**ASSESSMENT OF PHYSICO-CHEMICAL PROCESSES FOR TREATMENT AND REUSE OF GREYWATER**

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**Abstract**

The present study deals with real greywater that was collected from five flats and connected to a pilot plant. The research study aims at evaluation of greywater treatment and reuse using diverse phico-chemical treatment process including sedimentation, coagulation/flocculation and Fenton`s reaction. The study includes the evaluation of different settling times using two successive sedimentation tanks that received raw greywater. The chemical coagulation phase includes lime and lime aided with ferric chloride as well as advanced oxidation (as Fenton’s reaction). The experimental method involves monitoring of specific water quality constituents, under varying operating conditions, at different sedimentation periods and different chemicals doses to reach the sustainable approach. Greywater treatment was examined first in batch experiments to determine the optimum operating conditions including: the settling time, the dose of lime (CaO), ferric chloride (FeCl3), and Fenton’s reaction [Fe2(SO4)3.H2O2]. The obtained optimum conditions were implemented throughout the pilot plant investigation. The pilot plant study was performed at a settling time of 3.0 hours, the removal rates shifted from the initials 64.5, 30.1, 19.4 and 31.7% to 71.3, 25.5, 29.6 and 49.1% for the TSS, COD, BOD5 and oil & grease, respectively. Such treatment was not sufficient to reach the characteristics of non-restricted reuse. By increasing the settling time to 4.5 hours, better removal efficiency could be achieved namely; 66.5%, 40.3%, 38.5%, and 50.2%, successively. To enhance the treatment efficiency of the above system; lime was added at 160 mg/l where the characteristics of the final effluent could cope with the permissible level of the 2nd group (secondary wastewater treatment) for irrigation reuse according to the “Egyptian Guideline”. Combination of chemical treatment using lime (160 mg/l) aided with ferric chloride (100 mg/l) with sedimentation (4.5 hours) was carried out. The obtained results showed that the removal rates of TSS, COD, BOD and oil & grease enhanced to 94.9, 91.8, 94.2 and 97.2%, successively. The E. Coli count and the number of cells or eggs of Nimatoda in the final effluent reached 100/ml and 1 count/l, respectively. The final effluent could cope with the permissible level, 1st Class (advanced wastewater treatment), for non-restricted water reuse according to the “Egyptian Guideline for wastewater reuse”. Present study proves that chemical coagulation could successfully approach the objectives of treatment while mutually saves space, energy and labors.