

## Wastewater disinfection using sodium dichloroisocyanate (NaDCC) and sodium hypochlorite (NaOCl): Modeling, optimization and comparative analysis

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### ABSTRACT

The aim of this study was to evaluate the ability of sodium dichloroisocyanate (NaDCC) and sodium hypochlorite (NaOCl) for wastewater disinfection in a batch system with considering the contact time (5, 10, 15 min) and disinfectant concentration (0.01, 0.02, 0.04, 0.06, 0.08, 0.1, 0.2, 0.4 mg/L). Distilled water was mixed with wastewater to produce a given concentration of bacteria. Pure plate count (PPC) method was used to determine the initial and final concentration of bacteria. Three regression models including first order (FO), first order plus two way interaction (FO + TWI), and second order (SO) were used to fit the experimental data. The differences among group means were analyzed using Kruskal–Wallis and ANOVA analysis. The removal efficiency of NaDCC and NaOCl were 88.7 and 52.38% at an initial concentration of 0.01 mg/L and contact time of 10 min. The results of Kruskal–Wallis test showed that the mean of disinfection efficiencies were statistically different at different concentration of disinfectant ( $p$ -value < 0.05). However, there was no statistically significant difference between removal efficiency at different contact time based on one way ANOVA analysis ( $p$ -value > 0.05). These results were the same for both disinfectants. The modeling data showed that the best regression model to describe the disinfection mechanism was SO model with  $R^2$  value of about 0.84 for both NaDCC and NaOCl. According to the present study, it can be concluded that the NaDCC is more suitable for water and wastewater disinfection because of higher efficiency at lower contact time and concentration.

**Keywords:** Sodium dichloroisocyanate (NaDCC); Sodium hypochlorite (NaOCl); Wastewater; Disinfection; Modeling

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