

CHAPTER III EXPERIMENTAL

3.1 Equipment

1. Multistage froth flotation column
2. Air compressor
3. Peristaltic pump Masterflex L/S
4. Propeller
5. Air flow rate
6. Incubator
7. Spinning drop tensiometer
8. Total Organic Carbon Analyzer

3.2 Chemicals

Surfactants

- Alfoterra ($C_{14-15}(PO)_4SO_4Na$)

Solvents

- Sodium chloride 99% purity
- Motor oil grade SAE 10W-30
- Dichloromethane

3.3 Methodology

3.3.1 Microemulsion Phase Study

A 5 ml quantity of motor oil was added to a series of vials, each containing 5 ml of a surfactant solution having different surfactant and NaCl concentrations. After that, each vial was shaken gently by hand for 1 min and then equilibrated in a temperature-controlled incubator (Binder, KB400/E2) for 1 month at 30 °C. The equilibrium state was considered to be attained when the volume of

each phase of the microemulsion system was invariant. The IFT between the motor oil and the various surfactant solutions was measured by using a spinning drop tensiometer.

3.3.2 Multistage Froth Flotation Experiment

The foam fractionation system was performed in continuous flow operation with aqueous solution containing different surfactant and NaCl concentrations. The feed solution was continuously pumped by a peristaltic pump and entered at the top of the column. The pressurized air flow rate was measured by a rotameter and was introduced to the bottom of the column. After equilibrium time, the foamate was collected at foam height 60 cm and steam was collect at the bottom. The foam was weighted to measure the mass and the volume and Both of them were analyzed enrichment ratio and removal fraction.

The foam fractionation was studied under steady-state condition. Steady-state was ensured when all measured parameters were invariant with time. The concentration of motor oil was measured by extraction with di-chloromethane. The concentration of surfactant was measure by Total Organic Carbon Analyser (TOC). The Flow diagram of multistage froth flotation was shown at figure 3.1.

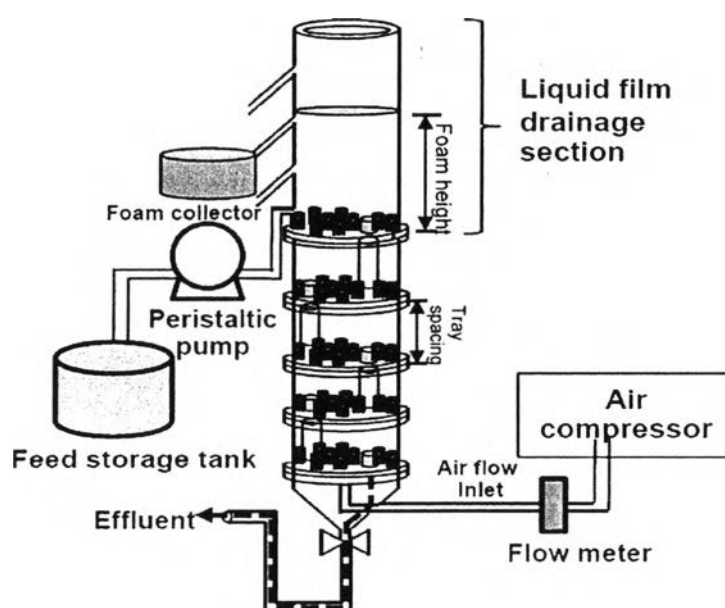


Figure 3.1 Flow diagram of multistage froth flotation.

3.4 Analytical Method

3.4.1 Microemulsion Phase Study

Microemulsion phase can be easily observed by visualization.

3.4.2 Motor Oil Analysis

The sample is extracted by dichloromethane and left for 10 min. then, the sample divide into 2 phase. The oil is in the bottom phase which is evaporated in a hood. So the oil content is obtained.

3.4.3 Surfactant Analysis

The sample after extraction is divided into 2 phase. The top phase is detected by TOC then the surfactant content is obtained.