

CHAPTER III EXPERIMENTAL

3.1 Materials

3.1.1 Chemicals

The cationic surfactant, cetylpyridinium chloride (CPC, 99% purity), was obtained from Zealand Company. The anionic surfactant, 4-octylbenzenesulfonate sodium salt (NaOBS, 97% purity) was purchase from Sigma Chemical Co. and the nonionic surfactant, polyoxyethylene octyl phenyl ether (Triton X-100, 99% purity) was from Fluka. Sodium Chloride (NaCl, AR Grade) was purchased from Labscan Company. All chemicals were used without further purification.

3.1.2 Plastics

Three types of plastic were used in this work; polytetrafluoroethylene, polyvinylchloride and polycarbonate. Polytetrafluoroethylene was purchased from Dupont (Thailand) Company. Polyvinylchloride was kindly provided by Thai Plastic and Chemicals Public Company and polycarbonate was obtained from Thai Polycarbonate Company. All plastics are in the powder form.

3.2 Methodology

3.2.1 Plastics Preparation

First, plastic powder is sieved to get the same size particles that are in the range of 45-212 μm in diameter. This powder will be used in adsorption experiment. In wetting part, the powder is compressed to be in the plate form by using compression molding.

3.2.2 Adsorption Isotherm

Adsorption experiments are carried out using different concentration of aqueous surfactant solution. Surfactant stock solutions are prepared and diluted with deionized water to form a series of 20 ml solutions with varying surfactant concentrations. These surfactant solutions are added to screw cap vials containing 1.0 g of plastic. The filled vials are allowed to equilibrate at 30 °C in a shaker bath for 48 hours. After equilibrium, the supernatant is separated from the mixture by centrifuged at 1200 rpm for 15 minutes and is then analyzed for the bulk phase concentration of surfactant using UV-VIS spectrophotometer. The amount of adsorbed surfactant is determined using the solute depletion method.

3.2.2 Surface Tension Measurement

The surface tension of surfactant solutions is determined by using a pendant drop technique with drop shape analysis equipment (Krüss, DSA 10). Temperature are controlled at 30 °C. A drop of solution is formed at the tip of the needle that is placed vertically. The photo of the drop is taken by the camera of the instrument. Then, the drop shape is analyzed using the computer program in order to find the value of surface tension. The experiment are repeated for five times and the mean value will be calculated.

3.2.3 Contact Angle Measurement

The contact angles are measured by using the sessile drop technique with the contact angle measuring instrument (Krüss, DSA10). The fresh plastic pellet is first compressed into a smooth sheet and cut to an appropriate size about 3cm. x 3cm. A 10 µL drop of surfactant solution is then placed onto the plastic sheet. During the measurement, the chamber is kept at 30°C and saturated with water vapor to prevent the evaporation of water from surfactant solution.