CHAPTER I
INTRODUCTION

Microemulsion has already been used in technological and household applications. It is a spontaneous formation of a transparent or translucent solution upon mixing of oil, and surfactant combined with a cosurfactant and an electrolyte. The greatest expectation for application of microemulsion is enhancement of oil recovery. Traditional methods used an anionic surfactant and an alcohol as a cosurfactant to form microemulsion, where a cosurfactant has an ability to prevent formation of rigid structures such as gel, liquid crystal, and precipitation. An application of microemulsion for removal of organic contaminants in subsurface (soil remediation) has been proposed based on the success of oil recovery by using microemulsions enhancement.

Technological development of microemulsion for cleaning up of chemicals in soil remediation is emphasized on use of harmless substances in a formulation. Any residue left in subsurface and subjected to diffuse in along underground water will not be harmful to living matters and environment. Food grade or biodegradable surfactants have been proposed for soil remediation (Dierkes *et al.*, 1998, Solan and Kunieda, 1997). There are many attempts to formulate alcohol-free microemulsion systems by using an environmentally friendly cosurfactant such as unsaturated fatty acid ethyl ester (Kahlweit *et al.*, 1995), polyglyceral, ether phosphate (Solan and Kunieda, 1997) and octanoic acid (Selle *et al.*, 1991), etc., since most of microemulsion formulations contain short chain and low molecular weight alcohol which is known as volatile organic and flammable substance. In our previous study on the removal of perchloroethylene (PCE) in subsurface, octanoic acid was proposed as the friendly cosurfactant in microemulsion system consisting of Dowfax8390, water, PCE and hardness ions as an electrolyte. The results

showed the gel formation occurring in type II microemulsion. In addition, octanoic acid promoted microemulsion type III to occur easily for the Dowfax8390 system which apparently gave very low viscosity and good PCE solubilization.

More attention is paid on using fatty acids as the cosurfactant due to the fact that fatty acids have the advantage of low vapor pressure and biodegradable property, when it is applied to the soil remediation. Moreover fatty acids are widely used in cosmetic and pharmaceutical (Thevinin *et al.*, 1997). In this study we will investigate alcohol-free microemulsion formation using octanoic acid as cosurfactant. A simply well known microemulsion system consisting of SDS, water, and hexane reported in Bourrel and Schechter's textbook (1988) will be used, except octanoic acid will replace alcohol cosurfactant. The systems will be studied for phase behavior, solubilization and physicochemical properties.