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### *An Examination of Silver Nanoparticles: Antimicrobial Effects and Mitigation*

Silver nanoparticles exhibit antimicrobial effects, these nanoparticles are being added to plastics, textiles, and building materials. The purpose of this research was to examine the chemistry of silver nanoparticles through antimicrobial effects and the potential impact on microbial cycling of nitrogen in the environment. The research consisted of two hypotheses; the first one was that silver nanoparticles will restrict the growth of nitrogen cycling bacteria and *E. coli* because silver nanoparticles are known to be antimicrobial. The second one was that gray water will minimize the antimicrobial effects that silver nanoparticles have on nitrogen cycling bacteria and *E. coli* because the gray water may aggregate the silver nanoparticles. Microbial nitrogen cycling bacteria and *E. coli* were cultured in the presence of silver nanoparticles and a solution of silver nanoparticles and gray water. Qualitative bio-chemical testing was performed on the nitrogen cycling cultures; zones of inhibition were measured on the *E. coli* cultures and were found to be statistically significant. It was found that gray water mitigated the antimicrobial effects of silver nanoparticles in the initial phases of testing, and that silver nanoparticles had no long term effect on nitrogen cycling bacteria. A limit of inhibition of *E. coli* bacteria growth was observed with varying concentrations of silver nanoparticles and gray water. Both research hypotheses were supported by the data.