THE INVESTIGATION OF ZINC OXIDE NANOPARTICLES (ZnONPs) ON AEROBIC GRANULATION

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Nanoparticles, which are defined as tiny particles with sizes under 100 nm, have special physical properties that include ionization potential, reactivity, small size, high surface-to-mass ratio, chemical stability, improved absorption capacity, resistance to pH, and resistance to heat. Zinc oxide nanoparticles have been widely utilized in almost all scientific disciplines due to their remarkable features. However, several studies have claimed that concentrations of zinc oxide nanoparticles greater than 10 mg/L could pose a potential threat to the entire ecosystem due to their strong bioavailability, aggregation, and mobility. Since aerobic granular sludge has been shown to successfully eliminate heavy metals, sewage wastewater, slaughterhouse wastewater, high-strength food wastewater, aniline wastewater, printing dye wastewater, and more, it has been recognized as one of the most promising approaches in wastewater treatment technologies. Because aerobic granular sludge utilizes sustainable methods for treating pollutants through biosorption, bioaccumulation, and biodegradation, it has a wide range of uses in wastewater treatment. The aim of this research is to investigate the effect of two different doses of zinc oxide nanoparticles (1 mg/L and 5 mg/L) on granulation. The results showed that the efficiency of ammonia removal was considerably inhibited in the presence of 5 mg/L ZnO NPs. However, neither dosage application significantly altered the nitrite removal rates, while both ZnO NP concentrations noticeably prevented nitrate removal. Phosphorus removal decreased with even a low concentration of ZnO NPs Finally, the concentration of biomass increased under both ZnO NP concentrations.