

Acute aquatic toxicity of tire and road wear particles to alga, daphnid, and fish.

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Abstract: Previous studies have indicated that tire tread particles are toxic to aquatic species, but few studies have evaluated the toxicity of such particles using sediment, the likely reservoir of tire wear particles in the environment. In this study, the acute toxicity of tire and road wear particles (TRWP) was assessed in *Pseudokirchneriella subcapita*, *Daphnia magna*, and *Pimephales promelas* using a sediment elutriate (100, 500, 1000 or 10000 mg/l TRWP). Under standard test temperature conditions, no concentration response was observed and EC/LC(50) values were greater than 10,000 mg/l. Additional tests using *D. magna* were performed both with and without sediment in elutriates collected under heated conditions designed to promote the release of chemicals from the rubber matrix to understand what environmental factors may influence the toxicity of TRWP. Toxicity was only observed for elutriates generated from TRWP leached under high-temperature conditions and the lowest EC/LC(50) value was 5,000 mg/l. In an effort to identify potential toxic chemical constituent(s) in the heated leachates, toxicity identification evaluation (TIE) studies and chemical analysis of the leachate were conducted. The TIE coupled with chemical analysis (liquid chromatography/mass spectrometry/mass spectrometry [LC/MS/MS] and inductively coupled plasma/mass spectrometry [ICP/MS]) of the leachate identified zinc and aniline as candidate toxicants. However, based on the high EC/LC(50) values and the limited conditions under which toxicity was observed, TRWP should be considered a low risk to aquatic ecosystems under acute exposure scenarios.