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| Thesis Title | Performance of Sequencing Batch Reactor Using Internal Carbon Source under Anoxic Period in Denitrification Process |
| Thesis Credits | 12 |
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## Abstract

This research emphasizes on the optimized Sequencing Batch Reactor (SBR) system operation for high strength nitrogen wastewater with low COD/N ratio. This low COD/N ratio may cause the limitation of organic carbon for denitrification under anoxic period. The aim of this research is to study the use of sludge and wastewater refered to internal carbon as organic carbon sources for denitrification process with no external carbon supply and the optimized operation in which the effluent nitrogen was less than 50 mg/l-N. Two sets of SBR with volume of 4 litres were used. The experiments were conducted into two parts, in the first part, the effects of the operating parameters; Solid Retention Time (SRT) and anoxic period were investigated that were SRTs with infinite and 30 days and anoxic periods with 15 and 39 hrs. The second part, the efficiency of nitrogen removal in SBR precess was studied in which the time of anaerobic was added to the first stage of operation.

From the first experiment, the results showed that the nitrogen removal efficiencies of aerobic-anoxic SBR operating at 24 hr/cycle at infinite and 30 day SRTs were 58.7 and 53.4 %, respectively, which had no significant difference. Furthermore, there was also no significant difference of nitrogen removal efficiencies between the use of anoxic periods of 15 and 39 hrs (58.7 and 60.5%, respectively). The second experiment demonstrated that when the anaerobic was added into the first stage, nitrogen removal efficiency was increased to 96.6 %. The amount of nitrogen found in the effluent was only 15.3 mg/l-N. It should be noted that the

Soluble COD (SCOD) removal efficiencies of all SBR used in this research were higher than 96%.

The profile of concentration with the time in the cycle of anaerobic-aerobic-anoxic SBR showed the accumulation of nitrite during aerobic period which is highly beneficial for denitrification process. Moreover, during anaerobic stage, the Soluble COD (SCOD) was reduced to 70% with the unloss of Total COD (TCOD) which implied that there was the accumulation of internal carbon in microbial cells.

As the result, the endogenous specific denitrification rate (ESDR) on anoxic stage in anaerobic-aerobic-anoxic SBR of 0.0248 gNOx-N/gMLSS/d was similar to specific denitrification rate (SDR) in which methanol was used as external carbon source. This value was higher than ESDR and SDR from aerobic-anoxic SBR operation which were 0.013 and 0.021 NOx-N/gMLSS/d, respectively. It can be suggested that the ESDR and SDR in this study were rather low compared to other research work due to a high SRT used in this experiment.

Keywords : Low COD/N ratio / Internal carbon source / SBR / SRT / SDR