CHAPTER 8

DISCUSSION

The raw characteristics of wastewater were found to vary during the period of observation as shown in Fig. 7 - 15. This may be explained by the variation in waste paper quality, ie., quantities of dirts and contaminants.

The low BOD to COD ratio of raw wastewater indicates the presence of bioresistant organic constituents. (Fig. 16)

Considering the turbidity, suspended solids, pH value and alkalinity from table 29 chemical coagulation will be the most efficient method for the removal of suspended or colloidal solids. That is, the chemical treatment method is desirable.

Fig. 17 and Fig. 18 show the rapid rate of BOD and COD removal as the alum dosage was increased up to the range of 120 - 160 ppm. Increasing the alum dosage above 140 ppm did not practically improve the COD and BOD removal. This shows that the optimum dosage in removing BOD and COD is 140 ppm.

From Fig. 20, the removal of turbidity depends on the alum dosage. The effective dosage is 140 ppm.

Fig. 22, the removal of suspended solids are very good at the alum dosage of 120 ppm.

Fig. 23, in using alum as a coagulant, the optimum pH value in removing COD is 6.6 to 7.

For lime, pH value of 11 to 11.5 is suitable for COD removal. (Fig. 24)

For ferric chloride coagulant, the pH range from 5.5 to 6.00 is desirable for the COD removal. (Fig. 25)

Fig. 26 shows the comparision of Alum, Lime and Ferric Chloride dosages for COD removal. At the same percent of COD removal, Ferric Chloride dosage is greater than alum, while Lime dosage is more than Ferric Chloride. The optimum dosage of $FeCl_3$, Lime, are 150 and 300 respectively.

Fig. 27 shows that Coagulant with aid is slightly more effective in removing BOD than coagulant alone.

The addition of aid will decrease the requirement of coagulant dosage.

Fig. 28, the three coagulants with aid, Alum with aid is the best, the second is Ferric Chloride with aid and the last is Lime with aid.

We will choose the coagulant that the cost is rather cheap, efficiency in the flocculation and easy to handle pH range is from 5 to 9 .

As a result of high pH value, Lime is not interesting here.

Ferric Chloride has the disadvantage of being more difficult to handle and causing color.

The disadvantage of the alum are the less dense of the floc, slower and longer period in setting than the iron floc. However, it is cheaper, easier to use and handle, more efficient in the flocculation. The pH value and Alkalinity of raw wastewater are unnecessary adjustment in order to obtain a complete reaction. Consequently, we decided to use the alum as the coagulant. Large, feathery flakes generally indicate that the amount of coagulant is too great. At 140 ppm of alum dosage, the floc particles with the size of a pin head are obtained.

The addition of coagulant aid will enhance coagulation by promoting the growth of large, rapid - setting flocs. Therefore, alum with aid gives better result than alum alone. However the aid is very expensive and it has to be used at an appropriate amount so as to give good result. At too high dosages, the aid will inhibit floc formation because of its electronegative property. By the way, the economy depends upon the use of alum alone and the careful control of alum dosage. Too small an amount is just as wasteful as is too

large a one. Usually chemical doses effective in the plant are somewhat lower than with laboratory - scale equipment.

However, some paper mills may require secondary treatment depending on the process conditions and raw materials of each individual mill.
