Chapter IV

Experimentation

4.1 The Apparatus

4.1.1 Standard Tank

The experimentation apparatus as shown in Figure 4.1 , are shown as the standard tank configuration .

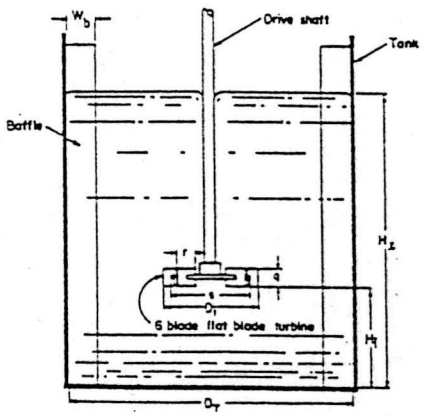

Figure 4.1 Standard Tank Configuration.

Mixing Tank	:	The material used in the construction is polyacrylate. The size of tank used was 15 cm. in diameter and 20 cm. in height with flat bottom cylindrical tank equipped with 4 baffles. The size of baffle used was 1.5 cm.
Agitator	:	Agitators used were 6 blade disc turbine, marine, propeller, and paddle.
Motor	:	1/2 HP direct current motor that can ratio inversely when the electric poles were alternated.
Revolution measurement	:	number of revolutions was measured by using a Photo Tachometer.

4.1.2 T.K Agi Homomixer Tank

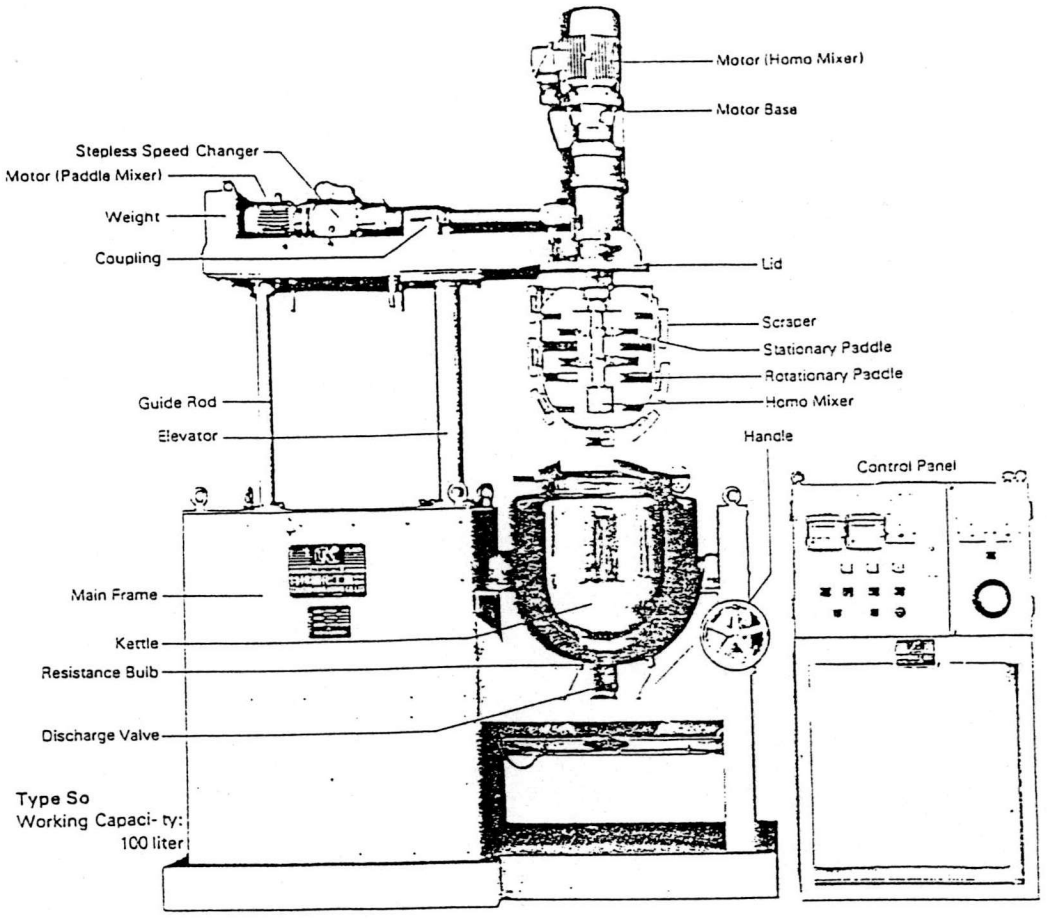

Figure 4.2 T.K.Agi Homomixer Tank

Mixing Tank	:	The material used in the construction is hard glass jacketed vessel. The size of tank was 15 cm. in the diameter and 20.5 cm. in height with hemisphere type bottom cylindrical tank.
Agitator	:	Agitator used were rotating paddle , U-shape with scrappers and pitch bar and stationary pitch bar fixed to stator rods
Motor	:	Totally enclosed Fan-Cooled Squirrel-Cage type induction motor 0.2 kW , AC 220 V , 50 Hz , single phase
Revolution	:	Approx.0-500 rpm by Ringcorn Variable mechanical speed reducer . [16]

4.2 Material Used.

4.2.1 Material Content.

The material used in the experiment as liquid detergent built formula, were :

Table 4.1 Liquid Detergent Formula

	Material	% Active Matter
Solid Part	Sodium carbonate	5.0
	Sodium carboxy methyl cellulose (CMC)	0.2
	Sodium tripolyphosphate (STPP)	15.0
Liquid Part	Linear alkylbenzene sulfonate (LAS)	12.2
	Sodium alkylpolyethoxy sulfate (AES)	2.8
	Triethanolamine	1.0
	Perfume	0.3
	Fluorescent whitening agent	0.4
	Pigment solution (acid blue 62)	0.5
	Purified water	q.s.

4.2.2 Properties of Material

Table 4.2 Properties of solid part material

	Density (g/ml)	Particle Size (μ)	Solubility [17] (%)	Purity (%)	pH (1% sol^n)
Sodium carbonate	0.4-0.6	75-150	7.1% in cold water 45.5% in hot water	99.0	9-11
Sodium carboxy methyl cellulose	-	-	1% in water	50.0	9-11
Sodium tripolyphos phate($Na_5 P_3 O_{10}$)	0.7	150	14.5 % in cold water 32.5 % in hot water	90.0	9-11

Table 4.3 Properties of major liquid part material

	Sp.Gr.	Viscosity (cp.)	pH (direct)	Active Matter (%)
Linear alkylbenzene sulfonate (LAS)	-	-	8-9	41-45
Sodium alkylpolyethoxy sulfonate (AES)	1.04-1.05	75-225	9-10	31-33
Trithanolamine	1.12-1.13	-	8-11	99

4.3 Procedure

The procedure of the experiment used for studying the mixing condition affecting the preparation of homogeneous liquid detergent is shown as sequence of mixing in Figure 4.3 .

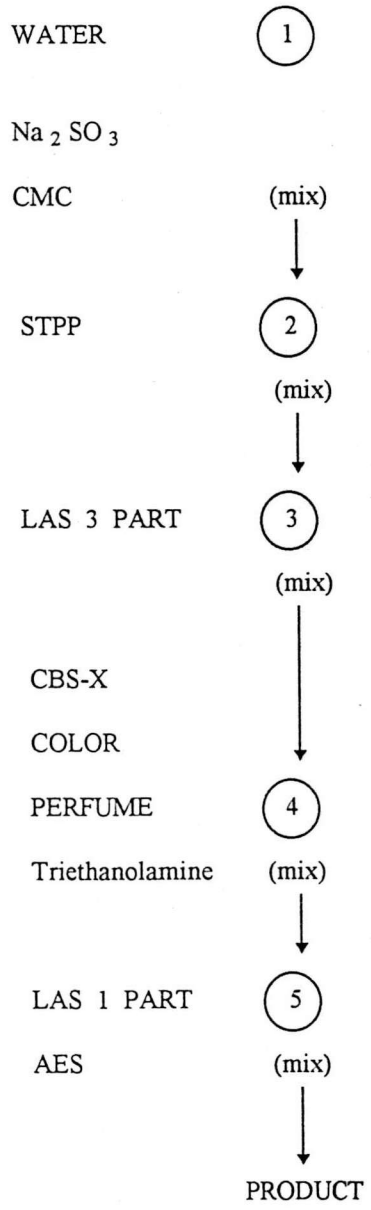

Figure 4.3 Sequence of Mixing.

4.3.1 Experimental procedure

1. Set up the mixing tank, operating system of motor and agitator.
2. Prepare all materials used .
3. Feed water into the mixing tank , the amount equivalent to quantity used in the formula.
4. Switch on the motor and adjust to the desired speed.
5. Add other materials into the mixing tank by following the mixing sequence .
6. Observe the result of mixing of liquid in every step of mixing.
7. Determine the liquid detergent properties .
8. Change the variables to the next desired value and resume the experiment .

4.3.2 Stability Determination

1. Liquid detergent compositions obtained, were filled into the polyester bottles for determination of color, odor and viscosity and filled into the polyvinyl chloride transparent bottles for determination of separation and freeze - thaw stability.
2. All samples were stored under various condition , in air conditioned room at 20-25 °C , room temperature at 25-30 °C , exposing to sunlight condition and in an oven 45 °C . For freeze- thaw stability, samples were stored for 24 hours from -4 °C to ambient temperature.
3. Determination of all samples were performed every week for 2 months.

4. Evaluation of test results for odor and color stability were evaluated as grade point , as follow

grade 5 : the sample had same results as the reference

4 : the sample had nearly the same results as the reference

3 : the sample had worst results than the reference but could be accepted

2 : the sample had worst results than the reference and could not be accepted