CHAPTER 6

EXPERIMENTAL PROCEDURE

6.1 Flow Measurement of wastewater

The estimation of the discharge rate from thickeners and the cylinder machine was encountered by the difficulty in the flow measurement method. Therefore, the approximate water balances at the thickeners and the cylinder machine were done by determining the in going and the leaving stock consistency at each units. From water balance calculation, it was found that the discharge rate from the thickeners ranged from 70 - 80 tons per ton paper produced, while the discharge from the cylinder machine was somewhat higher at the rate of 100 - 120 tons per ton paper produced. However, the variations in water usage must be allowed because no precise consistency control is used in the mill under study. So, in analysing the raw characteristics of the overall waste stream, the wastewater from the thickeners and the cylinder machine were mixed at the proportion of 1 : 1

6.2 Sampling

The sampling techniques used in this research assure representative samples, and the data obtained from the samples analysis will ultimately serve as a basis for designing

treatment facilities. Because no universal procedure for sampling exists, sampling was tailored to fit the operation of paper board manufacturing process and the characteristics of the waste produced. The suitable sampling locations are point A and point B . (Fig. 2)

The flow rates and the concentration of waste products vary only slightly. So composite samples were collected from point A and point B at 3 hours intervals over a period of 24 hours and were then mixed with the proportion of 1 : 1

6.3 Sample Analysis

The uniformity of procedure of sample analysis followed Standard Methods for the examination of Water and Wastewater [1971]

Total Solids

Total solids content, which is composed of floating matter, matter in suspension, colloidal matter, and matter in solution, can be defined as all the matter that remains as residue upon evaporation at 103 to 105 C

Suspended Solids and Dissolved Solids

Total Solids can be classified as either suspended solids or filterable solids by passing a known volume wastewater through a filter.

The suspended solids fraction includes the settleable solids. The filterable - solids fraction consists of colloidal and dissolved solid. The dissolved solids consist of both organic and inorganic molecules and ions.

The analysis used Gooch Crucible Method instead of Filtration Method.

Temperature

The temperature of raw wastewater, and the temperature during analysis was vary from 27 °C to 25 °C

Color

Raw wastewater was undetectable by spectrophotometer because of low color content. This analysis of color was observed by eyes.

Turbidity

A measure of a light - transmitting properties of water in unit FTU.

The Turbidimeter used in this analysis is shown in Fig. 3

pH

The hydrogen - ion concentration which is an important quality parameter of wastewater, can be measured with a pH meter. The pH meter is show in Fig. 4

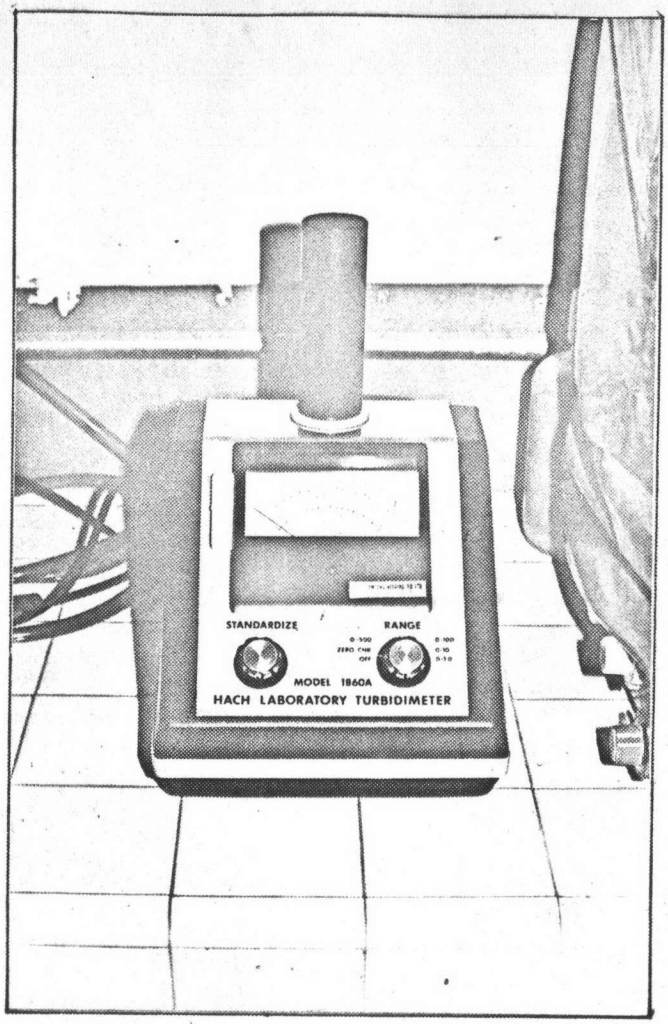

FIG 3 TURBIDIMETER

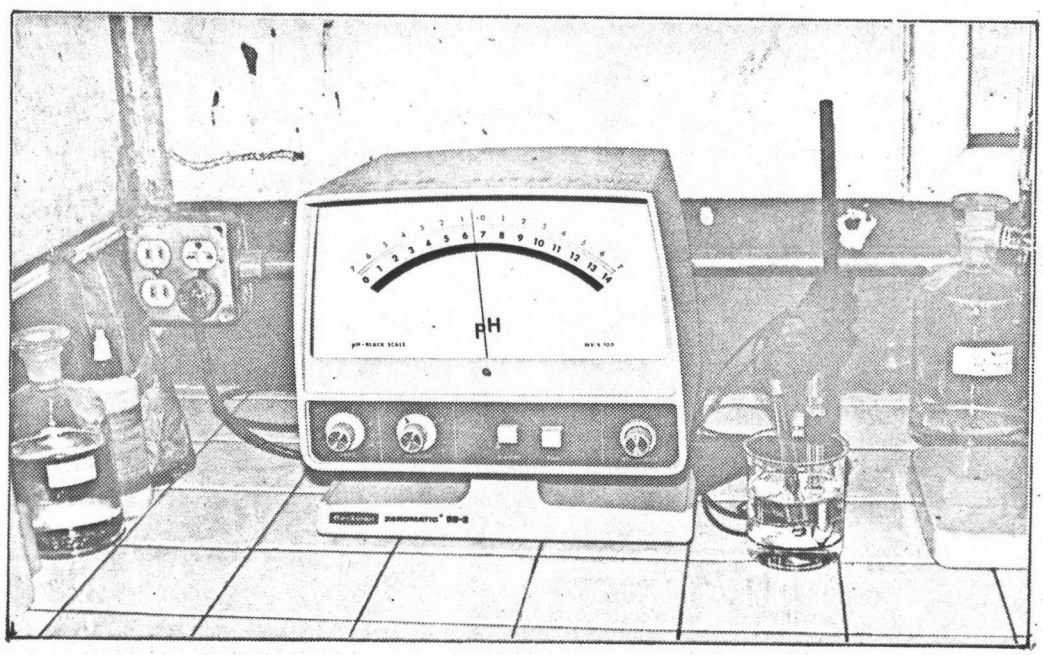

FIG 4 pH METER

Alkalinity & Acidity

The results of Alkalinity & Acidity are expressed in terms of calcium carbonate $CaCO_3$

Measurement of Organic Content

The determination of the organic content of wastewaters in laboratory methods commonly used here are biochemical oxygen demand (BOD) and chemical oxygen demand (COD).

BOD This determination involves the measurement of the dissolved oxygen used by microorganisms in the biochemical oxygen of the organic matter.

The used parameter of organic pollution applied to wastewater in the 5 - days BOD (BOD_5).

BOD data are used for sizing the waste treatment facilities and for measuring the efficiency of some treatment processes.

COD The COD of a waste is, in general, higher than the BOD because more compounds can be chemically oxidized than can be biologically oxidized.

COD test is shown in Fig. 5

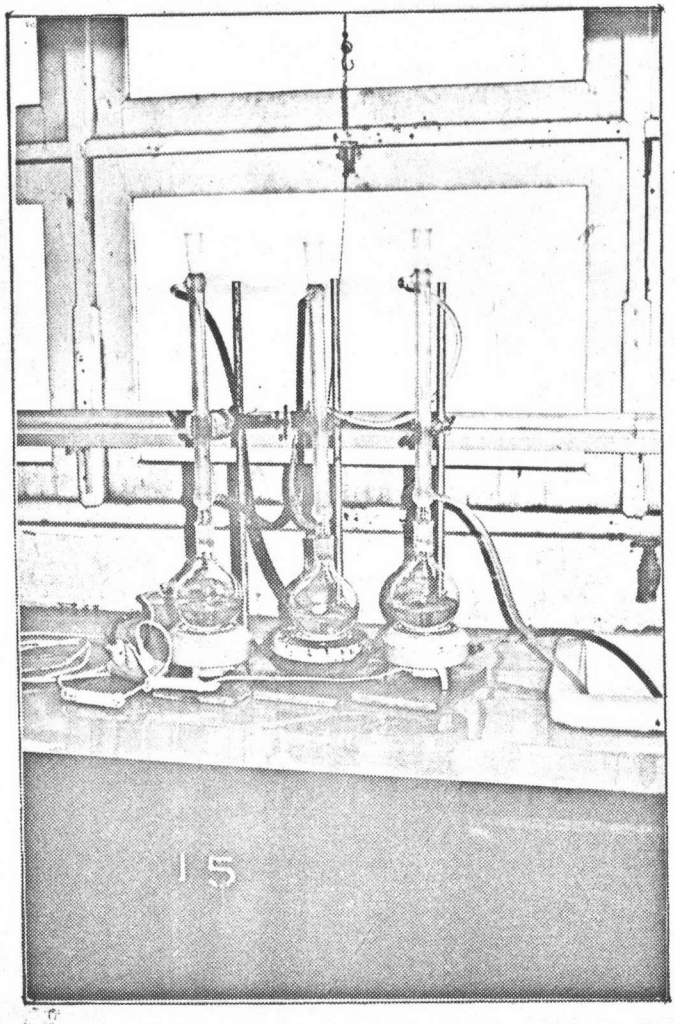

FIG. 5 COD APPARATUS

6.4 Coagulation control by Jar Test

In laboratory investigation of the applicability of coagulation to treatment of a particular waste may be accomplished by use of a " Jar Test " or the jar test is a laboratory procedure which affords a rapid means to determine the effects of Chemical Treatment on wastewater.

Standard Laboratory Stirror of Phippes & Bird, Inc. U.S.A. as shown in Fig. 6

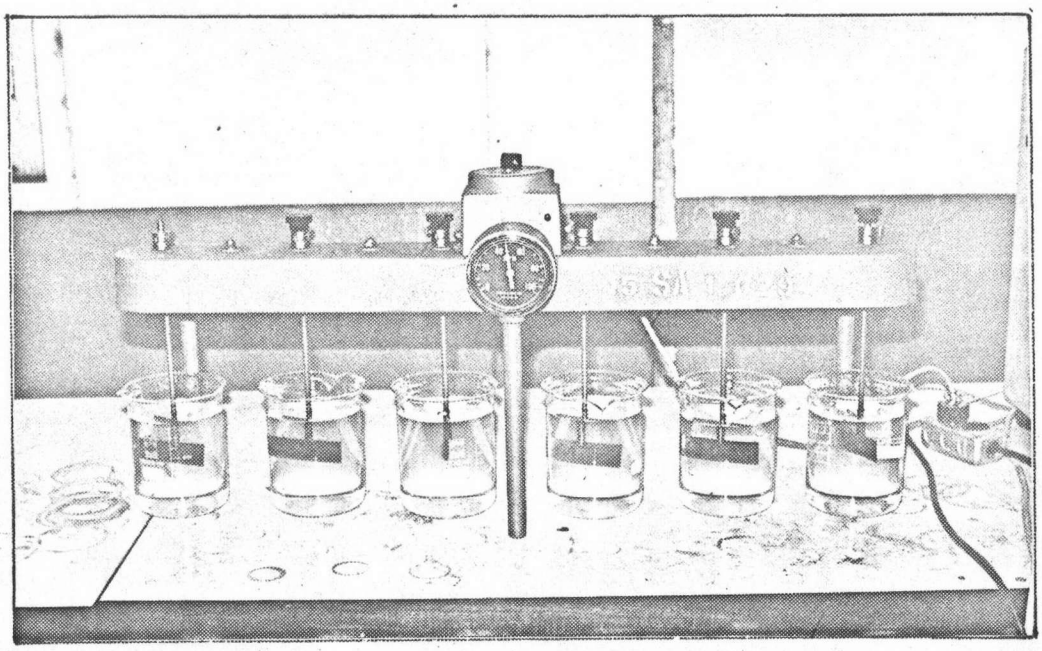

FIG 6 COAGULATION CONTROL BY JAR TEST

It consists of a series of six stirring paddles which can be rotated at a variable controlled speed to mix contents of 1 liter beakers. This permits the simultaneous treatment and observation of six samples under identical mixing conditions in order to determine the relative merits of various chemical treatments, or to determine the optimum dosage of a particular chemical.

Jar tests can be used to determine the dosages of lime, alum, or other coagulant required for clarification of wastewater or the dosages needed to secure certain phosphorus removals. They can also be used as a screening test for polymers or other chemicals used as aids in the flocculation of wastewater or the dewatering of sludge. (Culp 1971)

The procedure of making jar tests are as follows.

(1) Add a 1 - liter sample of paper board wastewater to each of six beakers accommodated in jar test apparatus.

(2) Start agitator and run at 95 rpm.

(3) Add reagents (Alum or Ferric Chloride or Lime or Alum + aid or Ferric Chloride + aid or Lime + aid) rapidly to beakers. Stir at 95 rpm for 1 minute.

(4) Reduce stirring rate to 40 rpm and stir for 29 minutes for slow mix.

(5) Observe and record time of floc appearance for each beaker.

(6) Shut off stirrer, the paddles are then removed from the jars and allow the floc to settle to the bottom of the beakers for 15 and 30 minutes.

(7) Withdraw samples of supernatant liquid (Treated water), and then turbidity, pH, Alkalinity, Acidity, Suspended Solids, COD and BOD were measured by Standard Method [1971]
