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Silver nanoparticles in municipal wastewaters and environmental fate

Silver nanoparticle is largely used for various products and is finally found in discharged wastewaters. Silver was typically detected in all investigated municipal wastewaters. Concentrations of total silver in municipal were measured to assess Ag removal efficiency of treatment plants. Wastewater samples were also analyzed by the technique of single-particle inductively coupled plasma–mass spectrometry (SP-ICP-MS) to identify and determine that they contained silver nanoparticles. Nano-sized forms would account for less than 5% of the total Ag released from municipal effluents. Once released in the receiving environment, Ag NPs can undergo major transformation and their initial properties can be modified under natural conditions. The developed analytical approach was used for tracking silver nanoparticles and their degradation products over a period of 80 days. Particle size distributions changed significantly under different experimental conditions where most material was found in coarse colloidal fractions (<100 kDa). The presence of natural humic substances slowed degradation of nanoparticles, which is characterized by the increase of free/small ion complexes and the detection of colloids with a size less than 80 nm. Half-live values were generally estimated to be less than 15 days under natural conditions. Future research on nanotoxicity should consider exposure conditions, and then potential transformation, for risk assessment studies.

Biography

Christian Gagnon is a Senior Researcher in Geochemistry at Environment and Climate Change, Canada. He obtained his PhD from the University of Quebec/INRS-Oceanography and completed his Postdoctoral studies on the bioavailability of contaminants at the State University of New York, Stony Brook. His research focuses on the fate, transformation and behaviour of chemical contaminants released into the aquatic environment. All of its work aims at a better understanding of the mechanisms of transformation and the fate of metals and emerging substances in waste water discharges and the receiving environment. He has published over 150 scientific publications and reports and has contributed to over 250 scientific presentations on contaminant behaviour in the aquatic environment.

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