

## Removal of dissolved organic phosphorus from synthetic agro-industrial wastewater using ferric chloride

The available phosphorus removal/recovery technologies can achieve low concentrations of orthophosphate phosphorus (P-OP). Furthermore, P-OP can be recovered for reuse as fertiliser. However, in some agro-industrial wastewater, the dissolved organic phosphorus (DOP) is a relevant fraction that remains after conventional phosphorus removal processes and is not recovered [1]. Therefore, improvements and new technologies to recover DOP are necessary to advance the circular phosphorus economy [1,2]. Ferric chloride is frequently used to control P-OP effluent concentrations [3]. When  $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$  is added, hydrous ferric oxides (HFO) are formed [4]. The dominant P-OP removal mechanism is the  $\text{H}_2\text{PO}_4^-$  adsorption on HFO [3,4]. However, there are no reports about the mechanisms of DOP removal into HFO. Operational conditions can affect DOP adsorption/removal mechanisms.

In this work, batch experiments were conducted using  $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$  and synthetic wastewater (2 mg-P-OP/L as  $\text{KH}_2\text{PO}_4$  + 18 mg-DOP/L as myo-inositol-1,2,3,4,5,6-hexakisphosphate) to quantify the effects of alkalinity (Alk=50-100 mg- $\text{CaCO}_3$ /L), Fe/total phosphorus molar relationship ( $r=0.6-1.5$ ) and pH (pH=4.0-6.0) on DOP removal efficiency (RE\_DOP). With Alk=75 mg- $\text{CaCO}_3$ /L,  $r=1.05$  and pH=5.31, DOP was not detected. For low  $r$ , the RE\_DOP was adversely affected by increasing alkalinity and decreasing pH. The results suggested that competition for the active sites depends on the decreasing preference:  $\text{H}^+ > \text{HCO}_3^- > \text{DOP} > \text{H}_2\text{PO}_4^-$ .

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