



CHAPTER III EXPERIMENTAL

3.1 Materials

3.1.1 Chemicals

The anionic surfactants, sodium dodecyl benzenesulfonate (SDBS, 88% purity), was purchased from Acros. The cationic surfactants, cetylpyridinium chloride (CPC, 99% purity) was procured from Zealand Company, and the nonionic surfactants, polyoxyethylene octyl phenyl ether (OP(EO)₁₀, 99% purity) was obtained from Fluka. All chemicals were used without further purification.

3.1.2 Carbons

Activated carbon was from C. Gigantic Carbon Co., Ltd. and multi-wall carbon nanotubes were obtained commercially.

3.2 Methodology

3.2.1 Adsorption Experiment

The adsorptions of surfactants from aqueous solution onto the carbons were carried out at 25 °C. The surfactant solutions were prepared and diluted by distilled water. Surfactant solutions (20 mL) with different concentrations (0-10,000 μmol/L) were added to 25 mL glass vials with Teflon screw cap containing 2.5 mg of carbons. The vials were shaken in shaker bath for 5 days. After the adsorption reached the equilibrium, the supernatant was separated from the adsorbents by using 0.45 μm Nylon syringe filters. These solutions (CPC, SDBS and OP(EO)₁₀) were analyzed by using the photometric mode of Ultraviolet -Visible (UV-Vis) spectrophotometer (Shimadzu Lamda 10) at wavelength of 259, 224 and 275 nm, respectively. The supernatant surfactant concentration was determined by fitting the absorbance to the calibration curve.

3.2.2 Dispersion Experiment

Dispersion experiments were performed by using the aqueous solutions of various surfactants in distilled water at concentrations: 0.1 CMC, CMC and 10 CMC. Surfactant solutions (20 mL) were added to 25 mL glass vials with Teflon screw cap containing 0.1 mg of MWNTs. Each vial was sonicated for an hour. Then, the equilibrium concentrations of dispersed MWCNTs were measured by using the kinetic mode of UV-Vis spectrophotometer (Shimadzu Lamda 10) at wavelength 650 nm, which was used to examine the surfactant-coated MWCNTs. Essentially, the spectra collected between 400 and 800 nm do not contain signals by surfactants molecules, besides, the same concentration of surfactant aqueous solution was used as reference to eliminate the absorbance of surfactant in suspensions.

3.2.3 Determination of Specific Surface Area

The specific surface areas of the carbonaceous adsorbents were determined by nitrogen adsorption BET measurement by a surface area analyzer (Quanta Chrome, Autosorb-1).

3.2.4 Zeta Potential Measurement

The zeta potential of the powder was determined by using a zeta meter (Zeta-Meter System 3.0+, Zeta Meter Inc., USA). The instrument automatically measures the electrophoretic mobility of particles in dilute suspension and then converts the electrophoretic mobility into zeta potential for aqueous system.