

Enhanced bio-sulfur recovery with high carbon to nitrogen ratios under micro-aerobic condition using denitrifying sulfide removal processChuan Chen¹, Ruo-Chen Zhang¹, Xi-Jun Xu¹, Ai-Jie Wang¹, Nan-Qi Ren¹ and Duu-Jong Lee^{1,2}¹Harbin Institute of Technology, China²National Taiwan University, Taiwan

Denitrifying Sulfide Removal (DSR), which simultaneously degrades sulfide, nitrate and organic carbon, has increasingly gained attention as the key unit in industrial wastewater treatment. Its stable operation depends by autotrophic and heterotrophic bacteria close cooperation. The low treatment efficiency with high C/N molar ratio, which causes heterotrophic denitrifiers more vigorous, was seen as a burden on DSR engineering application and a problem to be solved. In this article, 12 groups of batch tests were conducted with different C/N molar ratios (1.26/1, 2/1 and 3/1) and two S/N molar ratios (5/6 and 5/8) under anaerobic or micro-aerobic condition. Less than 50% sulfide was removed from the anaerobic bottles and no sulfur transformation was observed at the end, because high C/N molar ratios can enhance the activity of sulfur reducer, resulting in the sulfur produced from sulfide oxidation reduced to sulfide again. These phenomena didn't get much better with the use of different S/N molar ratios. Nevertheless, 100% sulfide removal was gained under micro-aerobic condition (DO<0.2) in which sulfide chemical oxidation only accounted for less than 5%. The continuous expanded granular bed reactor was employed, to further verify the enhancing effect of micro-aerobic condition. Results showed that sulfide removal efficiency reached peak performance at 70% and 55% of total sulfur was recovered. This performance was nearly twice as much as anaerobic environment overall. We speculated that applying micro-aeration can inhibit heterotrophic denitrifiers' activity and make DSR technology handle industrial wastewaters with high C/N ratios

Biography

Chuan Chen has completed his PhD from Harbin Institute of Technology (HIT) and Post-doctoral studies from University of Calgary from 2013 to 2014. He is Associate Professor of HIT at present and has published more than 40 papers in reputed journals.

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