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Efficiency of an upflow anaerobic sludge blanket reactor treating potato starch processing wastewater and related process kinetics, functional microbial community and sludge morphologyPhilip Antwi¹, Jianzheng Li¹, Portia Opoku Boadi¹, Jia Meng¹, Frank Koblah Quashie¹, Xin Wang¹, Nanqi Ren¹ and Gerardo Buelna²¹Harbin Institute of Technology, China²Centre de Recherche Industrielle du Québec, Canada

Herein, an upflow anaerobic sludge blanket reactor was employed to treat potato starch processing wastewater and the efficacy, kinetics, microbial diversity and morphology of sludge granules were investigated. When organic loading rate (OLR) ranging from 2.70 to 13.27 kgCOD/m³.d was implemented with various hydraulic retention times (72h, 48h and 36h), COD removal could reach 92.0-97.7%. Highest COD removal (97.7%) was noticed when OLR was 3.65 kgCOD/m³.d, but had declined to 92.0% when OLR was elevated to 13.27 kgCOD/m³.d. Methane and biogas production increased from 0.48 to 2.97 L/L.d and 0.90 to 4.28 L/L.d, respectively. Kinetics and predictions by modified-Gompertz model agreed better with experimental data as opposed to first-order kinetic model. Functional population with highest abundance was Chloroflexi (28.91%) followed by Euryarchaeota (22.13%), Firmicutes (16.7%), Proteobacteria (16.25%) and Bacteroidetes (7.73%). Compared with top sludge, tightly-bound extracellular polymeric substances was high within bottom and middle sludge. Morphology was predominantly Methanosaeta-like cells, Methanosarcina-like cells, rods and cocci colonies.

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