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Proposal of upgrading Isfahan north wastewater treatment plant: An adsorption/bio-oxidation process with emphasis on excess sludge reduction and nutrient removal

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Abstract

There is a rising challenge in managing the activated sludge process due to excess sludge disposal from the wastewater treatment plant and inadequate effluent quality due to the stricter standard of effluent quality. Hence, the incorporation of oxidic-settling-anoxic process and ultrasonic waves in the return sludge line was proposed to assess the excess sludge reduction and nutrient removal in the adsorption/ bio-oxidation activated sludge process as a proposal upgrading. The results indicated that sludge production from adsorption/bio-oxidation process could be reduced using oxidic-settling-anoxic and ultrasonic by 50% at each studied mixed liquor suspended solids level. Compared to the adsorption/biooxidation process, the total and soluble chemical oxygen demand removal efficiencies in adsorption/ bio-oxidation process with oxidic-settling-anoxic and ultrasonic slightly decreased suggesting a lysis phenomenon. During the operation of adsorption/bio-oxidation process with oxidic-settling-anoxic and ultrasonic, the total Kjeldahl nitrogen removal efficiency improved in A and B stages, with 38.3 +/- 8.1% and 83.1 +/- 6.5% versus 36.8 +/- 14.5% and 75.1 +/- 7.3%, respectively. According to the stoichiometric calculations, in B stage of adsorption/bio-oxidation process with oxidic-settling-anoxic and ultrasonic, the soluble available ultimate biochemical oxygen demand and net NO3 produced for denitrification were 69.5 and 43.8 mg/L, respectively. Overall, the experimental data revealed that the adsorption/biooxidation process with oxidic-settling-anoxic and ultrasonic produced lower excess biological sludge and better total Kjeldahl nitrogen removal efficiency compared to the adsorption/bio-oxidation system alone. Keywords: Activated sludge process Excess sludge reduction OSA process Ultrasonic (C) 2020 Elsevier Ltd. All rights reserved.

Keywords

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