

Removal of Lead by Aluminum-based WTR Collected from Different Parts of the United States

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Lead is one of the heavy metals of concern present in urban stormwater, which has its roots in the use of lead-based paint and leaded gasoline, which were banned by the USEPA, and car batteries, which are still in use. Soil and water bodies contaminated by lead pose a risk to human health, especially children. Our group has previously worked on developing a stormwater filter media consisting of aluminum-based water treatment residuals (Al-WTRs) to adsorb and immobilize lead. Al-WTRs have proven to be effective adsorbents and their application is of high interest as they are recycled industrial byproducts. However, their characteristics vary significantly based on the protocols used by the drinking water treatment plants, such as the dosage of coagulants used. This raises the question of whether all water treatment residuals are equally effective, regardless of their origin. In this study, thirteen Al-WTRs originating from different water treatment plants across the United States were tested for their capacity to adsorb lead. The physicochemical characteristics of each Al-WTR was studied and then they were subjected to adsorption experiments. The adsorption capacities of Al-WTRs were correlated with their characteristics using multi-linear regression to find the most significant parameter affecting their efficiency. The results indicated that certain specific characteristics in all Al-WTRs are positively correlated with their adsorption capacities and can be used as indicators before their use in large scale applications.

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