CHAPTER I
INTRODUCTION

For thousands of years, people all over the world have been using soap in many applications such as washing, bathing, and cleaning because soap molecules have two parts. One end is "water-hating" or long chain hydrocarbon which can be attracted by fat or grease. The other end is "water-loving" or a carboxylic group which can be attracted by water. The dirt is surrounded by the tail of soap molecules and the soap molecules turn out the head parts to water. So they dissolve in water and carry the greasy dirt away known as micelle (Toedt *et al.*, 2005).

Usually, soap dissolves in water. Unfortunately there are many ions in water, especially divalent cation such as calcium and magnesium ions that are main components of hard water. The calcium and magnesium molar ratio typically is 4:1 in hard water (Dissanayake *et al.*, 2009). When soap dissolves in water with high hardness, the white insoluble precipitate will be generated known as soap scum which can be calcium and magnesium stearate. Not only the performance of the soap is lower but still leaves an unpleasant sticky stain on the shower floor or sanitary wares such as sinks and bathtubs also.

In cleaning products, they are formula to be able to get rid of soap scum and undesirable deposits. Normally, the main ingredients are surfactants, chelants and solvents. The cleaner with powerful should remove soap scum quickly or not have mechanical force involved. Unfortunately, the most cleaning agents are still acid solution which causes skin irritation and respiratory problem. Therefore, the existence of soap scum can generally be eliminated in a mixture of surfactants and chelating agents. The concentration of surfactant is prepared above critical micelle concentration (CMC) to co-micellizes with a non-ionized stearic acid. However, the soap scum dissolution effectiveness has largely depended on the surfactant type and solution pH because of the charge on surfactant (Itsadanont et al, 2013). Tetrasodium glutamatediacetate (Na_4GLDA) is biodegradable chelating agent. From the previous work (Parts I, II, and III of this series), the system of mixing Na_4GLDA with dimethyldodecylamine oxide (DDAO) surfactant provided the highest equilibrium solubility but the highest dissolution rate of pure soap scum (calcium stearate or magnesium stearate) was found in the system of disodium ethylenediaminetetraacetate (Na_2EDTA)/DDAO at pH of 11 and a constant temperature of 25°C.

The purpose of this work was to study the equilibrium solubility and dissolution rate of mixed soap scum in dimethyldodecylamine oxide (DDAO) amphoteric surfactant with different chelating agents (Na_4GLDA and Na_2EDTA) at different molar ratios. Moreover, the synthesized soap scums were also characterized for the physical properties such as particle size, surface morphology, and functional groups.