CHAPTER FIVE

Conclusions

The influent characteristics of the detergent wastewater used in the present study were as follows: pH range of 9 to 12.5, temperature range of 25 to 27° C, suspended solids range of 15000 to 18000 mg/l, zeta potential range of - 38 to - 25 mV, chemical oxygen demand range of 20 000 to 36 000 mg/l and surface tension range of 31 to 35 dynes/cm.

From the experiments carried out, it was identified that there were optimum conditions for a treatment process using alum. These can be summarised as follows: alum dosage of 3.0 g/l, pH of 9, mixing time of 25 minutes, mixing intensity of 40 rpm and settling time of 30 minutes. This treatment process yielded the following results: zeta potential of -1.7 mV, percentage turbidity removal of 90%, surface tension value of 67.3 dynes/cm, chemical oxygen demand of 5800 mg/l, sludge volume of 90 ml/l and weight of solids in sludge of 66.3 mg/l.

As for the treatment with ferric sulfate, the optimum conditions were: ferric sulfate dosage of 9.0g/l, pH of 9, mixing time of 25 minutes, mixing intensity of 30 rpm and settling time of 30 minutes. This treatment process yielded the following result: zeta potential of - 4.8 mV, percentage turbidity removal of 80%, surface tension value of 65.1 dynes/cm, chemical oxygen demand of 6700 mg/l, sludge volume of 50 mg/l and weight of solids in sludge of 55.6 mg/l.

The coagulant aids, polyvinyl alcohol, sodium alginate and polyethylenimine were found to be unsuitable agents for use as primary coagulants. The preferred coagulation agent was alum as the dosage required was relatively low and the treatment results were better than that for ferric sulfate.

A double chemical treatment was carried out with alum as the coagulant agent and polyethylenimine as the coagulant aid. The conditions applied was as obtained for the optimal treatment of the wastewater with alum. There was an improvement when compared to the results obtained with the use of alum alone. The double chemical treatment yielded the following results: zeta potential of - 0.9 mV, percentage turbidity removal of 94%, surface tension value of 68.2 dynes/cm, chemical oxygen demand of 3500 mg/l, sludge volume of 94mg/l, suspended solids of 2000 mg/l and weights of solids in sludge of 75.2 mg/l.

An absorption study was carried out with granulated activated carbon. The optimal dosage of granulated activated carbon required for the removal of surfactant was 0.2 g/l. However the removal of color was ineffective as the removal was not complete even with a high dosage of 20 g/l.

Further investigations are necessary to determine the optimum dose of the polyelectrolyte to be used with alum, and also to determine whether powdered activated carbon will be a better choice for the polishing stage. Above all, the cost of the various options should be thoroughly evaluated.