



Dug Well Water Quality to Reduce Pollution Parameters Kapasa Village, Biringkanaya District, South Sulawesi

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Abstract

The quality of dug well water should comply with established regulations. The pollution caused by bacteria to water in the ground widens to ± 2 meters at a distance of 5 meters from the source of pollution and narrows to a distance of 11 meters in the direction of the ground flow. This type of research is descriptive research, namely to determine the use of silica sand filter media, activated carbon in filter reactors on reducing TDS, Nitrite (NO₂), Dissolved Manganese and MPN Coliform by comparing the composition of the filter media with reference to clean water quality standards Permenkes No. 2 In 2023, the samples in this research were dug wells located in Kapasa Village, Biringkanaya District, Makassar City. The results of this research after the filtration intervention of manganese media, activated charcoal and silica sand, found that TDS, color, Manganese Nitrite (NO₃) had decreased levels of environmental pollution, this is in accordance with the Regulation of the Minister of Health of the Republic of Indonesia Number 2 of 2023. Conclusions from the results research shows that silica sand, manganese and activated charcoal filtration media, TDS, manganese nitrate (NO₂) and MPN Coliform can effectively reduce water pollution levels in dug wells in accordance with the Minister of Health Regulation. So the risk of infectious and non-communicable diseases can be overcome with the intervention of silica sand, manganese and activated charcoal filtration media.

Keywords: Quality, Well Water, Pollution Parameters, Biringkanaya, South Sulawesi

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1. Introduction

Dug wells are one of the most common and widespread well constructions used to extract groundwater for small communities and individual homes as drinking water at a depth of 7 – 10 meters from the ground surface. Dug wells provide water that comes from soil layers that are relatively close to the ground surface, therefore they are easily exposed to contamination through seepage. Generally, seepage comes from human waste in latrines/latrines and animals, as well as from waste from the well itself, both because the floor and the wastewater channel are not watertight. Dug wells are a source of providing clean water for communities in rural and urban areas.

Dug wells provide water that comes from soil layers that are relatively close to the ground surface, therefore they are easily exposed to contamination through seepage from human, animal waste, or for domestic household purposes.

Dug wells as a source of clean water must be supported by construction requirements, location requirements for the construction of a dug well, this is necessary so that the quality of dug well water is safe in accordance with established regulations. Pollution caused by bacteria to water in the ground extends to ± 2 meters at a distance of 5 meters from the source of pollution 3 and narrowing to a distance of 11 meters in the direction of ground flow. Groundwater has an important role in the lives and livelihoods of the Indonesian people, because its function is one of the basic daily needs. The presence of groundwater in Indonesia is quite abundant, but not everywhere there is groundwater according to geological conditions and rainfall.

Groundwater is some of the rainwater that reaches the earth's surface and absorbs into the soil layers and becomes groundwater. Before reaching the groundwater layer, rainwater will penetrate several layers of soil and cause hardness of water. The hardness of ground water causes the water to contain mineral substances in concentrations. These mineral substances include calcium, magnesium and heavy metals in the form of Fe and Mn. From a health perspective, the use of dug wells is not good if the method of making them is not properly considered, but to minimize the possibility of pollution, prevention efforts can be made. These precautions can be fulfilled by paying attention to the physical





conditions of the well which is based on conclusions from the opinions of several experts. in this field, including the location of the well not less than 10 meters from the source of pollution, the floor of the well at least 1 meter in diameter and distance from the walls of the well and watertight, waste water drainage channels of at least 10 meters and permanent, the height of the well rim 0.8 meters, have a well ring (wall) of at least 3 meters and have a strong and tight well cover.

2. Research Methods

This type of research is descriptive research, namely to determine the use of silica sand - activated carbon filter media in filter reactors to reduce TDS, Nitrite (NO₂), Dissolved Manganese and Total Coliform by comparing the composition of the filter media with reference to clean water quality standards Permenkes No. 2 of 2023.

3. Results and Discussion

a. Results

Table 1
Inspection Results Laboratory Parameter
Bacteriological In Well Dig, Kapasa Village
Biringkanaya District, Makassar City

Parameter Bacteriological	Before Intervention		Sesudah Intervention		Niai Limit Maximum
	Results Inspection Laboratory	Information	Results Inspection Laboratory	Information	
MPN Coli	371	No FulfilCondition	110	No FulfilCondition	(0) CFU/IOO ml
E. Coli	0	FulfilCondition	0	Fulfil Condition	(0) CFU/IOO ml

The results of laboratory tests before the filtration media intervention were carried out showed that the bacteriological parameters of MPN Coliform do not meet the requirements based on mark Limit Maximum in accordance Minister of Health Regulation, whereas E. Coli show results test laboratory before done intervention media filtration showed that there was a decrease in bacteria and after the intervention





was carried out filtration media manganese, charcoal active, and sand silica found that MPN Coliforms wow no fulfil condition in accordance Minister of Health Regulation No 2 Year 2023.

b. Discussion

1. Silica sand media

To produce clean water, quartz sand is also used to produce drinking water. Quartz sand is again used because of its ability to remove turbidity, suspended particles, and also filter macro particles such as mud or moss. The function of active sand is to reduce the iron (Fe) content in water and at the same time filter large / small particles in the water. This active sand is black and is recommended for filtering drilled well water and the like, especially those with high iron content problems. Sand that contains a lot of silica is called silica sand or quartz sand.

Silica sand, often also known as white sand, is the result of weathering of rocks that contain main minerals, such as silicon dioxide and feldspar. Silica sand is used as a medium to reduce the total suspended solid / TSS content in the water to be filtered. For water that causes odors, other additives can be used which we will discuss next. Gradual sand sizing is needed to produce water according to needs. Generally, silica sand is sold in packs per bag. 50 Kg and the price varies, calculated per Kg.

2. Manganesa Media

Manganese sand functions to remove manganese, iron or hydrogen sulfide content which looks like an oily top layer in drinking water. The function of Manganese Zeolite is to remove Manganese content (Mn^{2+}), and the oily top layer in drinking water or ground water or PDAM water or Mountain water The function of Manganese Zeolite is to remove Manganese content (Mn^{2+}), and the oily top layer in drinking water or ground water or PDAM water or mountain water.





The manganese content in water can be tested simply by adding tea to the water, the color of the water will change to blue and not brown or yellow like the color of tea in general, this is due to the high manganese content in the water. Iron or manganese in water is generally in the form of Fe^{2+} or Mn^{2+} ions, compounds that are soluble in water and colorless. If the water comes into contact with air, the Fe^{2+} ions or Mn^{2+} ions will slowly oxidize to form ferric compounds (Fe^{3+}) or manganedioxide compounds (Mn^{4+}) which are insoluble in water. These compounds are brown in color and can cause an unpleasant odor and taste. There are many ways to remove iron and manganese from water. One simple way is to combine the aeration and filtering process with silica sand filter media, Manganese Zeolite and activated carbon, or with Manganese Zeolite and active carbon media. By using a manganese zeolite filter and an activated carbon filter equipped with a cartridge filter and Ultra Violet sterilizer, you can produce processed water that can be drunk directly.

Both iron and manganese, in water, are usually dissolved in the form of compounds or bicarbonate salts, sulfate salts, hydroxides and also in colloidal form or when combined with organic compounds. Therefore, the processing method must be adjusted to the form of iron and manganese compounds in the water to be processed. There are several ways to remove iron and manganese from water, one of which is by oxidation, coagulation, electrolytic method, ion exchange method, contact filtration method, soda lime process, processing with iron bacteria and other methods. The process of removing iron and manganese by oxidation can be done in three ways, namely oxidation with air or aeration, oxidation with chlorine (chlorination) and oxidation with potassium permanganate. Apart from oxidation, the removal of iron and manganese compounds in water which is commonly used, especially on a household scale, is by passing it through a filter with Manganese Zeolite media.

Manganese greensand/manganese sand is special sand coated with a catalyst, why it is coated with a catalyst is because this layer reacts with iron,





manganese and sulfide dissolved in water and forms sediment which is then trapped in the filter media. This media is also used to remove arsenic or radium. Manganese sand is generally used to reduce levels of iron, manganese and Hydrogen Sulfide or H₂S in water. So, manganese sand is indeed suitable for use in overcoming several well water problems such as rust-smelling water, oil-coated water, water that causes yellow and black deposits at the bottom of water storage containers, and water that smells.

3. Activated Charcoal Media

Activated Carbon is a material that contains many very small pores. The presence of many pores makes activated carbon have the ability to absorb any other substances that are close to it. For household needs, generally the use of water filter media is between 9 months to 1 year for local activated carbon. For imported media it can last up to 2 years because of its higher absorption capacity. Active carbon works by binding urea and toxic substances to be carried through the bloodstream to the digestive tract and excreted through feces. Reduces gas production from the digestive tract. Reduces unpleasant odor in sufferers of trimethylaminuria. Reduces total and LDL cholesterol and increases HDL. Activated carbon is a water filter solution to purify water and absorb the smell, taste and color of the water. The way active carbon purifies water is by adsorbing contaminants that cause odor, taste and color in the water, making the water clear and odor-free. Activated Alumina Carbon Composite has pollutant adsorptivity capabilities with quite good physical and chemical properties, but does not have an antibacterial agent that is capable of killing bacteria.

4. Conclusion

The conclusion from the research results is that silica sand, manganese and activated charcoal filtration media, TDS, manganese nitrate (NO₂) and MPN Coliform can effectively reduce water pollution levels in dug wells in accordance with Minister of Health Regulation No. 2 of 2023. So that the risk of infectious diseases and non-infectious disease can be overcome with the intervention of silica sand, manganese and





activated charcoal filtration media, the need for awareness among the people around the dug wells to maintain cleanliness around the wells and get used to healthy water treatment before the water is consumed.

5. Compliance With Ethical Standards

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Disclosure of conflict of interest

This research collaboration is a positive thing for all researchers so that conflicts, problems and others are absolutely no problem for all writers.

Statement of informed consent

Every action we take as authors is a mutual agreement or consent.

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