

論文 / 著書情報  
Article / Book Information

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| 題目(和文)            |                                                                                                                                                                                              |
| Title(English)    | Elucidation and correction of fluorescence quenching for accurate prediction of chlorination by-products                                                                                     |
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| Author(English)   | Kornravee Saipetch                                                                                                                                                                           |
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| 学位種別(和文)          | 博士論文                                                                                                                                                                                         |
| Category(English) | Doctoral Thesis                                                                                                                                                                              |
| 種別(和文)            | 要約                                                                                                                                                                                           |
| Type(English)     | Outline                                                                                                                                                                                      |

# Thesis outline

## **Title: Elucidation and correction of fluorescence quenching for accurate prediction of chlorination by-products**

### Background and objective of this study

Chlorination by-products is a drawback of chlorination which is known as possible carcinogenic agents. Monitoring of such compounds are crucially importance for safety. The current monitoring methods required substantial budget, time and skilled technician (i.e., gas chromatography), which limits method's applicability. Therefore, monitoring of chlorination by-products by using predictive models has been proposed as the promising method for prompt monitoring. However, the accuracy of proposed models still requires improvement because they have higher level of error in concentration than the level of regulated concentration of chlorination by-products. One of possible errors which has potential to play a major role on accuracy of predictive models is the improper utilization of surrogate parameters. Fluorescence excitation-emission matrix (EEM) is believed as the best surrogate indicating precursors of chlorination by-products from its commonality of aromatic structure. However, EEM itself has a limitation in underestimation of amino acid and/or protein concentrations in the water matrix containing humic substances, which naturally co-exists in aquatic system. None of proposed models have considered this fact, which may play significant role on the prediction accuracy of chlorination by-products predictive models.

Therefore, the aim of this study is the improvement of an accuracy of models for prediction of trihalomethane concentrations (THMs) of THMs formation potential (THMsFP) test by using EEM after eliminating of its embedded limitation based on its fluorescence quenching mechanism.

### Structure of the study

The study contains seven chapters (Figure 1) and a brief overview of each chapter is given below:

Chapter 1: This chapter describes the overall background, the importance of this study, summary of the main contents and propose of this study.

Chapter 2: This chapter provides a comprehensive literature review about DBPs and the current status on the application of fluorescence in DBPs predictive models.

Chapter 3: This chapter reports an importance of correcting for fluorescence quenching in fluorescence-based prediction of THM formation potential under the separate reaction of chlorine and bromine

Chapter 4: This chapter reports the mechanism of an inter-components interaction in dissolved organic matter by using multi-spectroscopies

Chapter 5: This chapter proposes the idea of the methods for correction of fluorescence quenching for unknown water samples

Chapter 6: This chapter reports the EEM-based models for prediction of THM species concentration of THMFP test after correcting fluorescence quenching

Chapter 7: Outline of main findings in this thesis and provides recommendation for future researches and applications

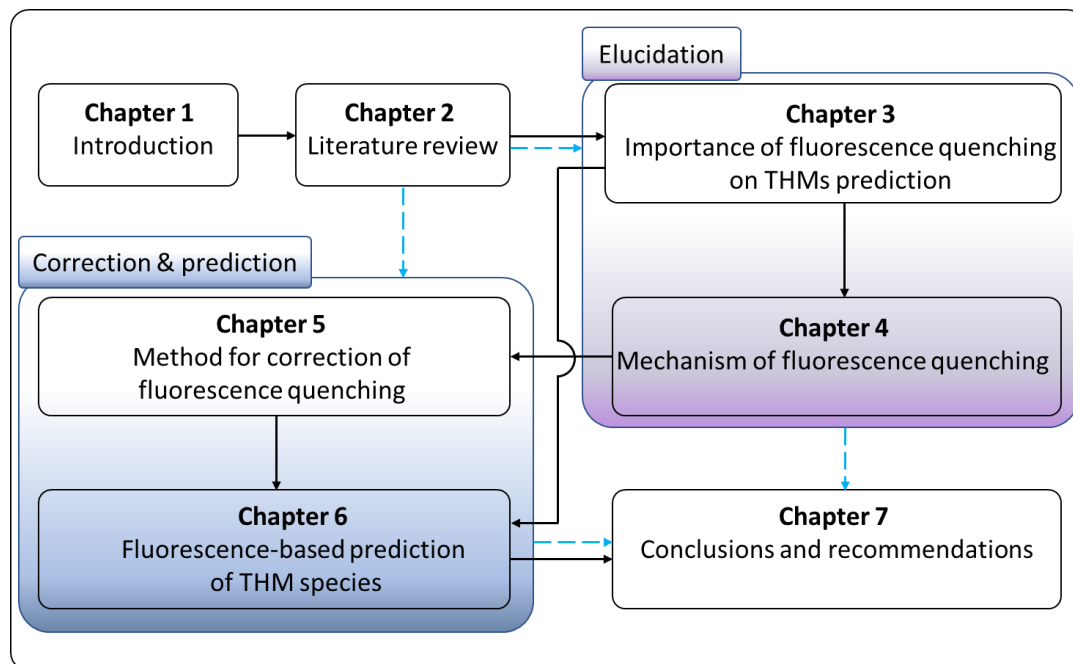


Figure 1 Structure of the study and connections between chapters