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Granular biomass floatation: a simple kinetic/stoichiometric explanation

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Abstract

Floatation events are commonly observed in anammox, denitrifying and anaerobic granular systems mostly subjected to overloading conditions. Although several operational strategies have been proposed to avoid floatation of granular biomass, until now, there is no consensus about the conditions responsible for this phenomenon. In the present study, a simple explanation based on kinetic and stoichiometric principles defining the aforementioned processes is provided. The operational zones corresponding to evaluated parameters where risk of floatation exists are defined as a function of substrate concentration in the bulk liquid and the radius of the granule. Moreover, the possible control of biomass floatation by changing the operating temperature was analyzed. Defined operational zones and profiles fit data reported in literature for granular biomass floatation events. From the study the most influencing parameter on floatation occurrence has been identified as the substrate concentration in the bulk media.

Keywords: anaerobic, anammox, denitrification, granule, methane, nitrogen.

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