ABSTRACT

Landfill leachates present high ammonia and organic matter concentrations, besides other pollutants, which do not allow its discharge to the environment without a previous treatment. Older landfill leachates, with more stabilized organic matter, present great pollutant potential, mainly due to the presence of recalcitrant substances that not often are removed by biological treatment and need the application of a post-treatment. The present research aimed to apply the physicochemical treatment for two biological wastewater treatment plant effluents. The first one was constituted by an activated sludge (sequence batch reactor - 70 liters), which effluent was submitted to a coagulation-flocculation process, using iron and aluminum salts, for recalcitrant organic matter removal. A lab scale aerated lagoon was operated in parallel. The lagoon was dimensioned for biodegradable organic matter removal, which effluent was submitted to a chemical precipitation process for ammonia removal (formation of the mineral struvite ($MgNH_4PO_4.6H_2O$).The results showed that the ferric chloride ($FeCl_3$) was the more appropriated coagulant considering the economic point of view, however high dosages (1,160 mg $FeCl_3$/L) comparing with 2.465 mg $Al_2(SO_4)_3.6H_2O$/L had been required to achieve recalcitrant organic matter removal. Applying $FeCl_3$, the optimum pH was of the order of 4.0 and for $Al_2(SO_4)_3$, approximately 5.0. During the tests, the influence of the mixture conditions on the physicochemical phenomena was evaluated. The results demonstrated that the velocities gradient and the mixture time do not influenced the coagulation-flocculation phenomena. Regarding to the chemical precipitation of ammonia in struvite form, the better removals (~ 90%) were achieved when the solubility limit of the mineral was exceeded. Due to this fact, it was necessary to apply a molar rate of 1.5:1:1.4 between the ions (Mg^{+2}:NH_4^+:PO_4^{-3}). Nevertheless, the final effluent of this system presented a residual soluble phosphorus concentration higher than 12 mg P-PO_4^{-3}/L, hence it is not recommended for practical purposes.

Key words: Ammonia. Landfill. Coagulation-Flocculation. Leachate. Chemical Precipitation. Struvite.