CHAPTER I
INTRODUCTION

Liquid foams consist of gas bubbles of various sizes which are separated by liquid layers, lamellae, of various thicknesses that build up into a continuous liquid network. In general, foams break almost immediately after gas bubbles are introduced below the surface of pure liquid because pure liquids are easily drained out from foam films by gravitational force. Surfactants play an important role in foam formation and stabilization because they are adsorbed at the interface between the air bubbles and the thin liquid films. The surfactant molecules occupy both inner and outer layers of air/liquid interfaces of a foam film, which form a repulsive barrier between two layers called the disjoining pressure. The repulsion between head groups of surfactant molecules is due to electrostatic repulsion and/or steric hindrance in the presence of ionic and nonionic surfactants respectively.

Ionic surfactants tend to have foamability, the ability to form foams, higher than nonionic surfactants (Bikerman, 1953). In case of foaming of anionic surfactant system, it is affected by divalent cations such as calcium ion and magnesium ion which are present in hard water. These metal ions reduce foaming in hard water. Soaps, the sodium salts of long chain carboxylic acids, are commonly added to laundry detergents containing anionic surfactants as an antifoam agent (Porter, 1994). It has been proposed that the complexation of soap with multivalent ions in normal tap water forms rigid monolayer at the thin liquid film surface leading to inflexibility in the foam film which causes film rupture (Hongpaya, 1998). However, this mechanism is not universally accepted. Another mechanism that has been proposed suggests that the hydrophobic nature of the calcium soap precipitate leads to dewetting and hence destabilization of foam film. Many other factors can affect the foaming property in this complicated system such as the effect of calcium-anionic surfactant precipitate, the chain length of anionic surfactant and soap, and the micellar stability.

The aim of this work is to study the effect of divalent cation on the foaming of the mixture of an anionic surfactant and soap. In this work, the Ross-Miles foam test (ASTM method D-1173-53), a static method of foam measurement, has been used. The aqueous mixture of sodium dodecyl sulfate, SDS, and sodium octanoate, SO, has been used in this work. Foams of various ratios of SDS and soap mixtures in the presence of calcium ion have been generated. The experiments covered a wide range of calcium ion concentrations.