

## Prediction of trihalomethane formation in water distribution systems

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### ABSTRACT

Utilities involved in drinking water treatment are faced with a serious challenge in achieving the balance between pathogen destruction by chlorination and trihalomethanes (THMs) minimization below regulatory levels. Mathematical modeling offers an effective tool in cases where the prediction of THM formation is required. The main purpose of this study is to develop an empirical mathematical model that would predict the THM formation in water distribution systems on a laboratory scale. A parallel purpose of the study is to investigate, develop and test procedures for conducting water quality studies related to THM formation. Different types of regression models were investigated using backward elimination for the THM model parameters to select the optimum number of independent variables to be used. The Statistical Package for the Social Sciences backward regression revealed that there are five possible empirical models that predict the amount of total THMs formation as a function of various parameters such as, chlorine concentration, contact time, and temperature. The fifth model which only considers the free chlorine as independent variable, explains 80% ( $R^2 = 0.8$ ) of the variability in total trihalomethanes (TTHM). This means that the best regression variable in predicting the TTHM is the free chlorine. The developed model serves as a basis for conducting further studies of THM formation on real scale water distribution networks.

*Keywords:* Chlorination; Trihalomethane; Modeling; Water distribution; Water quality; Chlorination by-product

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