CHAPTER I
INTRODUCTION

In recent years, the utilization of surface active agent for the separation and purification of various compounds, e.g., bioproducts and environmental pollutants, from aqueous streams has been increased. Some advantages in surfactant-based separation technologies are availability of various surfactants, possibility of designing a desirable surfactant, flexibility of the process, and nontoxicity and biodegradability of most surfactants.

Cloud point extraction (CPE) is a separation process that utilizes nonionic surfactant as a separating agent. It has high potential to be an alternative to traditional liquid-liquid extraction because of its high efficiency, cost effectiveness and environmental friendliness. The CPE can be considered as an aqueous biphasic extraction. When the aqueous nonionic surfactant solution is at a temperature above its cloud point, phase separation is induced, forming two isotropic aqueous phases. One is rich in surfactant micelles called a micellar-rich phase or coacervate phase. The other phase is lean in surfactant micelles and, called a dilute phase. Dissolved organic solutes will tend to be solubilized and concentrated in the coacervate phase, which contains surfactant in concentrated form.

Cloud point extraction has been applied for separating several compounds, e.g., water-soluble organics, membrane proteins, and metals from aqueous media. For example, phenol and pyridine derivatives are successfully separated from aqueous solution by cloud point extraction (Akita and Takeuchi, 1996)

In order to make the CPE economically feasible, the surfactants, which serve as a solvent in the extraction process, have to be recovered and reused. Since these organic solutes have high enough volatility, it has been suggested to remove these solutes from the surfactant solution by vacuum stripping. Therefore, this work aims to study the removal of volatile aromatic pollutant from coacervate phase by means of vacuum stripping in packed bed contactor with co-current operation. The study will focus on three components that are t-octylphenolpolyethoxylate, $OP(EO)_7$ (trade name Triton X-114) as a surfactant, water as a diluent and toluene as a volatile aromatic pollutant. A mathematical model of the packed column will be further

performed in order to study the effect of vacuum pressure and feed velocity on the mass transfer coefficient.