

## Phosphorus removal from Tunisian landfill leachate through struvite precipitation under controlled degassing technique

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### ABSTRACT

This study investigated phosphorus removal through struvite precipitation by controlled air degassing in synthetic wastewater and landfill leachate (LFL). Experiments were conducted at a temperature of 25°C and airflow rate of 30 L min<sup>-1</sup>. The obtained results show that struvite precipitated successfully by controlled air degassing in both solutions. Struvite precipitated at the same nucleation time for both synthetic wastewater and for LFL (17 min). The nucleation pH was lower from LFL (8.16) than from synthetic solution (8.36). The phosphorus removal efficiency from LFL was 61.19% while 77.61% removal efficiency was reached with the synthetic solution. This difference in phosphorus removal efficiency between the two solutions is due to impurities contained in leachate. The XRD analysis of both solutions revealed struvite as the major component and identified a second phase of hydroxyl apatite for the LFL. Struvite precipitation from synthetic solution and LFL obeyed the 1st order kinetic model of constant rates with  $k = 0.030$  and  $0.017 \text{ min}^{-1}$ , respectively. The use of scanning electronic microscopy to investigate the struvite crystals showed that most of observed crystals from sanitary landfill leachate were relatively bigger and flattened than those obtained from synthetic solution.

*Keywords:* Phosphorus; Leachate; Magnesium; Ammonium; Struvite

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