

Domestic wastewater has nutrients such as phosphate and nitrogen which are released into natural water resource, They cause algae growth and eutrophication problems. This research was the study to reduce the concentration of phosphate and nitrogen in wastewater by the two stages anoxic-oxic activated sludge process which consisted of two anoxic chambers in series and followed by one oxic chamber. The return sludge from settling tank was fed into the first anoxic chamber at a rate 1:1 of influent flowrate and sludge from oxic chamber was fed into the second anoxic chamber at a rate 1:4 of influent flowrate. The sludge age was also controlled at a period of 10 days in all experiments. This research has volumetric loading between 0.16-1.30 kg BOD/m<sup>3</sup>-d.

The results show that this system had the maximum removal efficiencies of 99.69% BOD for volumetric loading 0.65 kgBOD/m<sup>3</sup>-d and F/M ratio 0.2 kgBOD/kgMLSS-d, 89.57% COD for volumetric loading 1.30 kgBOD/m<sup>3</sup>-d, 98.50% suspended solid for volumetric loading 1.01 kgBOD/m<sup>3</sup>-d, 97.60% total phosphate and 98.25% orthophosphate for volumetric loading 0.50 kgBOD/m<sup>3</sup>-d with HRT in anoxic chamber 2 hours/chamber and oxic chamber 6 hours, 98.18% total nitrogen for 1.30 kgBOD/m<sup>3</sup>-d. The existing phosphate and nitrate of treated effluent were 0.12-1.20 and 0.20-5.85 mg/L, respectively. Moreover, the sludge bulking was not presented in all experiments. The relation of orthophosphate uptake and released were  $P\text{-uptake} = 1.0582(P\text{-release}) + 3.793$  and  $R^2 = 0.9514$  at flowrate 48 L/d,  $P\text{-uptake} = 1.0632(P\text{-release}) + 2.827$  and  $R^2 = 0.9934$  at flowrate 36 L/d,  $P\text{-uptake} = 1.1749(P\text{-release}) + 2.1749$  and  $R^2 = 0.9987$  at flowrate 24 L/d. In addition, it was found that BOD:TP and COD:TP ratio of the system decreased while the organic loading increased and the maximum BOD:TP and COD:TP ratio were 100:3.48 and 100:2.70 respectively.