

**FEAST-FAMINE OPERATION TECHNOLOGY FOR FILAMENTOUS FOAMING CONTROL IN
WASTEWATER TREATMENT PROCESS**

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ABSTRACT: Filamentous foaming is a common problem happened in activated sludge treatment plants. It often deteriorates the quality of final effluent. It was previously identified as that the cause of foaming problem was the overgrowth of filamentous bacteria, like *Nocardia* spp. In this study, characteristics of filamentous and floc-forming bacteria were identified firstly. The maximum specific growth rate (μ_{max}) and the half-velocity constant (K_s) of the Monod kinetics model for filamentous and floc-forming bacteria, were obtained from the batch culture growth data, followed by processing with nonlinear regression method. It was discovered that the growth rate of *Nocardia amarae* bacteria, under the condition of Food to Microorganism (F/M) ratio below 0.5 mg of BOD/(mg of MLSS \cdot qd), was higher than non-filamentous bacteria like, like *P.aeruginosa*. Based on the theory of growth kinetics, μ_{max} Feast-Famine Operation (FFO) technology was developed in reducing the filamentous foaming problems. In the feast phase, with a high F/M ratio, activated sludge cultures consume nutrients and produce the stored polymers, like Polyhydroxyalkanoate (PHA), simultaneously. In the famine phase, with a low F/M ratio, activated sludge cultures consume stored polymers as a carbon and energy source. The sludge microbes underwent a repetitive switch between high and low F/M ratio during the course of wastewater treatment. This paper will also discuss on the metabolic model for the activated sludge cultures. The experimental results revealed that FFO strategy effectively suppressed filamentous overgrowth in keeping with high biological oxygen demand (BOD) removal efficiency. The technology introduced here is a contribution to a further development of activated sludge processes for filamentous foaming control.

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