

EFFECTIVENESS OF USING ZEOLITE AND RESIN IN REDUCING Ca IONS AND Mg IONS IN HARD WATER FROM WELLS IN PURWODADI, GROBOGAN, CENTRAL JAVA

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ABSTRACT

One of the schools in Purwodadi area uses groundwater as a water source to fulfill daily needs. From the analysis, it is known that the groundwater contains Ca²⁺ and Mg²⁺ elements with moderate hardness. If the water is used to meet daily water needs, it will cause problems, such as excessive use of soap that can damage the environment, damage to fabrics or clothing, and corrosion of equipment made of iron. Therefore, it is necessary to reduce hardness in order to improve water quality.

The purpose of this research is to reduce the level of hardness contained in groundwater in the Purwodadi Grobogan area using zeolite, reduce the level of hardness contained in groundwater in the Purwodadi Grobogan area using zeolite, determine the effectiveness of using zeolite in reducing water hardness levels, and determine the effectiveness of using resin in reducing water hardness levels.

The research method that will be carried out to achieve the objectives consists of three stages. The first stage is zeolite and resin preparation. The second stage is the absorbance test of zeolite and resin against hard water. The third stage is testing the Ca²⁺ and Mg²⁺ content in hard water before and after the absorbance process by zeolite and resin.

The results of FTIR characterization of cation resin showed the presence of O-H (alcohol), C=C (alkene), and S=O (sulfonate) functional groups. The resin is proven to contain sulfonate groups detected in the range of wave numbers 1006 - 1168 cm⁻¹ in the FTIR test results. The mass of resin used in hard water treatment affects the results of Ca and Mg reduction in hard water. In this study, the most effective resin mass used to treat 200 ml of hard water is 25 grams. The percentage decrease in Ca concentration is 100% and the decrease in Mg is 99.79%.

Cation resin that is used repeatedly still has good effectiveness in reducing high hardness levels. After being used repeatedly to treat 200 ml of hard water for 5 repetitions, the resin is still able to reduce 97.40% of Ca levels and 98.26% of Mg levels from the original levels. The effect of acid activation performed on commercial zeolite is to increase the surface area of zeolite by 8.87%. Based on the results of the SAA characterization test conducted on zeolite samples that have not been activated, the surface area is 5.091 m²/g, while the activated zeolite has a surface area of 5.465 m²/g. The best adsorption efficiency generated from the research conducted is by using a stirring composition of 1.5 grams of zeolite with a stirring time of 2 minutes.

Kata Kunci: *ard water, zeolite, resin, effectiveness, adsorption*