Effects of some operating parameters on the efficiency of a sequencing batch reactor system for treatment of textile wastewater containing acid dyes

Suntud Sirianuntapiboon\textsuperscript{a,*}, Kanidta Chairattanawanc

\textsuperscript{a}Department of Environmental Technology, School of Energy, Environment and Materials, King Mongkut’s University of Technology Thonburi, Thungkru, Bangkok 10140, Thailand
Tel. +66 2 470 8656; Fax: +66 2 470 8660; email: suntud.sir@kmutt.ac.th
\textsuperscript{b}Department of Applied Science, Office of General Education, Sripatum University, Phahonyothin Road, Chatuchak, Bangkok 10900, Thailand

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\textbf{ABSTRACT}

The purpose of this research was to find the optimal treatment conditions of a sequencing batch reactor (SBR) system for treatment of various types of textile wastewater (TWW) and synthetic textile wastewater containing acid red 18 and acid blue 9 dyes. Experiments were carried out under various BOD\textsubscript{5}:TN ratios of 100:5, 100:10, 100:15, and 100:20, with mixed liquor suspended solids of 3,000 mg/L, and at hydraulic retention times (HRT) of 5, 7.5, and 10 d in order to determine the highest removal efficiency. Also, glucose, starch industrial wastewater (SWW), and noodle industrial wastewater were tested for their suitability as a carbon source. The results showed that mixed acid dyes had no significant effect on heterotrophic bacteria, but strongly repressed denitrifying bacteria activity. The SBR system with two times diluted TWW containing 1,480 mg/L glucose demonstrated high removal efficiencies for color, chemical oxygen demand (COD), biochemical oxygen demand (BOD\textsubscript{5}), and TN (75.9 ± 2.1, 89 ± 7, 92 ± 1, and 90.9 ± 2.8%, respectively). Regarding the effect of nitrogen concentration and HRT, the highest color, COD, BOD\textsubscript{5}, and TN removal efficiencies (91.1 ± 0.3, 96 ± 1, 97 ± 3, and 86.9 ± 0.4%, respectively) were observed with one time diluted TWW containing 1,480 mg/L glucose and 344 mg/L urea (BOD\textsubscript{5}:TN of 100:10) at HRT of 10 d. For future applications, noodle or SWWs could be used as a carbon source instead of glucose, without any significant difference in color removal efficiency. This study suggests that the SBR system could be applied for treatment of TWW after one-time dilution with water and supplemented with carbon and nitrogen sources at organic loading and BOD\textsubscript{5}:TN ratio of 0.17–0.23 kg BOD\textsubscript{5}/m\textsuperscript{3}d and 100:10, respectively.

\textbf{Keywords:} Acid dye; Noodle industrial wastewater; Sequencing batch reactor (SBR); Starch industrial wastewater; Textile wastewater

\textsuperscript{*}Corresponding author.