two electrodes (Ihsana, 2010).

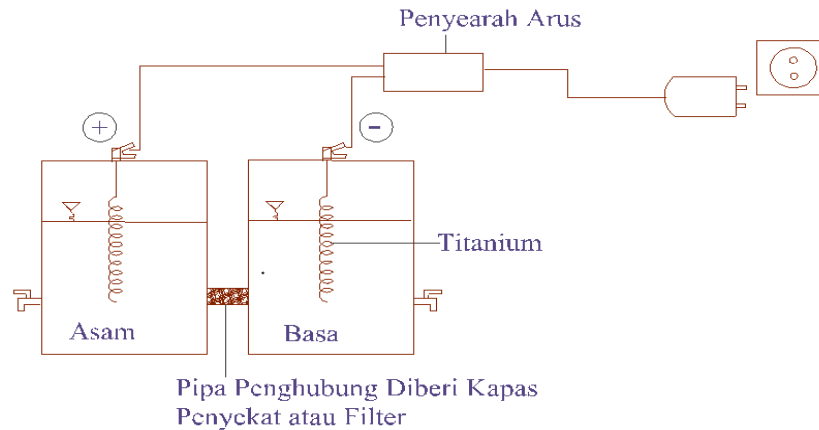


Figure 1. Electrolysis Equipment

2. Method

This research was conducted in May-June 2022, taking locations in the village area of Aek Godang which is located in North Padang Lawas Regency. The people of this area use existing water sources as their main source of cooking needs and especially as a source of drinking water. In this study examined 15 samples of water sources in the Aek Godang area. Each sample was taken as much as 1 liter to be used as a test material. The water used as the test material is drilled well water, dug well water, river water. The method used in this research is the experimental method, namely by testing the trial materials using TDS and an electrolyzer (water electrolyzer) by electrolyzing water, then the results obtained will be compared with one another.

3. Results and Discussion

This research was conducted at the Padangsidempuan IAIN Laboratory, with samples taken in the Sihitang area, where the Aek Godang community and Padangsidempuan IAIN students who are in the area are the main objects who consume drinking water from several existing sources. Among them; dug well water, drilled well water, river water and tap water.

The increasing number of residents who come and go, the higher the consumption of drinking water needed by local residents. Population density also supports the level of water consumption both in households and in industry, so that the composition of water in community settlements also needs to be reviewed. River water around residents also often becomes a place for organic and inorganic waste so that accumulation and blockage occurs which causes flooding on residential roads. Meanwhile, the water from the drilled wells that are used by residents also sometimes experiences turbidity and the water from dug wells causes a distinctive odor.

This experiment was carried out to analyze the condition of the water used by the community, in order to know how much metal or aluminum content is contained in the water. The

presence of iron (Fe) in clean water causes a metallic odor, gives rise to a red colloidal color (rust) in water due to oxidation by dissolved oxygen and can be toxic to humans. Likewise, the presence of chromium (Cr) which has high toxicity, the properties carried by this poison also result in acute poisoning and chronic poisoning, while the presence of aluminum (Al) can cause neurological disorders in humans. Considering the dangers that can be caused by metal elements contained in water, an experiment was carried out to test how much metal element content is in community water sources using the electrolysis method and a water solids meter or often referred to as TDS (total dissolved solids).

Before carrying out the water electrolysis process, the water temperature is measured using a TDS (total dissolved solid) instrument, a drinking water tasting panel concludes that the taste of drinking water is related to the TDS level as follows; very good taste, TDS less than 300 mg/liter; good, between 300-600 mg/liter; enough, between 600-900 mg/liter; less, between 900-1200 mg/liter; unacceptable, greater than 1200 mg/liter. High TDS levels can be seen from crusty kitchen equipment and crusty pipes. Meanwhile, for good water consumption it should be less than 300 mg/L or between 300-600 mg/L.

At the time of electrolysis of water will experience a color change that marks what is contained in the water. Water that is tested at the same time must use different water sources. The final result obtained can be white, gray, yellow which contains various other elements

Table 1. Results of TDS and Electrolysis Analysis

No	Water type	TDS level	Time	Color	Content
1	River water	42	1 minute	Clear Gray	- Calcium
2	Dug well water	24	1 minute	Clear	-
3	Drilled well water	40	1 minute	Clear- yellow	Aluminium
4	Tap water	23	1 minute	Clear	-

The results table above explains that river water has a low TDS level of 42 mg/L so that this water is included in the category of unfavorable water, but after being electrolyzed the color changes to gray which indicates that the water contains lime. Drilled well water has a tds level of 40 mg/L which is considered poor water, but after being electrolyzed it changes color to yellow which indicates that the water contains aluminum. Dug well water and tap water have a tds level of 24 mg/L and 23 mg/L, this water is clean water, after going through electrolysis there is no color change, so the water shows good water and is suitable for drinking.



Figure 2. Water Sample

From the results above, most of the water sources in the Aek Godang area are suitable for drinking and some containing metal elements such as aluminum and lime are not suitable for drinking because they are categorized as polluted. The presence of these elements in water if you drink it will have an impact on your health and you will experience several serious diseases such as; kidney disease, central nervous system, carcinogenic, metabolic imbalance, urinary disorders, and liver disease.

The drinking water standards used in Indonesia are the same as those used by WHO. Water is considered fit for drinking if it meets the physical, microbiological, chemical and radioactive requirements. (Permenkes no. 492/MENKES/PES/IV/2010 regarding drinking water quality requirements).

1. Physical, namely: a) Colorless/clear; b) Odorless; c) Natural taste
2. Biological parameters, namely: Does not contain harmful germs such as *E.Coli and Coliform bacteria*.
3. Chemical parameters, namely: a) Total dissolved solids (TDS) < 500. Total dissolved solids or mineral content dissolved in water is less than 500. Our bodies need minerals that are useful for the body. However, these minerals may not exceed the limits set by the government; b) pH 6.5-8.5. Good water acidity is between 6.5 to 8.5; c) Free of toxic chemicals; d) Does not contain heavy metals; e) Does not contain pesticides; f) Does not contain radioactive material.

4. Conclusion

The results of this experiment show that the water source of the Aek Godang community has a TDS level below 300 mg/L using a water electrolysis device with the result that the color changes are yellow and gray and there is no color change in the water, so it can be concluded that this community's water source fall into the good category. The source of drinking water is suitable for consumption and safe for health. Thus it can be seen that the water in this area is mostly not

polluted.

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