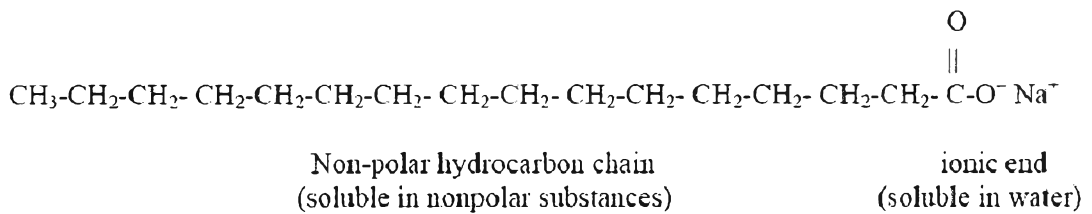




## CHAPTER I INTRODUCTION

Soap is widely used in many applications such as washing, bathing and cleaning because its molecular structure has both hydrophobic and hydrophilic parts that refer to a long chain hydrocarbon and a carboxylic group at one end which is ionic bond with alkali such as sodium ( $\text{Na}^+$ ) ion and potassium ( $\text{K}^+$ ) ion as shown in Figure 1. Due to a structure of soap, in the cleaning process, soap will form micelle to have properties that can remove the impurities such as oils, greases, fat and others from the surfaces.



**Figure 1** Structure of a soap molecule.

Normally soap can dissolve very well in water. Unfortunately, it cannot dissolve in hard water containing divalent cations, especially calcium ( $\text{Ca}^{2+}$ ) and magnesium ions ( $\text{Mg}^{2+}$ ), which causes the forming of a white insoluble precipitate. It is well known as “soap scum” that could deteriorate the cleaning property of soap (Rosen, 2004). In order to maintain the performance of soap for cleaning process in hard water, the amount of soap is required more than usual. In addition, soap scum is also the cause of a sticky stain or filmy layer cover around sanitary wares such as showers, bathtubs and sinks. Covering for a long time will makes it more difficult to remove and lead to the formation of mold and mildew. The consequence is an unpleasant odor and appearance for example the color of sticky stain is change from white to yellow precipitate by bacteria.

The existence of soap scum can be removed by applying a surfactant which cause mixed micelles between added surfactant and protonated stearic acid at low solution pH or stearate anion at high solution pH. Moreover, using different type of surfactants showed different performance on removing soap scum because of the

charge of added surfactant (Itsadanont, 2011). Apart from using surfactant, the addition of salt can be used to reduce the repulsion between head group of surfactant as a consequence the mixed micelles can form easier.

The purpose of this work is to investigate the effect of solution pH and NaCl concentrations on both equilibrium solubility and dissolution rate of calcium soap scum in amphoteric surfactant at constant temperature.