ABSTRACT

The purpose of this research is to evaluate the treatment efficiency of vinasses generated in an industrial alcohol plant by flocculation with an organic polymer of polyacrylamide monomers for the removal of total suspended solids and the recycling of waste, applying a central composite design. rotating as a response surface methodology, calculating the optimal points of the independent variables. The response variable is total suspended solids (TSS) evaluated through turbidity as an indicator. The natural variables are translated into coded variables, a first-order model is developed, and the steepest ascent method is applied, then adjusting to a second-order model for optimal calculation of the independent variables. To carry out the experimental part of the second-order model, a rotating central composite design (CDC) is used, consisting of a 22 factorial with 4 runs, 4 axial or star runs and 6 central runs. Initially, we worked with 3 independent variables such as pH, temperature and concentration of the organic polymer, but from the variance analysis of the first order model, the temperature variable did not contribute significance in the experimental interaction on the response variable, therefore said variable is discarded. and is taken as a constant in the experimentation process. The vinasse sample from the industrial alcohol plant is characterized, analyzing the treatment supernatant in the laboratory and the experimental results of the treatment of the vinasse by flocculation show agreement with the stated objectives, quantifying a reduction in turbidity and removal of total suspended solids in 93.48% and 75%, respectively, at optimal pH values equal to 4.96 and flocculant concentration at 30.85 ppm, concluding that the treated effluent and the sludge generated by treatment meet the requirements for recycling as water for the dilution of molasses in the industrial fermentation process and soil improver respectively

Keywords: Wastewater treatment, response surface methodology, central composite design, vinasses treatment.