CHAPTER I
INTRODUCTION

Surfactants appear in the effluents of a number of industries such as textile, paper and pulp, food processing, and detergent manufacturing. These species can cause severe waste water problems. As environmental regulations tighten, there is increasing concern about reducing the surfactant concentration in the effluent streams. Nowadays, surfactant based-separation processes are of increasing interest in the removal of waste water and ground water (Scamehorn and Hawell, 1989). Generally, in these processes the surfactants will be added to remove the pollutants from effluent streams. Sometimes, these resultant effluent streams contains a low surfactant concentration. In addition to satisfying environmental regulations, the value of the surfactant being emitted sometimes make recovery operations economical. The surfactant concentrations in these effluent streams are generally around or below the critical micelle concentration (CMC) (Scamehorn, Shristain and Ellington, 1989).

Colloid-Enhanced Ultrafiltration technique is one of surfactant based-separation processes. The interesting path of this technique is micellar-enhanced ultrafiltration (MEUF). In MEUF, surfactant is added to an aqueous stream containing dissolved pollutants. The surfactant concentration is higher than CMC point, so most of the surfactant is present as aggregates called micelles. The micelles solubilize organic contaminants and bind multivalent ions (e.g., heavy metal , chromate) if the surfactant is chosen to have the proper valence. This stream is then treated by Ultrafiltration with membrane, pore size small enough to block the micelles from entering stream. After this

step, retentate solution, stream not passing through the membrane, contains surfactant in micellar form with contaminants. If the contaminants are volatile organic, the vacuum stripping is used to separate the contaminants from the surfactant, or if it is heavy metal, precipitation technique can be used to separate these metal from the surfactant. The surfactant is then reused in the process. In the permeate, stream passing through the membrane, surfactant not in micelles (monomer) leak into the permeate stream coming through the membrane at a concentration around the CMC (Scamehorn et al., 1989).Generally, the surfactant must be recovered from the stream for an economical separation (Roberts, 1993).

Leakage of surfactants monomers into permeate is undesirable for environmental and economic reasons. Some methods which have been considered to solve this problem include the use of surfactant with very low CMC so leakage is tolerable, use of polymeric surfactant which should not pass into the permeate at all, or foam fractionation.

Foam fractionation has been extensively studied for the purpose of removing pollutants such as heavy metal from water by adding surfactant on purpose. In the current study, the purpose is to recover surfactant itself by using foam fractionation. In previous work (Tharapiwattananon, 1996), effect of air flow rate, foam height, liquid height, surfactant feed concentration, and sparger porosity have been studied. In this work, the effect of added salt concentration and the temperature of the system is investigated. This research involves the systematic study of variables on the efficiency of a foam fractionation operation in a pilot-scale fractionator for several different surfactants.