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13 - Recovery of phosphorus as struvite from the dewatered liquor through crystallization using seawater as magnesium source

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Abstract

Because of the finite and nonrenewable nature of the phosphate resource, recycling and reuse of nutrients is an environmental and economic motivation that finally leads to water reuse. In recent times, phosphorus recovery has been attempted using waste materials. Hence in this paper, the recovery of phosphorus was studied from the dewatered liquor using seawater as a magnesium source, using the struvite crystallization technology, which is one of the most widely recommended technologies for the recovery of phosphorus. The sludge dewaterability was achieved with varying dosages of granulated blast furnace slag as skeleton material. Initial characteristics of dewatered liquor and seawater were investigated. Batch studies were conducted with varying pH (7–11) and a molar ratio of Mg/P (0.6–1.4) to determine the optimum condition for the maximum recovery of phosphorus. Characterization studies were carried out to study morphology by scanning electron microscope, the composition of solids by Fourier transform infrared, and phase identification by X-ray powder diffraction for the confirmation of struvite formation; 94% of the phosphorus was recovered as struvite, demonstrating good phosphorus recovery capability. The goal of the study is to develop an innovative and economical method for crystallizing struvite in order to extract phosphorus from the dewatered liquid. It can be concluded that seawater can also be considered as a source of magnesium for the production of struvite.

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