

EFFECTS OF TiO₂ AND SiO₂ NANOPARTICLES ON ACTIVATED SLUDGE

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Abstract:

This paper deals with the observation and evaluation of the effects of TiO₂ and SiO₂ nanoparticles on microorganisms in activated sludge. The selected nanoparticles were tested at three different concentrations - 0.1 g/l, 0.3 g/l, and 0.5 g/l. Respirometry measurements were mainly used to evaluate the effects of TiO₂ and SiO₂ nanoparticles on microorganisms, as they allowed us to observe their activity, i.e. consumption of O₂. Fluorescence microscopy, for which a Live/Dead Cells Kit was used, enabled us to observe and compare the viability of microorganisms in the activated sludge. The acute toxicity of these nanoparticles was primarily tested during these experiments; however, no significant toxic effects were observed. It was found that the concentration of nanoparticles has an effect on their toxicity to microorganisms. In the case of TiO₂ nanoparticles the greatest toxic effect on the microorganisms was observed at a concentration of 0.1 g/l. The highest tested concentration did not show any effect.

Key words:

Nanoparticles, toxicity, activated sludge, respirometry