

พิมพ์ต้นฉบับบทความวิจัยวิทยานิพนธ์ภายในกรอบสี่เหลี่ยมนี้เพียงแผ่นเดียว

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MR. BOONTAI NITHIPONGSAKUL : APPLICATIONS OF THE CONTACT-STABILIZATION ACTIVATED SLUDGE PROCESS FOR NITROGEN AND PHOSPHORUS REMOVAL. THESIS ADVISOR: ASSO. PROF. SURAPOL SAIPANICH, Dr. Ing., 236 pp. ISBN 974-635-780-8.

The objectives of this research were to study the feasibility, efficiency and to determine kinetic parameters for the applications of the contact-stabilization activated sludge process for nitrogen and phosphorus removal. Sludge Retention Time (SRT) was varied at 3, 6, 10 and 16 days. Influent wastewater, sludge return and internal MLSS return flowrates were controlled at 35, 35 and 105 litres/day, respectively. The Hydraulic Retention Time (HRT) in the stabilization, anoxic 2, anaerobic, anoxic 1 tanks were kept constant at 2 hours while the HRT in the contact tank was controlled at 4 hours. Synthetic wastewater with the COD, TKN, and phosphorus concentrations of 600, 30 and 10 mg/l, respectively, were used in the experiments. The experimental results were described below.

At SRT 3, 6, 10 and 16 days, the COD removal efficiency of this system was 94.3, 94.7, 97.0 and 97.0%, respectively, the total nitrogen removal efficiency was 66.9, 75.8, 80.4 and 84.7%, respectively, and the phosphorus removal efficiency was 38.7, 73.2, 63.2 and 65.3%, respectively. The results of the experiments indicated that SRT did not have any significant effect on the system's COD removal efficiency. The total nitrogen removal efficiency was proportional to the SRT while the phosphorus efficiency showed an adverse trend with increasing SRT. The experiments can be concluded that the appropriate SRT for this system should be in the range of 10-16 days.

The system kinetic parameters for substrate (COD) removal were as follows :  $Y_T$  0.464 mg.MLVSS/mg.COD,  $k_d$  0.0712 day<sup>-1</sup>,  $K_{OT}$  21.14 day<sup>-1</sup>,  $Y_T$  21.61 day<sup>-1</sup>. And  $K_{ST}$  was related to SRT as shown in the following equation,  $K_{ST} = 589.58 \theta_C^{0.3391}$ . While the system kinetic parameters for nitrification were as follows :  $Y_N$  0.2 mg.NVSS/mg.NH<sub>3</sub>-N,  $k_{dn}$  0.05 day<sup>-1</sup>, Nitrifier Fraction 3.36%. And  $\mu_{NC}$  was related to SRT as shown in the following equation,  $\mu_{NC} = 1.9575 \theta_C^{-0.8563}$ .

Denitrification rates in anoxic 1 tank ( $U_{DN1}$ ) are were in the range of 0.042-0.053 mg.NO<sub>3</sub><sup>-</sup>/mg.MLVSS-day and the rate was related to SRT as shown in the following equation :  $U_{DN1} = 0.0633 \theta_C^{-0.1413}$ . While denitrification rates in anoxic 2 tank ( $U_{DN2}$ ) had the average value of 0.003 mg.NO<sub>3</sub><sup>-</sup>/mg MLVSS-day and the rate was related to SRT as shown in the following equation :  $U_{DN2} = 0.0031 \ln \theta_C - 0.0051$ . At SRT 3, 6, 10 and 16 days, the phosphorus release rates in anaerobic tank were 136, 193, 205 and 206% of the influent phosphorus concentration, respectively, and the phosphorus uptake rates in contact tank were 55.1, 86.1, 82.1 and 83.1% of the phosphorus concentration in anaerobic tank, respectively.

The kinetic parameters and mathematical equations from this research can be used for process design calculation. The calculation results approximated to the results obtained from the experiments.

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