CHAPTER I
INTRODUCTION

Surfactants are widely applied in many of industries especially in household products. A large volume of surfactants was used results in the presence of the surfactants in sewage effluents and sludges which are normally discharged into surface waters or disposed of on lands, thus impacting the ecosystems. Nowadays, awareness of the ecological impacts of surfactants is growing owing to increased interest in environmental issues. Surfactants that are environmental friendly and have rapid biodegradation are of great interest to be used for any applications.

Moreover, as the price of petrochemicals has increased, surfactants derived from renewable resources have become more attractive to replace petroleum-based surfactants including alkyl phenol ethoxylates because they have less toxic after biodegradation. AEs are more tolerant of high ionic strength and also hard water than anionic surfactants. They are biodegraded more readily than linear alkyl benzene sulfonate (LAS) which are currently used as a main component in most commercial detergent products. Moreover, AEs are excellent for removal of oily soil and are often used in laundry products. They are also excellent emulsifiers and suspending agents in numerous industrial applications, where they compete with alkylphenol ethoxylates which are completely biodegraded under aerobic conditions. However, the aerobic biodegradation intermediates of alkylphenol ethoxylates are toxic to fish and other aquatic organisms whereas AEs can be degraded aerobically with higher rates and without any toxic products.

In addition, microemlsion formation of AEs is of great interest in many areas including enhanced oil recovery, pharmaceutical, agrochemicals, cosmetic ingredients, and household products. The widespread interest in microemulsions for in these different industrial applications are based mainly on their high solubilization capacity for both of hydrophilic and hydrophobic compounds, their large interfacial areas, the ultra-low interfacial tensions achieved when they coexist with excess aqueous and oil phases, and their long-term stability (Rosen, 2004).

The application potential of microemulsions was recognized at an early stage and has started a buildup of knowledge about the phase behavior of oil-water-surfactant systems, which are known as fish diagrams.

The purpose of this work was to investigate the microemulsion formation of motor oil with AEs having different EO groups under the presence of cosurfactant with different chain lengths at various temperatures. The microemulsion formation of surfactant/cosurfactant/ motor oil/water systems to form different Winsor Types (I, II, III, IV) microemulsion were obtained, known as fish diagrams. In order to enable to choose the suitable conditions for a specific application, the effects of number of EO groups of AEs, cosurfactant chain length, and temperature on microemulsion formation and solubilization capacity were studied. In addition, cloud point temperature of added alcohols into AEs was also investigated.