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Clean Water Quality Analysis based on Chemical Parameters at the Taha Qur'an Education Park Bima Regency

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Abstract

Unclean water is the cause of skin diseases. Skin diseases are included in water washed diseases which are influenced by the environment and human behavior. The water source at the Taha Qur'an Education Park is a drilled well, this water source is close to the residents' livestock pens which can be a source of pollution. The aim of the research is to determine the quality of clean water in the Taha Qur'an Education Park. Type of qualitative descriptive research. The population in this study was all the water taps in the Taha Qur'an Education Park. The number of samples was 2 samples. Based on Minister of Health Regulation number 32 of 2017, the results of water chemistry quality tests from the results of pH measurements on samples from Tap A were 7.5 and on samples from Tap B were 7.5, which is based on Regulation of the Minister of Health of the Republic of Indonesia Number 32 of 2017. Quality standard values for pH it is 6.5-8.5, while for checking Detergent levels in clean water the results obtained for tap A samples are 0.03 Mg/L and for Tap B samples it is 0.02 Mg/L, which is based on the Minister of Health Regulation Republic of Indonesia Number 32 of 2017 The quality standard value for Detergents is 0.05 Mg/L. It is hoped that the management of the Taha Qur'an Education Park will continue to maintain the quality of clean water in the Taha Qur'an Education Park, Bima Regency.

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INTRODUCTION

Water is an environmental medium that cannot be separated from humans in their lives. However, as technology develops, pollution of the water environment occurs on a large scale, causing water quality to decline (M. Sari & Huljana, 2019).

A healthy and unpolluted environment can be seen from the quality of water used by humans as a basic support for activities in human life. Water is an environmental medium that cannot be separated from humans in their lives. However, as technology develops, pollution of the water environment occurs on a large scale, causing water quality to decline. A healthy and unpolluted environment can be seen from the quality of water used by humans as a basic support for activities in human life (Wardhani & Cahyonugroho, 2023)

Sources of clean water are generally found in layers of soil or rocks below the ground surface. The role of groundwater is very important because groundwater is the main source of water to meet basic human needs (Alfatihah dkk., 2022)

The main source of groundwater is rainwater which enters through infiltration into the soil. Groundwater has several disadvantages or weaknesses compared to other water sources because groundwater contains mineral substances in high concentrations. These mineral substances include magnesium, calcium and iron which cause hardness. The main problems faced in relation to water resources are the quantity of water which is no longer able to meet increasing needs and the quality of water for domestic purposes which is decreasing from year to year. Industrial, domestic and other activities such as agriculture have a negative impact on water resources (Ahmad Iqbal Addzikri & Firra Rosariawari, 2023).

Using water that does not meet the requirements can cause health problems. These health problems can be infectious or non-communicable diseases. Infectious diseases that are spread directly by water are called waterborne diseases. Non-communicable diseases due to water use occur because the water has been contaminated with dangerous or toxic substances. Clean water must not contain chemicals in excessive amounts. Clean water that meets health requirements must be free from contaminants and must meet quality standards (Kadang & Ola, 2021).

Environmental Health Quality Standards for Water media for Sanitation Hygiene Purposes include physical, biological and chemical parameters which can be mandatory parameters and additional parameters. Mandatory parameters are parameters that must be checked periodically in accordance with statutory provisions, while additional parameters are only required to be checked if geohydrological conditions indicate the potential for pollution related to the additional parameters. The mandatory parameters for physical parameters consist of Temperature and TDS, the mandatory parameters for chemical parameters are Detergent and pH while the mandatory parameters for biological parameters are Esceria Coli and Coliform. Water for Sanitation Hygiene Purposes is used to maintain personal hygiene such as bathing and brushing teeth, as well as for washing food, eating utensils and clothes. Apart from that, water for hygiene, sanitation purposes can be used as raw drinking water (Permenkes RI No. 32, 2017).

Clean water must not contain chemicals in excessive amounts. Chemically, clean water must not contain toxic substances, must not contain substances that can cause health problems, and must not contain substances that exceed certain levels so that they can cause health problems. One of the chemical parameters of clean water is hardness. For drinking and cooking water purposes it is only permitted with a hardness limit of 50-150 mg/L. Hardness levels above 300 mg/L include very hard water (Budiarti & Soenoko, 2019)

The Taha Qur'an Education Park is one of the Qur'an Education Parks located in the Sanggar District, Bima Regency. The number of students at the Taha Quran Education Park is 111 students. Improving the quality of the process of teaching and learning activities in the Taha Quran Education Park, the need for clean water is a very important factor in supporting various activities in the Qur'an Education Park environment. The use of water in the Quran Education Park environment includes bathing activities , washing, toileting, ablution, etc. Based on the background above, researchers are interested in examining chemical parameters in clean water in the Taha Qur'an Education Park.

METHOD

Types of Research

The type of research used is descriptive qualitative with a laboratory approach which aims to determine the quality of clean water based on chemical parameters in the Taha Qur'an Education Park, Bima Regency. The measurement results will be compared with applicable

standards based on the Regulation of the Minister of Health of the Republic of Indonesia Number 32 of 2017 concerning environmental health quality standards and water health requirements for sanitation hygiene purposes.

Research Procedure

Sampling (SNI 03-7016-2004)

Equipment and Materials

Sample bottles (Jerry can sample bottles, glass bottles, sterile sample bottles), Carrying bags, Bunsen lamps, Cotton, 70% alcohol, Tissue, Label paper, Cooler, Clamp/crust and Sodium thio sulfate reagent.

Procedure

1. Check the tap is working properly
2. Clean the tap from any objects that are stuck and might interfere with it using a clean cloth, clean the tip of the tap from any dust
3. Turn the tap until the water flows optimally and let the water run for 1-2 minutes
4. Sterilize for one minute with fire from cotton that has been dipped in alcohol using a Krustang, another alternative is to use another type of combustion (Bunsen lamp). Or wipe with alcohol using cotton.
5. Chemical sampling, The tap does not need to be sterilized, prepare a sample bottle, open the lid of the sample bottle and insert the water sample by avoiding contact with air by flowing water over the walls of the bottle until it is full.

Labeling

1. Sample code
2. Sample type
3. Sampling location
4. Purpose of inspection
5. Sample
6. Collection date
7. O'clock
8. Sample sender
9. Check parameters

Sample delivery

Sample are placed in a carrier bag at a cold temperature (4℃) and sent to the laboratory as soon as possible, a maximum of 3 x 24 hours for clean water. For dirty water 12 to 24 hours.

Detergent Inspection (SNI 06-6989.51-2005)

Equipment and Materials

The tools used include spectrophotometry, analytical scales, 250 mL separating funnel (preferably with a spout and lid made of Teflon), 100 mL measuring flask; 500 mL and 1000 mL, 200 mL beakers, 1.0 mL, 2.0 mL, 3.0 mL and 5.0 mL volumetric pipettes and 5 mL and 10mL measuring pipettes. The materials used are Linear Alkyl Sulfonate (LAS) powder or sodium lauryl sulfate (C12H25OSO3Na), 0.5% phenolphthaline indicator solution; Dissolve

0.5 g of phenolphthaline with 50 mL of 95% alcohol in a 250 mL beaker. Add 50 mL of distilled water and a few drops of 0.02 N NaOH solution until pink. 1N sodium hydroxide (NaOH) solution; Dissolve 4.0 g NaOH with 50 mL distilled water in a 100 mL volumetric flask, add distilled water until it reaches the mark and homogenize. Sulfate solution (H2SO4) 1N; Take 2.8 mL of concentrated H2SO4, then put it in a 100 mL measuring flask containing 50 mL of distilled water. Add distilled water until it reaches the mark and homogenize.

Sulfate solution (H2SO4) 6N; Take 20 mL of concentrated H2SO4, then put it in a 200 mL beaker containing 120 mL of distilled water and homogenize. Methylene blue solution; Dissolve 100 mg methylene blue with 100 mL distilled water and homogenize. Take 30 mL of the solution and put it in a 1000 mL measuring flask, add 500 mL of distilled water, 41 mL of 6N H2SO4 and 50 g of sodium phosphate monohydrate (NaH2PO4.H2O), shake until completely dissolved then add distilled water until it reaches the mark and homogenize chloroform (CHCl3) p.a; washing solution; Take 41 mL of 6N H2SO4 and put it in a 1000 mL volumetric flask containing 500 mL of distilled water. Add 50 g of sodium dihydrogen phosphate monohydrate (NaH2PO4.H2O), shake until completely dissolved then add distilled water until it reaches the tera mark and homogenize, hydrogen peroxide (H2O2) 30%, Isopropyl alcohol (i-C3H7OH); k) glass fiber (glass wool).

Preparation of 1000 mg/L anionic surfactant stock solution

Dissolve 1,000 g of active 100% LAS or sodium lauryl sulfate (C12H25OSO3Na) with 100 mL of distilled water in a 1000 mL volumetric flask then add distilled water until it reaches the mark and homogenize.

NOTE Store anionic surfactant stock solutions in the refrigerator to reduce biodegradation. If a precipitate forms, this solution cannot be used.

1. Preparation of 100 mg/L anionic surfactant standard solution

   Pipette 10 mL of 1000 mg/L anionic surfactant stock solution and put it in a 100 mL volumetric flask, then add distilled water until it reaches the mark and homogeniz.

2. Preparation of working solutions of anionic surfactants

   a. pipette 1.0 mL; 2.0 mL; 3.0 mL and 5.0 mL of 100 mg/L anionic surfactant standard solution and put each into a 250 mL volumetric flask;

   b. add distilled water until it reaches the tera mark to obtain an anionic surfactant content of 0.4; 0.8; 1.2 and 2.0 mg/L MBAS.

   NOTE The working solution can be prepared from commercially available ready-to-use standard surfactant solutions.

3. Creation of Calibration Curve

4. Test Prosedure

   a. measure 100 mL of the test sample in duplicate and place it in a 250 mL separating funnel;

   b. add 3 drops to 5 drops of phenoltaline indicator and 1N NaOH solution drop by drop into the test sample until a pink color appears, then remove it by adding 1N H2SO4 drop by drop;

   NOTE If the anionic surfactant content in the sample is 0.08 mg/L - 0.4 mg/L, then the volume of the test sample taken is 250 mL and if the anionic surfactant content in the sample is 0.025 mg/L - 0.08 mg/L, then the volume The test sample taken was 400 mL.

pH Measurement (SNI 06-6989.11-2004)

Tools and Materials

The tools used include a Ph meter with equipment, a glass or magnetic stirrer, a 250 ml beaker, tissue paper, analytical scales and a thermometer. The material used is a buffer solution.

Preparation

Calibrate the pH-meter with a buffer solution according to the instrument's work instructions every time you take a measurement. For test samples that have high temperatures, condition the test samples to room temperature.

Procedure

1. dry with tissue paper then rinse the electrode with plain water.
2. Rinse the electrode with the test sample.
3. Dip the electrode into the test sample until the Ph meter shows the correct reading.
4. Record the scale reading or numbers on the Ph meter display.

RESULTS AND DISCUSSION

Based on the results of examining the chemical parameters of clean water in the Qur'an Taha educational park using pH parameters and detergent levels, the results were obtained

Table 1 Result of Parameter Chemical

Parameter	Sample	Measurement Result	Quality Standard
Ph	Tap A	7,5	6,5 – 8,5
	Tap B	7,5	
Deterjen	Tap A	0,03 Mg/L	0,05 Mg/L
	Tap B	0,02 Mg/L	

In the table above, it can be seen that the pH measurement results on Tap A and Tap B are the same as 7.5, while checking the detergent level on Tap A is 0.03 Mg/L and on Tap B is 0.02 Mg/L. By obtaining normal pH test results which are supported by good water source conditions, namely closed drilled wells, taps that are not exposed to direct sunlight and normal water temperature conditions because if the water source is directly exposed to sunlight, photosynthesis will occur in the living organisms. If it is in water, the carbon dioxide concentration will decrease so that the pH will rise and the water will become alkaline and vice versa. (Vidika A. dkk., 2017).

pH value of more than 8.5 indicates low corrosion properties because the lower the pH, the higher the corrosion properties. Water pH values greater than 8.5 have a tendency to form scale and are less effective in killing bacteria because they are more effective in neutral or weakly acidic conditions. Based on the results of checking detergent levels, the results obtained were still below the threshold value determined by Ministerial Regulation of the Republic of Indonesia Number 32 of 2017.

By obtaining normal detergent test results which are supported by good water source conditions, namely remote water sources with waste disposal systems and good drilled well construction, this can prevent contamination of water sources and also the number of students washing clothes is reduced due to the laundry which makes detergent. in normal water. If the use of anionic surfactants or detergents exceeding this threshold value will result in negative

impacts, namely increasing the toxicity of poisons, becoming carcinogenic substances (causing cancer), causing a taste in the water, reducing oxygen absorption in the water, damaging the gills and respiratory organs of fish and inhibiting the ability of photosynthesis. (Saputri dkk., 2018).

Conventional detergents are made from various chemical compounds such as builders, artificial fragrances, and the most dangerous are surfactants Surfactants are petroleum derivative compounds that function to reduce the tension on the surface of water or make the surface wetter so that it is more likely to interact with oil and fat (Destiquama dkk., 2019). Most conventional detergents use surfactants in the form of phosphates, alkyl benzene sulfonate, diethanolamines, alkyl phenoxy (Vaulina, 2022). All of these compounds are compounds that come from non-renewable resources (petroleum), are toxic and are dangerous for the environment (A. P. Sari & Nurdiana, 2017). High detergent surfactant content and exceeding the detergent MBAS limit value in water is one of the causes of eutrophication Eutrophication is water pollution caused by the emergence of excessive nutrients into the water ecosystem. Eutrophication that occurs in water ecosystems is caused by the presence of detergents containing phosphate (Y. Sari, 2019)

CONCLUSION

Based on the results of the examination of the chemical parameters of the clean water at the Qur'an Taha Education Park, it has met the requirements in accordance with the Regulation of the Minister of Health of the Republic of Indonesia Number 32 of 2017, where the pH measurement results obtained for samples from Tap A were 7.5 and for samples from Tap B were 7.5, where based on the Regulation of the Minister of Health of the Republic of Indonesia Number 32 of 2017, the quality standard value for pH is 6.5-8.5, while for checking detergent levels in clean water, the results obtained for tap sample A were 0.03 Mg/ L and in the Tap B sample it is 0.02 Mg/L, which is based on the Regulation of the Minister of Health of the Republic of Indonesia Number 32 of 2017. The quality standard value for Detergent is 0.05 Mg/L. It is hoped that the staff of the Qur'an educational park will pay more attention to the sanitary hygiene of the existing clean water reservoirs.

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