

Removal and/or Recovery of Phosphates by Precipitation as Ferric Phosphate from the Effluent of a Municipal Wastewater Treatment Plant

Authors : Kyriaki Kalaitzidou, Athanasia Tolkou, Christina Raptopoulou, Manassis Mitrakas, Anastasios Zouboulis

Abstract : Phosphate rock is the main source of phosphorous (P) in fertilizers and is essential for high crop yield in agriculture; currently, it is considered as a critical element, phasing scarcity. Chemical precipitation, which is a commonly used method of phosphorous removal from wastewaters, finds its significance in that phosphates may be precipitated in appropriate chemical forms that can be reused-recovered. Most often phosphorous is removed from wastewaters in the form of insoluble phosphate salts, by using salts (coagulants) of multivalent metal ions, most frequently iron, aluminum, calcium, or magnesium. The removal degree is affected by various factors, such as pH, chemical agent dose, temperature, etc. In this study, phosphate precipitation from the secondary (biologically treated) effluent of a municipal wastewater treatment plant is examined. Using chlorosulfate (FeClSO_4) it was attempted to either remove and/or recover PO_4^{3-} . Results showed that the use of Fe^{3+} can achieve residual concentrations lower than the commonly applied legislation limit of PO_4^{3-} (i.e. 3 mg $\text{PO}_4^{3-}/\text{L}$) by adding 7.5 mg/L Fe^{3+} in the secondary effluent with an initial concentration of about 10 mg $\text{PO}_4^{3-}/\text{L}$ and at pH range between 6 to 9. In addition, the formed sediment has a percentage of almost 24% PO_4^{3-} content. Therefore, simultaneous removal and recovery of PO_4^{3-} as ferric phosphate can be achieved, making it possible for the ferric phosphate to be re-used as a possible (secondary) fertilizer source.

Keywords : ferric phosphate, phosphorus recovery, phosphorus removal, wastewater treatment

Conference Title : ICW 2015 : International Conference on Wastewater

Conference Location : Paris, France

Conference Dates : June 25-26, 2015