

Abstract :

The physical characteristics, microbial activities and kinetic properties of the granular sludge biomass were investigated under the influence of different hydraulic retention times (HRT) along with the performance of the system in removal of color and COD of synthetic textile wastewater. The study was conducted in a column reactor operated according to a sequential batch reactor with a sequence of anaerobic and aerobic reaction phases. Six stages of different HRTs and different anaerobic and aerobic reaction time were evaluated. It was observed that the increase in HRT resulted in the reduction of organic loading rate (OLR). This has caused a decrease in biomass concentration (MLSS), reduction in mean size of the granules, lowered the settling ability of the granules and reduction of oxygen uptake rate (OUR), overall specific biomass growth rate (μ overall), endogenous decay rate (k_d) and biomass yield (Y_{obs} , Y). When the OLR was increased by adding carbon sources (glucose, sodium acetate and ethanol), there was a slight increase in the MLSS, the granules mean size, μ overall, and biomass yield. Under high HRT, increasing the anaerobic to aerobic reaction time ratio caused an increase in the concentration of MLSS, mean size of granules and lowered the SVI value and biomass yield. The μ overall and biomass yield increased with the reduction in anaerobic/aerobic time ratio. The HRT of 24 h with anaerobic and aerobic reaction time of 17.8 and 5.8 h respectively appear to be the best cycle operation of SBR. Under these conditions, not only the physical properties of the biogranules have improved, the highest removal of color (i.e. $94.1 \pm 0.6\%$) and organics (i.e. $86.5 \pm 0.5\%$) of the synthetic textile dyeing wastewater have been achieved.