

PRETREATMENT CORNER

Addition to List of Microconstituents: Nanosilver

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According to Wikipedia, nanotechnology is the study of the controlling of matter on an atomic and molecular scale. Nanotechnology typically deals with structures of the size 100 nanometers or smaller in at least one dimension; and involves developing materials or devices within that size range. One billion nanometers equal one meter, or a better comparison is that a human blood cell is 8,000 nanometers.

Does it sound like science fiction? Yes, but it isn't. Nanotechnology is alive and thriving in today's world. It is predicted to be a trillion dollar industry by 2015. Nanotechnology has the potential to create many new materials and devices in the electronics, energy and medical industries. So what does nanotechnology have to do with wastewater treatment and industrial pretreatment programs?

Just like any new technology when introduced into the environment, there may be justifiable concerns about the toxicity of nanomaterials. One such nanomaterial that has come under scrutiny is nanosilver. Nanosilver or silver nanoparticles is an antibacterial technology that is currently found in air conditioners, air purifiers, clothing, refrigerators, toys, vacuum cleaners and washing machines, to name a few.

An article in the November 17, 2009 edition of the *Scientific American* journal reports that laboratory studies involving exposure of zebrafish to nanosilver resulted in the death and/or mutation of fish embryos. However, scientists do not yet know how this fish toxicity from nanosilver impacts humans or the environment, in general.

Many of you have worked for years trying to eradicate silver from wastewater discharges in your sewer systems, specifically from photographic processing operations. It now appears there is a new threat in town. POTWs have been upgrading their solids processing facilities to improve their classification from Class B to Class A biosolids. What impact will nanotechnology have on the microconstituents that tend to accumulate in biosolids?

EPA is working with manufacturers through the Nanoscale Materials Stewardship Program (NMSP) and released an interim report on their cooperative efforts in January 2009. A final report is expected to be released in early 2010. The NMSP was developed to provide a better scientific foundation for making regulatory decisions by encouraging manufacturers to submit information about nanoscale materials. Chemical information is currently submitted through the Toxic Substances Control Act (TSCA) and Significant New Use Rules (SNURs).

EPA is also co-funding the Center for Environmental Implications of Nanotechnology (CEINT) through the National Science Foundation. CEINT's focus is to research the behavior of nanomaterials in ecosystems. CEINT is headquartered at Duke University and is a collaboration between Duke, Carnegie Mellon University, Howard University and Virginia Tech, and includes investigators from the University of Kentucky and Stanford University.

While EPA and other organizations' actions are a beginning, this is another example of how our industrialized nation moves ahead technologically without considering all of the environmental implications.