

## **CHARPER III**

### **EXPERIMENTAL**

#### **Materials and Equipment**

##### **Equipment:**

1. Cathetometer
2. Spinning drop tensiometer
3. Terg-O-Tometer
4. Colormetric spectrophotometer ,Colorflex (Hunter Lab)
5. UV/VIS Spectrophotometer
6. Contact angle Tester
7. High Performance Liquid Chromatography/ELSD

##### **Materials:**

###### Surfactants

- Methyl Ester Sulfonate (MES) (88 % active)
- Alcohol Ethoxylate (99 % active)

###### Solvents

- Oil-red-O soluble dye
- Dichloromethane (99% purity)
- Isopropanol (99% purity)
- Ethanol (99% purity)
- Distilled water

###### Other Chemicals

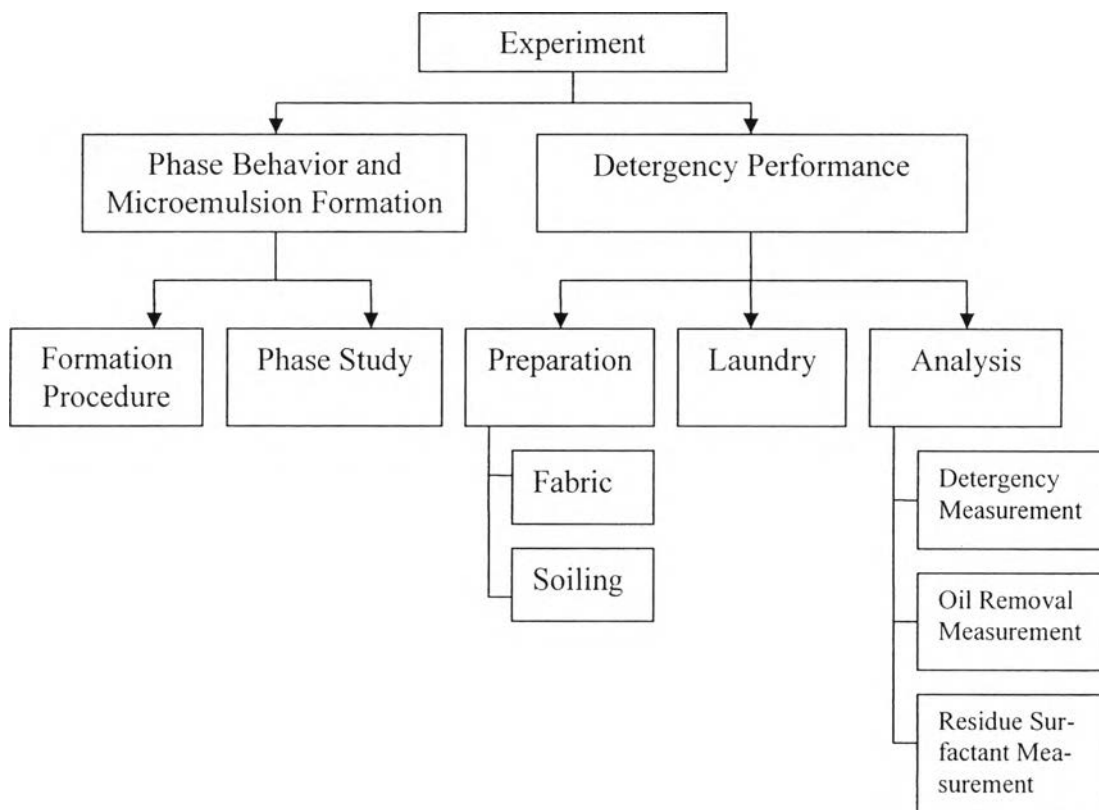
- Sodium Chloride (99% purity)
- Motor oil
- Commercial detergent

###### Fabric

- Cotton
- Polyester/cotton blend (65/35)
- Polyester

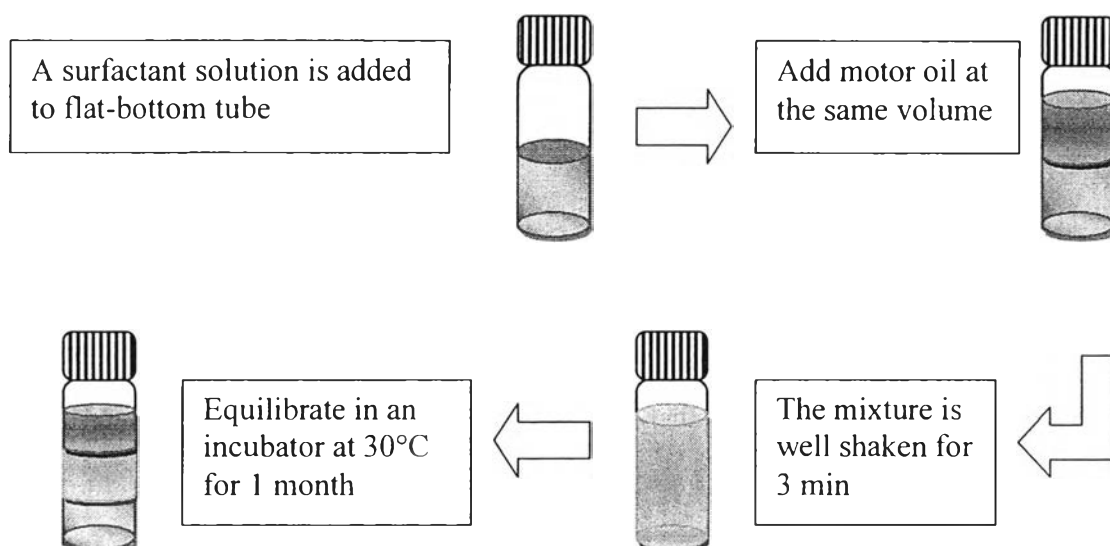
## Experimental Procedures

### 1. Overview of Procedures:



## 2. Phase Behavior and Microemulsion Formation

### 2.1 Formation procedure



## 2.2 Phase Study

1. After leaving 1 month, all tubes are measured the phase height of each phases (water, oil, middle phase) by using a cathetometer
2. Determine the Interfacial Tension (IFT), by using a spinning drop tensiometer.
3. Plot the Interfacial Tension (IFT), as a function of surfactants concentration

## 3. Detergency Performance

### 3.1 Preparation

#### 3.1.1 Fabric

Fabric is pre-washed before soiling to get rid of contaminates. This method is followed according to the ASTM standard guide D4265-98

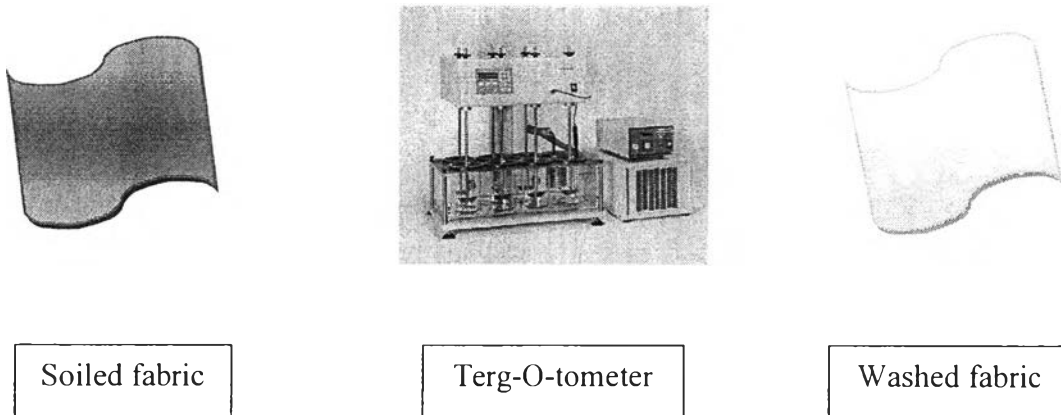
#### 3.1.2 Soiling

This method is followed according to Goel (1998)'s method

- a) Dissolve 0.1 g of the oil-soluble dye into 100 ml of the motor oil
- b) Filter dyed oil until clear of solids
- c) Dilute 10 ml of clear dyed oil with dichloromethane to 100 ml
- d) Soak the fabric in a dyed oil solution
- e) Leave it 1 min and rinse to remove the stucked solution
- f) Lay the soiled fabric on a flat plate in a hood to dry overnight at room temperature
- g) Cut the soiled fabric into 3x4 inch and keep it in a sealed glass container to prevent an evaporation

### 3.2 Laundry

The soiled fabric is put in the bucket of a Terg-O-Tometer. The conditions is set at 1 liter of washing solution, 20 min of washing step, 3 min first rinse step, 2 min second rinse step, and 30°C washing temperature.



### 3.3 Analysis

#### 3.3.1 Detergency Measurement

- a) Measure reflectance of the unsoiled fabric and soiled fabric before washing via colormetric spectrophotometer
- b) After washing, measure the post-wash soiled fabric via colormetric spectrophotometer
- c) Calculate the percentage of detergency with following equation :

$$\text{Detergency (\%)} = [(A-B) / (C_0-B)] \times 100$$

Where

A, B, and  $C_0$  are the average reflectance of post-wash soiled fabric, pre-wash soiled fabric and unsoiled fabric, respectively.

#### 3.3.2 Oil removal measurement

This method is followed according to Goel (1998)'s method

- a) Extract attached oil from pre-wash soiled fabric by submerging the fabric in isopropanol overnight at room temperature
- b) After washing, submerge the post-wash soiled fabric in isopropanol overnight at room temperature
- c) Measure amount of both of extracted oil via UV/VIS Spectrophotometer
- d) Calculate extracted oil concentration from the calibration curve

### 3.3.3 Equilibrium Interfacial Tension Measurement

Spinning drop tensiometer is used to measure Interfacial Tension (IFT)

### 3.3.4 Residue Surfactants

High Performance Liquid Chromatography (HPLC/ELSD) is used to measure the amount of residue surfactants that adsorbed on the fabric. After the washing step and two rinses, the solution in each step was collected for the analysis of MES and AE concentrations.