Behavior and toxicity of metallic nanoparticles: from freshwater to saltwater

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Abstract
The increasing use of nanomaterials in industrial applications for the last decade implies an increase of the concern about potential toxic effects of released engineered nanoparticles to the environment. In fact, aquatic ecosystems are the main receptors of chemical pollution, including nanoparticles. Surface waters and, to a greater extent, oceans, will be the final receptors for all wasted NPs (Fabrega et al., 2011; Gong et al., 2011; Whiteley et al., 2013). The transition from freshwater to estuarine and marine ecosystems represents drastic changes in ionic strength, organic matter and other physicochemical properties, which affect to particle properties and their fate and behavior. Nevertheless, knowledge about the effects and the mechanisms of toxicity of the different NPs on the aquatic and, over all, marine biota is quite far away to be complete (Boxall et al.; 2007; Baun et al., 2008; Chinnapongse et al., 2011; Walters et al., 2014). Toxicity of metallic nanoparticles to aquatic organisms seems to be related to the physical and chemical properties of those nanoparticles as well as their behavior in aquatic media where dissolution, aggregation and agglomeration processes occur. These ones affect to metal bioavailability. In this study a review of fate, behavior and toxicity of metallic nanoparticles is carried out taken in account the differences between fresh and marine environment with special emphasis on phytoplankton.

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