



Phosphorus recovery from industrial and municipal wastewater with a fluidized-bed-reactor

Phosphorus recovery from wastewater has drawn intensive attention in recent years. Crystallization of the wastewater-containing phosphorus as struvite (MAP, $MgNH_4PO_4 \cdot 6H_2O$) with the fluidized bed reactor (FBR) is a promising phosphorus recovery technology because large MAP particles can be directly produced and used as fertilizer. Based on this background, this project was started in February 2012. The overall project aim is to get a profound understanding of MAP crystallization and aggregation processes in the FBR, and to implement this technology to recover phosphorus from industrial and municipal wastewater as large MAP particles.

To achieve the project aim, two 3.3 L transparent lab-scale FBRs of different shapes were designed and built. Series of experiments with the FBRs were conducted using synthetic wastewater, wastewater from the Treatment Plant for Education and Research (LFKW), industrial wastewater from the dairy plant Campina Heilbronn, and filtrate of the pretreated digested sludge from Offenburg wastewater treatment plant. Spherical struvite pellets with diameters of 3 to 4 mm were produced from both synthetic and real wastewater. The reactor design and the operating conditions including pH, superficial velocity, duration etc. had significant influences on the morphology and strength of the produced struvite pellets.

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Figure: MAP pellets produced from LFKW wastewater (left), industrial wastewater (middle) and pretreated- sludge filtrate (right)

