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POTENTIAL SAVING OF AERATION ENERGY IN INHIBITING SLUDGE BULKING USING MAGNETICALLY-ASSISTED SEQUENTIAL BATCH REACTOR (Mag-SBR) SYSTEM

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Abstract

Activated sludge treatment process is the most commonly used technology in treating municipal wastewater. Nevertheless, its stable operation is always plagued by occurrence of sludge bulking. Existing control approaches have led to various drawbacks and caused more problematic issues in the treatment system. Most common approach taken to control the sludge bulking is by increasing and maintaining high dissolved oxygen (DO) concentration throughout aeration phase. However, this approach led to high overall operational cost of the treatment system spent for aeration energy consumption. Relatively, very little attention was paid to the possibility of applying magnetic field in controlling sludge bulking problem. Application of magnetic field may stand a great chance of minimizing the occurrence of sludge bulking by inhibiting proliferation of filamentous microorganisms despite the condition of low DO concentration. In such mean, there is no significant needs to increase the aeration intensity as to supply more DO concentration in magnetically-assisted treatment system. Therefore, this study is aimed to evaluate the performance of treatment system under sludge bulking occurrence using magnetically-assisted sequential batch reactor (Mag-SBR) system. As to study the feasibility of the system without increasing the aeration energy consumption, this system is allow to operate under low DO concentration on ranged 2 to 3 mg/L. The average aggregation and settling velocity for Mag-SBR were 89% and 0.59 m/hr thus, resulted in significant decrement of sludge volume index to as low as 23.7 mL/g. This enhancement benefited the treatment removal performances whereby the average chemical oxygen demand, ammonia and total phosphorus were 87%, 88% and 72%, respectively.