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EFFECT OF ORGANIC CARBON ON TERTIARY DENITRIFICATION OF THE SECONDARY EFFLUENT IN BIOFILTERS PACKED WITH SUSPENDED CARRIERS

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Denitrifying biokinetics in biofilters packed with suspended carriers were evaluated under different empty bed residence times (EBRT) with ethanol or acetate as the electron donor. The two denitrifying biofilters removed nitrate (NO_3^-—N) effectively after only 3 – 4 days operation. At EBRT of 30; 15 and 7.5 min, the NO_3^-—N removal percentage was 84; 72 and 59% in the ethanol biofilter, and was 89; 70 and 62% in the acetate biofilter, respectively. With the influent NO_3^-—N loading rate ranged from 0.4 to 1.8 g/(m^2·day), the NO_3^-—N removal loading rate increased with increasing influent NO_3^-—N loading rates, and the system was substrate limited. While when the influent nitrate loading rate was above 3 g/(m^2·day), the system was biomass limited. The half-order coefficients were 0.162; 0.175 and 0.274 (mg/L)$^{1/2}$/min for the ethanol biofilter with the influent NO_3^-—N concentration of 7.3 – 7.7 mg/L, and were 0.107; 0.165 and 0.303 (mg/L)$^{1/2}$/min for the acetate biofilter with the influent NO_3^-—N concentration of 6.8 – 8.0 mg/L. Denitrification efficiency varied slightly during the backwashing cycle, and the effect of backwashing on the effluent turbidity was relatively large, especially for the biofilter with ethanol as the organic carbon.

Keywords: tertiary denitrification, secondary effluent, ethanol, acetate, empty bed residence times.

Introduction

Nowadays, wastewater treatment plants are facing stringent discharging standards. For example, in American, total nitrogen (TN) of below 3 mg/L and total phosphorus (TP) of below 0.3 mg/L have been set as discharging standards [1]. In addition, wastewater treatment technology has also evolved from enhanced nutrient removal (ENR) to limit of technology (LOT). The

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