Struvite production from food processing wastewater and incinerated sewage sludge ash as an alternative N and P source: Optimization of multiple resources recovery by response surface methodology

Thantzin MohMoh, 김동진[1,†]
한림대학교; [1]한림대학교 환경생명공학과
(dongjin@gmail.com[†])

Nitrogen (N) and phosphorus (P) cause eutrophication in water body, but they are also limiting elements in agriculture. In this study food wastewater (FW) and incinerated sewage sludge ash (ISSA) were combined together as the alternative NH4+ -N and PO43--P sources to produce struvite. PO43--P (67.0 g/kg SSA) was leached from the ISSA by acid treatment of ISSA. Multi-response surface methodology (RSM) has been applied to find the optimal condition for N and P recovery of 79.6 and 99.9%, respectively, from the mixed solution of ISSA leachate and centrifuged FW at pH 9.28, Mg/P 2, N/P 0.6. Overall yields were 64.9% NH4+ -N (27.1 g NH4+ -N /L FW) and 72.7% PO43--P (72.8 g T-P/kg ISSA) from FW and ISSA, respectively. This study also aims to find the optimum condition for the recovery of three elements (PO43—P, NH4+ -N, Mg2+) by multi-RSM. Recovery of 99.2% PO43--P, 64.4% NH4+ -N, and 95.4% Mg2+ was achieved at pH 9.04, Mg/P 1.04, N/P 0.6. XRD, ICP-OES, and P bioavailability test confirmed that the recovered precipitate had a high struvite content (77.5%) and P-bioavailability (98.4%) with low heavy metals content.