

Development and Performance of Aerobic Granular Sludge at Elevated Temperature

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Abstract : In this research, the formation and development of aerobic granular sludge (AGS) for domestic wastewater treatment application in hot climate conditions was studied using a sequencing batch reactor (SBR). The performance of the developed AGS in the removal of organic matter and nutrients from wastewater was also investigated. The operation of the reactor was based on the sequencing batch system with a complete cycle time of 3 hours that included feeding, aeration, settling, discharging and idling. The reactor was seeded with sludge collected from the municipal wastewater treatment plant in Madinah city, Saudi Arabia and operated at a temperature of 40°C using synthetic wastewater as influent. Results showed that granular sludge was developed after an operation period of 30 days. The developed granular sludge had a good settling ability with the average size of the granules ranging from 1.03 to 2.42 mm. The removal efficiency of chemical oxygen demand (COD), ammonia nitrogen (NH₃-N) and total phosphorus (TP) were 87.31%, 91.93% and 61.25% respectively. These results show that AGS can be developed at elevated temperatures and it is a promising technique to treat domestic wastewater in hot and low humidity climate conditions such as those encountered in Saudi Arabia.

Keywords : aerobic granular sludge, hot climate, sequencing batch reactor, domestic wastewater treatment

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