



## Effects of organic substances on struvite crystallization and recovery

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### ABSTRACT

The effects of organic substances on struvite crystallization and recovery from synthetic wastewater were investigated. Experiments were completed during trials lasting 5 days using a pilot reactor with two concentric stainless steel meshes as seed material. Various concentrations of organics were added to synthetic CO<sub>2</sub>-saturated solutions and the pH was elevated from an initial value of 6.5 using a degassing technique. The results showed the presence of glucose, humic acid, and citric acid could reduce the struvite mass accumulating rates as compared to solutions without organic additives. In addition, glucose as an additive could significantly promote the removal rate of phosphorus as opposed to the other two. The mechanisms of the inhibitory effects are specially focused on the fact citric acid is able to complex with Mg<sup>2+</sup>, and NH<sub>4</sub><sup>+</sup> in solution, while humic acid or glucose are able to adsorb onto the crystal surface. The recovered precipitates were analyzed using X-ray diffraction and were proven to have high purities. The morphologies of the precipitates were examined using scanning electron microscopy and found struvite particles aggregated together showing an irregular block shape, with the exception of particles recovered from solutions with humic acid, which showed a triangle-like shape.

*Keywords:* Organic substances; Struvite; Accumulation device; Nutrients removal and recovery

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