CHAPTER I
INTRODUCTION

Surface active agent, or surfactant, is a substant composed of both hydrophilic and hydrophobic portions. Surfactants are widely used in many products and processes such as soaps, detergents, polymerization, and pharmaceutical process and also play a crucial role in many other applications, for examples, cosmetic formulation, metal treatments, ore flotation, oil recovery, adhesion, coating and printing.

Surfactants can adsorb onto the surfaces or interfaces, and, resulting in modifing the degree of surface or interfacial free energy. The effectiveness of surfactant is determined by the extent of its adsorption onto a given surface and the configuration in which they adsorb (Hoeft and Zollars, 1996). Therefore, in order to utilize the surfactant effectively, the adsorption isotherm as well as the adsorption mechanism needs to be well understood.

Generally, the most obvious property of the substrate is the hydrophobic or hydrophilic nature of the surface. In many industrial applications, the surfactants are applied to the hydrophobic surfaces such as carbon and polymers as the wetting agents or dispersants to enhance the ability of aqueous solutions to wet and spread over hydrophobic surfaces. Many applications deal with the plastics surfaces because they are used widely. However, limited research has been reported on the wetting of hydrophobic surfaces by aqueous surfactant solution.

Wetting is often investigated without resorting to adsorption studies. However, adsorption and wetting are strongly related. Adsorption of a surface active agent at a solid/liquid interface leads to a layer or film formation on the solid surface, which affects its surface tension. The presence of the surface active agent at the interface changes the contact angle in a solid-liquid drop-air system, which is measure of wettability (Janczuk *et.al*, 1997).

In this study, the adsorption of the surfactants onto several powdered hydrophobic plastics will be measured. The ability of aqueous surfactant solutions in wetting plastics is investigated by measuring contact angle on the smooth plastic surfaces. The relative effect of surfactant on surface tension and the adsorption onto

solid-liquid interface in improving wettability will be evaluated for different combinations of surfactant solutions and plastic. Three surfactants used for this study are 4-octylbenzenesulfonate sodium salt, NaOBS, (anionic surfactant), Cetylpyridinuim chloride, CPC, (cationic surfactant) and polyoxyethylene octyl phenyl ether, Triton® X-100 (nonionic surfactant) and the plastics are polytrifluoroethylene (PTFE), polyvinylchloride (PVC) and polycarbonate (PC).