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# APPLICATION OF DISSOLVED AIR FLOTATION (DAF) TO THE TREATMENT OF DAIRY WASTEWATERS

A thesis presented in partial fulfilment  
of the requirements for the degree of  
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-by-

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I dedicate this thesis to  
my brother and sister-in-law, SRIDHAR and GAYATRI SUSARLA

## ABSTRACT

An investigative work was carried out to examine the process performance of dissolved air flotation to remove suspended solids and fat from dairy wastewaters. Suspended solids and fat inhibit advanced treatment systems and cause lot of problems like clogging etc. Traditionally dairy industry uses sedimentation and fat traps to remove solids and fat. Dissolved air flotation is a novel treatment method to purify dairy wastewaters.

A laboratory bench scale flotation unit was used to carry out the flotation experiments. The wastewater was collected from a dairy factory manufacturing milk powder and butter. Two types of wastewater was collected, one type (Type-I) of wastewater was used when the plant was manufacturing only milk powder. Type-II wastewater contained discharge from butter plant, thus exhibiting a overall characteristics of the discharges from the plant. The effects of change in pH, temperature and the usage of coagulant alum were examined to assess the process performance of flotation.

Experiments with changing the pH showed that pH plays an important role in the treatment of dairy wastewaters. When the pH was lowered to 4 from original pH of wastewater of 11.3, the solids and fat in the wastewater precipitated. High removal efficiencies were obtained at pH 4. Flotation tests were carried out at pH 4, 5, 7, 8 and original pH of wastewater. Considerable removal efficiencies were obtained at pH 7 and 8. This pH range is considered to be effective for further treatment like biological treatment. Temperature studies were carried out at pH 7 and 8.

Removal efficiencies were average and were comparable to the removals with pH studies, at temperatures 25° C and 34° C. At a higher temperature of 48° C removal efficiency decreased considerably. Maximum removal efficiencies were obtained for solids and fat at a temperature of 34° C.

Coagulant alum was used to increase the removal efficiency of solids and fat. Jar tests indicated that high dosage of alum was necessary to obtain optimum removal efficiencies. Alum was used in the concentrations of 150 mg/l to 400 mg/l. Removal efficiencies upto 92% were obtained for fat and solids.

From the experiments it can be concluded that dissolved air flotation is a suitable method for the removal of fat and solids from the dairy wastewater. Scale up experiments can be undertaken before application for large scale treatment system.

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