CHAPTER I
INTRODUCTION

One of the most common problems in using surfactants in any application is source of surfactants. The origins of surfactants currently available can be classified into two groups: Oleochemical surfactants, also referred as natural surfactant, are derived from plant oil or animal oils and fats; Petrochemical surfactants, also known as synthetic surfactants, are derived from petroleum. Presently the surfactant industry currently uses both natural (oleochemicals) and synthetic (petrochemicals) surfactant but natural surfactants have been increasingly used since they are considered to be environmentally friendly.

Basically, all surfactants have a same basic structure: a hydrophilic (water-loving) "head" and a hydrophobic (fat-loving or water-hating) "tail" which is always a long chain of carbon atoms (Rosen, 2004). The carbon chains of natural feed stocks (fatty alcohols) are always linear and even-numbered, for example, palm oil (C16-C18 chains), and palm kernel and coconut oils (the laurics, C12-C14), while synthetic feed stocks may have branched carbon chains and contain even or odd number of carbon atoms. These differences can result in a significant impact on cleaning performances. Therefore, oleochemical and petrochemical alcohols have different hydrophobic structures that affect to the performance properties of alcohol ethoxylates.

In addition, the different EO (ethylene oxide) adduct distribution (hydrophilic structure) of both alcohols may have narrow or broad distribution. The EO adduct distribution can be directly inserted into alcohol and made narrower or broader by modification of the catalyst (Hama, 1997). So, each alcohol ethoxylate has different average EO distributions that affect to the performance properties.

The replacement for group of alcohol ethoxylates, the knowledge of basic physico–chemical properties is important for applying these knowledge in selecting surfactants, ingredient and condition. The properties affected by hydrophobic and hydrophilic (alcohol and EO chains, respectively) structures are the surface tension at the CMC (critical micelle concentration), cloud point, wetting property, and especially foaming tendency. These properties are important in cleaning performance.

For example, low surface tension at the CMC generally assists cleaning, cloud point temperature approximates the temperature of maximum oily soil detergency, wettability is important in soil removal detergency, and high foaming is undesirable since it require extensive rinsing to remove foam in industrial process (Genova et al, 2003).

The foaming property of surfactant is one of the most important characteristics for the formulation of detergent, household cleaning and personal care products , and serve useful in industrial processes such as mineral separation (froth flotation). Foam is produce when air or another gas is introduced beneath the surface of a liquid (Rosen, 2004). Pure liquid can not form stable foam unless there are barriers to prevent foam coalescence when two gas bubbles touch. The barrier or two–sided liquid film is produced by the presence of a water-soluble surfactant.

Two of the most important factors in liquid foaming are foamability and foam stability. Foamability, which refers to the foam-generating power of a liquid at the initial stage of foaming and is a dynamic property of the foam-generating, depending on surfactant type, concentrtion, mechanical force, and electrolyte. Foam stability refers to persistence of formed foam collapse, depending on surfactant type, concentration, film thining, liquid drainage, and electrolyte. Normally, foam stability is expressed as the average foam lifetime. Both the foamability and foam stability were studied on the effect of the number of the EO group of alcohol ethoxylates and surfactant concentration.

In this work, the interfacial properties of alcohol ethoxylates derived from oleochemical alcohols were studied and compared to commercial surfactants such as nonylphenol ethoxylates. The CMC and cloud point were evaluated for different surfactants. The study of wetting property were measured by the equilibrium contact angle on sessile drop test. The foamability and foam stability also were determined by using simple shaking, the Ross–Miles and pneumatic methods. In the shaking test, a amount of solution is shaken in a locked cylinder. In the Ross–Miles method, a definite amount of solution is poured from the upper through an orifice of definite diameter onto a bottom of the same solution at a standard distance from the orifice. In the pneumetic method, a definite amount of solution in the column is aerated continuously until the foam height in the column is constant and maximum.