

The applications of inorganic and organic acids for the treatment of heavy polluted sewage sludge and the evaluation of the remaining metal with sequential chemical extraction

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ABSTRACT

Sludge is classified as difficult solid waste that requires special arrangements for disposal because of its noxious properties. The acid extraction method is characterized by fast removal of metals. Following this, this paper examined how the concentration and the contact time of the acids affect the removal of metals from the sludge. The sludge was further treated with HNO₃, HCl and CH₃COOH in different concentrations and different contact times. 5%, 10%, 15%, 20% and 30% v/v of HNO₃, HCl and CH₃COOH for 10, 20 and 30 min of contact time were applied. The final result indicates that a sufficient metal amount, about 60%, is removed by the application of HNO₃ (using 20% v/v HNO₃), 50% is removed by the application of HCl (using 20 v/v HCl) and 30% is removed by the application of CH₃COOH (using 20% v/v CH₃COOH). Also, this paper presents the result of the sequential chemical extraction procedure (SCEP) which was applied in order to observe the partitioning of Cd, Cu, Cr, Fe, Ni, Pb and Zn. SCEP was applied as well in the treated samples in order to observe where the remaining metals load. The final results indicated that the remaining metal is further stabilized.

Keywords: Sewage sludge; Organic acid; Inorganic acid; Acid extraction; Metals speciation; Sludge management

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