Max Warnock

UV-Vis Analysis of Silver Nanoparticles Released from Odor Control Clothing, Part II

In last year's research, I tested and confirmed the hypothesis that odor control clothing (socks) can kill aquatic life, in particular, water boatmen (Corixidae). From my research, I found the anti-microbial agent in the clothing was likely silver nanoparticles but had no way to prove it. This year, I synthesized my own silver nanopartcles to test their toxicity on water boatmen. I then compared the synthesized particles to the particles released from odor control socks using a UV-vis spectrometer. The synthesized nanoparticles made an absorbance peak at 390 nm on the UV-vis spectrometer and the nanoparticles from the odor control clothing made an absorbance peak at 360 nm. The peak at 360 nm is likely due to a commercial coating, which makes the peak shift farther left (5). The silver nanoparticle solution was then used in an experiment on the water boatmen where it was found that higher concentrations of silver killed the insects faster. Using the data from the UV-vis, it was possible to find the concentration of silver nanoparticles (0.0003488 ppb) needed to kill pollutant tolerant insects such as the water boatmen within a day in 100 mL of water. The EPA limit for concentration is 3.4 ppb (2). My research shows that even small concentrations of silver nanoparticles are harmful to life and that the safety limits are too high. Therefore, the widespread use of odor control clothing is an important issue that needs further study to protect the health of society and the environment.