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Aerobic granulation for wastewater treatment: performance evaluation at elevated temperature using real waste water

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Aerobic granulation is a novel environmental biotechnological process that has recently received the interest of researchers working in the area of biological wastewater treatment. Application of aerobic granular sludge (AGS) in treatment of wastewater using laboratory sequencing batch reactors (SBR) has shown that this technology is a promising technology in wastewater treatment. These studies have demonstrated the fast settling properties of AGS which facilitate biomass retention. In addition, the studies demonstrated the presence of substrate profiles across the granule radius, which allows concurrent aerobic, anoxic and anaerobic processes into the same granule. To date, most of the research work on AGS has been carried out using synthetic wastewater at a temperature of 30 °C or lower and no research has been conducted to evaluate the performance of AGS at elevated temperature using real wastewater. In this research, the possibility of cultivating AGS by using SBR system in treating real domestic wastewater at high temperature (50 °C) was investigated. The samples of seed sludge were obtained from the wastewater treatment plant of Madinah, Saudi Arabia a city that has a desert-like climate with temperature reaching close to 50°C during summer time. All experiments were executed in a sequencing batch reactor (SBR) with a complete cycle time of 3 h. Stable mature granules with average diameters between 2.0 and 5.0 mm and good biomass concentration of 5.8 g L⁻¹ were observed in the bioreactor. Promising results in treatment of the domestic wastewater were achieved with good removal rates of 84.4 %, 99.6 % and 81.7 % for COD, ammonia (NH₃) and total phosphorus (TP), respectively. The study demonstrated the formation capabilities of AGS in a single, high and slender column type-bioreactor at high temperature which is suitable to be applied in hot climate condition areas especially countries with tropical and desert like climates.

Biography

Mustafa Bob has completed his PhD at the age of 35 years from The Ohio State University and he was a postdoctoral fellow with the National Research Council (NRC) in USA. He is currently an assistant professor at Taibah University in Saudi Arabia. He has published more than 10 papers in reputed journals and has been serving as a reviewer for a number of reputed journals.

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