ABSTRACT

Treatment of Effluents from Food Services Establishments by Physico-chemical Processes – Pilot Scale Study for Trinidad and Tobago

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Effluents from Food Services Establishments (FSEs) contain primarily Fats, Oil and Grease (FOG) which severely impacts on sewers and the environment when released in high concentrations. In Trinidad & Tobago, it is estimated that approximately of 231,304 kg/day of unaccounted for FOG-bearing wastewaters are released into the environment. This project is about the optimization of physico-chemical processes for the treatment of FOGs for subsequent release into the environment.

Bench-scale studies analysed the characteristics of FSE's effluents from three popular sources, estimated the alum dosage for treatment in standard Jar Tests experiments, and used the results for the design of a pilot treatment plant. The mean concentration of constituents in the FSE were FOG (511 mg/l ± 116 mg/l), Suspended Solids (446 mg/l ± 146 mg/l), Chemical Oxygen Demand (2229 mg/l ± 963 mg/l) and pH (6 ± 0.3). Jar Tests were conducted using Poly-aluminium Chloride (PACl) as coagulant, anionic and cationic polyelectrolytes as flocculant aids with suitable pH adjustments of samples to determine the isoelectric point for aluminium hydroxide sludge. The FOG removal levels of 99.9% resulted in a final effluent concentration of 0.17 mg/l, which was well within the regulatory standard of 20 mg/l. The required conditions were a PACl concentration of 250 mg/l, followed by flocculation with 4 mg/l of 0.1% low cationic polyelectrolyte (CP 1154) at pH adjusted to 8, and post-sedimentation for thirty minutes.

The Jar test results were used as the basis for the design of a pilot-scale treatment plant. The plant was able to achieve a 97.4% removal of FOG (influent of 645.6 mg/l and an effluent level of 16.8 mg/l) using 0.1% medium cationic polyelectrolyte (CP1156) and pre- and post-sedimentation times of 120 minutes, and 360 minutes, respectively.

Keywords: Shamika Cudjoe; Coagulation-flocculation; Fats, Oils and Grease (FOG); Food Services Establishments (FSEs); post-sedimentation; pre-sedimentation.