

Adsorption Mechanism of Heavy Metals and Organic Pesticide on Industrial Construction and Demolition Waste and Its Runoff Behaviors

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Abstract : Adsorption of heavy metal pollutants (Zn, Cd, Pb, Cr, Cu) and organic pesticide (phorate, dithiophosphate diethyl, triethyl phosphorothioate), along with their multi-contamination on the surface of industrial construction & demolition waste (C&D waste) was investigated. Brick powder was selected as the appropriate waste while its maximum equilibrium adsorption amount of heavy metal under single controlled contamination matrix reached 5.41, 0.81, 0.45, 1.13 and 0.97 mg/g, respectively. Effects of pH and spiking dose of ICDW was also investigated. Equilibrium adsorption amount of organic pesticide varied from 0.02 to 0.97 mg/g, which was negatively correlated to the size distribution and hydrophilism. Existence of organic pesticide on surface of ICDW caused various effects on the heavy metal adsorption, mainly due to combination of metal ions and the floccule formation along with wrapping behaviors by pesticide pollutants. Adsorption of Zn was sharply decreased from 7.1 to 0.15 mg/g compared with clean ICDW and phorate contaminated ICDW, while that of Pb, Cr and Cd experienced an increase- then decrease procedure. On the other hand, runoff of pesticide contaminants was investigated under 25 mm/h simulated rainfall. Results showed that the cumulative runoff amount fitted well with curve obtained from a power function, of which $r^2=0.95$ and 0.91 for 1DAA (1 day between contamination and runoff) and 7DAA, respectively. This study helps provide evaluation of industrial construction and demolition waste contamination into aquatic systems.

Keywords : adsorption mechanism, industrial construction waste, metals, pesticide, runoff

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