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Phosphate Recovery from Hydrothermally Treated Sewage Sludge using Struvite Precipitation

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Abstract

New technologies are needed to recover phosphate from organic wastes, such as sewage sludge. Sewage sludge can be hydrothermally treated to make it safe but this process is expensive. Recovering a valuable by-product, such as phosphate, could improve the economics of hydrothermal treatment. Therefore, the technical and preliminary differential cost analysis of combining hydrothermal treatment with phosphate recovery (by precipitation of magnesium ammonium phosphate (struvite)) was investigated. The effects of pH, magnesium ion dose, and either wet oxidation or thermal hydrolysis hydrothermal treatment were examined. Phosphate recovery was more sensitive to pH than magnesium ion concentration, with diminishing rates of recovery at high levels of both. Also, more struvite was recovered following wet oxidation treatment than thermal hydrolysis. Preliminary differential cost analysis showed that wet oxidation combined with precipitation at an optimal pH and magnesium ion dose could generate revenue.

Keywords: Hydrothermal treatment; struvite precipitation; phosphate recovery; wastewater; sludge

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