ABSTRACT

The annual demand of phosphorus (P) for fertilizer use is more than 550,000 t in Germany. Several of the input streams like mineral fertilizer produced from phosphate rock or sewage sludge are problematic due to contamination with heavy metals and organic pollutants and/or supply risks. Phosphorus recovery from the wastewater stream might help to diminish these problems. Several procedures have been developed to recover P from either sewage sludge ash (SSA) or wastewater via precipitation or crystallization as struvite. This study determined the elemental composition and trace metal mass fractions of 252 SSA samples and 17 struvite samples from wastewater treatment plants (WWTP) to see whether there are differences related to the source of the sludge (municipal/industrial) or the stage of the WWTP where the struvite is produced. Results indicated that there is no clear trend of the elemental mass fractions related to the source of the sludge. All struvite samples show very low heavy metal contents, even though the struvite precipitated from the sludge shows slightly elevated heavy metal mass fractions compared to struvite crystallized from sludge liquor. Struvite is a clean and plant available material for fertilizer production from wastewater streams and has some advantages for the wastewater treatment plant. However, since the P recovery rate of struvite processes is low (7–11%) compared to that from SSA processes (90%), recovery from SSA is necessary for a substantial P recovery from the wastewater stream.

Keywords: Phosphorus recovery; Sewage sludge ash; Struvite; Elemental composition; Heavy metal content

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