

CHAPTER IV

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, 99% purity) was purchase from Sigma and the nonionic surfactant, polyoxyethylene octyl phenyl ether (Triton X-100, 99% purity) was from Fluka. All chemicals were used without further purification. Sodium Chloride (NaCl, AR Grade) was obtained from Ajax Chemicals.

3.1.2 Plastics

High density polyethylene (HDPE) was from Thai Polyethylene Co., Ltd., while polystyrene (PS) was obtained from Siam Polystyrene Co., Ltd. Polyethylene terephthalate (PET) was from Indorama Co., Ltd.

3.2 Methodology

3.2.1 Plastics Preparation

First, plastic pellets were grinded into powder by a grinding machine. Then the powder was sieved to get the particles that were in the range of 45-125 μm in diameter. This powder was further used in adsorption experiment.

3.2.2 Adsorption Isotherm

Adsorption experiments were carried out using different concentration of aqueous surfactant solution. Surfactant stock solutions were prepared and diluted with deionized water to form a series of 20 ml solutions with varying surfactant concentrations. These surfactant solutions placed into a screw capped containing 1.0 g of plastic. The filled vials were allowed to equilibrate at 30 $^{\circ}\text{C}$ in a shaker bath for 48 hours. After equilibrium, the supernatant was separated

from the mixture by centrifuged at 1200 rpm for 15 minutes and was then analyzed for the bulk phase concentration of surfactant using a UV-Vis Spectrometer (Shimadzu, Lamda 10). The amount of surfactant adsorbed was determined using the solute depletion method.

3.2.3 Surface Tension Measurement

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

3.2.4 Contact Angle Measurement

The contact angles were measured using the sessile drop technique by the contact angle measuring instrument (Krüss, DSA10). The fresh plastic pellet was first compressed into a smooth sheet and cut to an appropriate size. A 5 μ L drop of surfactant solution was then placed onto the plastic sheet and the contact angle was measured after 40 minutes in order to allow equilibrium to occur. During the measurement, the chamber was kept at 30°C and saturated with water vapor to prevent drop evaporation effect.