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Zinc leaching from tire crumb rubber.

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Abstract

Because tires contain approximately 1-2% zinc by weight, zinc leaching is an environmental concern associated with civil engineering applications of tire crumb rubber. An assessment of zinc leaching data from 14 studies in the published literature indicates that increasing zinc leaching is associated with lower pH and longer leaching times, but the data display a wide range of zinc concentrations, and do not address the effect of crumb rubber size or the dynamics of zinc leaching during flow through porous crumb rubber. The present study was undertaken to investigate the effect of crumb rubber size using the synthetic precipitation leaching procedure (SPLP), the effect of exposure time using quiescent batch leaching tests, and the dynamics of zinc leaching using column tests. Results indicate that zinc leaching from tire crumb rubber increases with smaller crumb rubber and longer exposure time. Results from SPLP and quiescent batch leaching tests are interpreted with a single-parameter leaching model that predicts a constant rate of zinc leaching up to 96 h. Breakthrough curves from column tests displayed an initial pulse of elevated zinc concentration (~3 mg/L) before settling down to a steady-state value (~0.2 mg/L), and were modeled with the software package HYDRUS-1D. Washing crumb rubber reduces this initial pulse but does not change the steady-state value. No leaching experiment significantly reduced the reservoir of zinc in the crumb rubber.

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