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Selectivity control of nitrite and nitrate with the reaction of S^0 and achieved nitrite accumulation in the sulfur autotrophic denitrification process

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Abstract: The characteristics of reaction between S^0 and NO_2^- -N or NO_3^- -N in the sulfur autotrophic denitrification (SADN) process were studied using S^0 as an electron donor and NO_2^- -N and NO_3^- -N as electron acceptors. The effect of changes in pH and temperature on the processes of NO_2^- -N and NO_3^- -N reduction were also studied to identify the optimum control parameters for strengthening the preference of S^0 on NO_3^- -N; thus, achieving the efficient accumulation of NO_2^- -N. The results showed that the affinity of S^0 for NO_3^- -N was considerably higher than that for NO_2^- -N. The optimum pH values for the reductions of NO_2^- -N and NO_3^- -N were 7.0 and 8.5, respectively, and both optimum temperatures were 35°C. By controlling different pH, the NO_3^- -N conversion efficiency reached 90%, at which time the accumulation of NO_2^- -N was more than 95%. Microbial community analysis showed that *Thiobacillus*, *Sulfurimonas*, and *Thioahalobacter* were the main genera in the S^0 -SADN process.

Keywords: S^0 - sulfur autotrophic denitrification (SADN), preference, parameter optimization, NO_2^- -N accumulation

1. INTRODUCTION

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