World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:17, No:12, 2023

Sludge Densification: Emerging and Efficient Way to Look at Biological Nutrient Removal Treatment

Authors : Raj Chavan

Abstract : Currently, there are over 14,500 Water Resource Recovery Facilities (WRRFs) in the United States, with ~35% of them having some type of nutrient limits in place. These WRRFs account for about 1% of overall power demand and 2% of total greenhouse gas emissions (GHG) in the United States and contribute for 10 to 15% of the overall nutrient load to surface rivers in the United States. The evolution of densification technologies toward more compact and energy-efficient nutrient removal processes has been impacted by a number of factors. Existing facilities that require capacity expansion or biomass densification for higher treatability within the same footprint are being subjected to more stringent requirements relating to nutrient removal prior to surface water discharge. Densification of activated sludge has received recent widespread interest as a means for achieving process intensification and nutrient removal at WRRFs. At the core of the technology are the aerobic sludge granules where the biological processes occur. There is considerable interest in the prospect of producing granular sludge in continuous (or traditional) activated sludge processes (CAS) or densification of biomass by moving activated sludge flocs to a denser aggregate of biomass as a highly effective technique of intensification. This presentation will provide a fundamental understanding of densification by presenting insights and practical issues. The topics that will be discussed include methods used to generate and retain densified granules; the mechanisms that allow biological flocs to densify; the role that physical selectors play in the densification of biological flocs; some viable ways for managing biological flocs that have become densified; effects of physical selection design parameters on the retention of densified biological flocs and finally some operational solutions for customizing the flocs and granules required to meet performance and capacity targets. In addition, it will present some case studies where biological and physical parameters were used to generate aerobic granular sludge in the continuous flow system.

Keywords : densification, aerobic granular sludge, nutrient removal, intensification
Conference Title : ICWTP 2023 : International Conference on Wastewater and Treatment Plants
Conference Location : Sydney, Australia
Conference Dates : December 04-05, 2023