Short Communication

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Enhanced performance of denitrifying sulfide removal process at high carbon to nitrogen ratios under micro-aerobic condition

Chuan Chen[1], Ruo-Chen Zhang[1], Xi-Jun Xu[1], Ning Fang[1], Ai-Jie Wang[1], Nan-Qi Ren[1], Duu-Jong Lee[1,2,3,*]

[1]State Key Laboratory of Urban Water Resource and Environment (SKLUWRE), Harbin Institute of Technology, 73 Huanghe Road, Harbin, Heilongjiang Province 150090, China; [2]Department of Chemical Engineering, National Taiwan University, Taipei 106, Taiwan; [3]Department of Chemical Engineering, National Taiwan University of Science and Technology, Taipei 106, Taiwan

[*]Corresponding authors: djlee@ntu.edu.tw (DJL)

Abstract: The success of denitrifying sulfide removal (DSR) processes, which simultaneously degrade sulfide, nitrate and organic carbon in the same reactor, counts on synergetic growths of autotrophic and heterotrophic denitrifiers. Feeding wastewaters at high C/N ratio would stimulate overgrowth of heterotrophic bacteria in the DSR reactor so deteriorating the growth of autotrophic denitrifiers. The DSR tests at C/N=1.26:1, 2:1 or 3:1 and S/N=5:6 or 5:8 under anaerobic (control) or micro-aerobic conditions were conducted. Anaerobic DSR process has <50% sulfide removal with no elemental sulfur transformation. Under micro-aerobic condition to remove <5% sulfide by chemical oxidiation pathway, 100% sulfide removal is achieved by the DSR consortia. Continuous-flow tests under micro-aerobic condition have 70% sulfide removal and 55% elemental sulfur recovery. Trace oxygen enhances activity of sulfide-oxidizing, nitrate-reducing bacteria to accommodate properly the wastewater with high C/N ratios.

Keyword:denitrifying sulfide removal; high C/N molar ratio; micro-aerobic condition

1. Introduction

Hydrogen sulfide, a reducing product of sulfate-reducing bacteria (SBR), is commonly yielded during anaerobic treatment of sulfate-laden wastewaters. The dissolved sulfide can result in severe corrosive and toxic effects on sewer, ecosystem and living species. Physico-chemical methods for sulfide removal requires extensive