

Evaluating Acid Buffering Capacity of Sewage Sludge Barrier for Inhibiting Remobilization of Heavy Metals in Tailing Impoundment

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Abstract : Compacted sewage sludge has been proved to be feasible as a barrier material for tailing impoundment because of its low permeability and retardation of heavy metals. The long-term penetration of acid mine drainage, however, would acidify the barrier system and result in remobilization of previously immobilized heavy metal pollutants. In this study, the effect of decreasing pH on the mobility of three typical heavy metals (Zn, Pb, and Cu) is investigated by acid titration test on sewage sludge under various conditions. The remobilization of heavy metals is discussed based on the acid buffering capacity of sewage sludge-leachate system. Test results indicate that heavy metals are dramatically released out when pH is decreased below 6.2, and their amounts take the order of Zn > Cu > Pb. The acid buffering capacity of sewage sludge decreases with the solid-liquid ratio but increases with the anaerobic incubation time, and it is mainly governed by dissolution of contained carbonate and organics. These results reveal that the sewage sludge possesses enough acid buffering capacity to consume protons within the acid mine drainage. Thus, this study suggests that an explosive remobilization of heavy metals is not expected in a long-term perspective.

Keywords : acid buffering capacity, barrier, heavy metals, remobilization, sewage sludge

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