OPTIMIZATION OF EXPERIMENTAL FACTORS IN SULFATE CONTENT REDUCTION IN SEAWATER USING RESPONSE SURFACE METHODOLOGY

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Abstract

Seawater is the main source of salt production. Seawater contains various mineral elements and from these elements there are elements that are categorized as impurities in the process of making salt, one of which is sulfate. Reduction of sulfate content in seawater can be done through the process of adding impurities to seawater, where the binder used is activated carbon.

The process of reducing sulfate content is carried out by conducting experiments based on factorial design with response optimization using the Response Surface Methodology (RSM) method. RSM is a methodology based on mathematical and statistical techniques used to model and analyze problems where the response obtained is influenced by several variables and the problem has the aim of optimizing the response. The factors used in this experiment are the weight of activated carbon and the volume of lime, then grouping is carried out on each factor based on the type of activated carbon. The response observed in this experiment is the percentage decrease in sulfate concentration.

The results of the analysis using the RSM method obtained a quadratic equation model with the equation value on activated carbon A: $y = -116.1 + 5.339x_1 + 0.333x_2 - 0.05398x_1^2 - 0.00395x_2^2 - 0.00044x_1x_2$, while the type of activated carbon B obtained equation value: $y = -129.4 + 6.22x_1 + 0.008x_2 - 0.064x_1^2 - 0.0018x_2^2 - 0.00192x_1x_2$, with an optimization value for activated carbon type A of 22.07% and specific gravity of activated carbon 49.2929 mg and the volume of citrus is 39.3939 μl, and the optimization value for activated carbon B is 23.243%, the specific gravity of activated carbon is 49.0909 mg and the volume of lime is 28.0808 μl.

Keywords: experimental design, response surface, salt, seawater