CHAPTER I

INTRODUCTION

The use of chlorine as a disinfectant in potable water had a long and successful history of making water sufficiently free of pathogenic organisms that minimized the probability of waterborne diseases among the consuming public. In developing countries, it is still a choice because of its effectiveness, relative ease of application and low cost.

Lately, some experimental results have indicated that the use of chlorine during water treatment can produce trihalomethanes (THMs). This has caused a lot of alarms and concerns among health authorities and general public. Chloroform, one of the THM species, has been shown to be toxic affecting the liver and kidney functions and carcinogenic. This concern has led to psychologically reluctant acceptance by the public on the use of chlorine in water treatment.

THMs, mainly chloroform, bromodichloromethane, dibromochloromethane and bromoform occur as results of reactions between chlorine and natural organic matter (NOM) such as decomposing plants and animal materials in water. There are a few possible ways to reduce THMs. Among them, removal of THM precursors before formation of THMs and the removal of THMs themselves during water treatment are the main processes (Kavanaugh, 1978). This study focuses on the removal of THM precursors, a preventive approach, in water treatment.

Precursors of THMs are macromolecules known as humic acid, fulvic acid, hymatomelanic acid and alga material. In most of surface water, the concentrations of the mentioned precursors highly present ranging from 1 to 20 mg/L TOC (Total organic carbon), which made them important precursors (Kavanaugh, 1978).

Therefore, the evaluation of THM precursors in raw water can lead to prevention of THMs formation.

A pelletizer is a reactor in which destabilized colloids are forced to be in contact with one another through a proper degree of agitation, resulting in small but very dense pellets (Mitsuo et al., 1975). The up-flow pelletization process was successfully used to remove turbidity from synthetic raw water (Tambo and Matsui 1987,1989; Panswad and Channarong, 1998). The process was also satisfactorily applied in clarification in biological wastewater treatment processes (Suzuki et al., 1993; Tambo et al. 1993, 1994). However, no studies used this system to remove THM precursors. In this study, the main objectives are to study the possibility and efficiency of up-flow pelletization process to remove THM precursors.

1.1 OBJECTIVES

i) To investigate the possibility and efficiency of up-flow pelletization process on THM precursors removal.
ii) To Determine the optimum operating conditions for up-flow pelletization process on THM precursors removal.
iii)To Determine the optimum dosage of coagulant and coagulant-aid on THM precursors removal.

1.2 SCOPES OF STUDY

In this study, the system is tested with raw water from Bangkhen Water Treatment Plant and run until a steady state condition is achieved. Polyaluminum chloride (PACl) and nonionic polymer is used as the coagulant and coagulant aid, respectively.

In addition, pH, turbidity, Total organic carbon (TOC) and UV absorbance at 260 nm (UV260) are analyzed as criteria to determine process performance in terms of THM precursor removal.

1.3 ANTICIPATED BENEFITS

This study may provide available results for some applications as follow:

i) The primary data on removal capability of THM precursors by up-flow pelletization process.

ii) The application guideline of alternative method by up-flow pelletization process for removal THM precursors in drinking waters.

iii)The research to develop new technology which is suitable to be used in Thailand.

1.4 COMPONENTS OF THE THESIS

This thesis comprises six chapters including this introduction. Chapter 2 gives literature survey concerning THM precursors, methods for THM precursors removal, mechanisms used by up-flow up-flow pelletization for THM precursors removal. In Chapter 3, materials and methods are presented. The results and discussions could be found in Chapter 4 and Chapter 5 is the conclusions. Finally, Chapter 6 is the recommendations for future works.