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Application of Activated Sludge Model for phosphorus recovery potential simulation

Michał Preisner[a,*], Marzena Smol[a], Elena Neverova-Dziopak[b], Zbigniew Kowalewski[b]

[a]*Mineral and Energy Economy Research Institute, Polish Academy of Sciences, ul. Wybickiego 7A, 31-261 Cracow, Poland, emails: preisner@meeri.pl (M. Preisner), smol@meeri.pl (M. Smol)*
[b]*AGH University of Science and Technology, al. Mickiewicza 30, 30-059, Cracow, Poland, emails: elenad@agh.edu.pl (E. Neverova-Dziopak), kowalew@agh.edu.pl (Z. Kowalewski)*

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ABSTRACT

The study investigates phosphorus (P) recovery potential from sewage sludge in the most prevalent activated sludge (AS) systems obtained with an Activated Sludge Model (ASM) simulation using BioWin software by EnviroSim Associates Ltd., (Hamilton, Ontario, Canada). The simulation study includes 10 various wastewater treatment systems. The analyzed systems were based on the following technologies: conventional activated sludge, anoxic-oxic, 3-Stage Bardenpho, 5-Stage Bardenpho, Johannesburg (JHB), modified Johannesburg system (MJHB), University of Cape Town, modified University of Cape Town system, oxic-anoxic (OA) and anaerobic-oxic. The ASM-based simulation allowed to develop P flows diagrams for 10 analyzed AS systems considering the effluent P load discharged to wastewater receiver and P recovery potential estimated on the base of total phosphorus content (TP) and inorganic phosphorus (IP) content in the sewage sludge. The range of the P recovery potential based on TP content in the sewage sludge reached from 1.33% in the JHB and MJHB systems to 1.01% in the OA system. The study covered the P bioavailability context by analyzing the simulation results of the IP content in the sewage sludge which varied from 0.19% in JHB and MJHB systems to 0.05% in the OA system.

Keywords: Activated Sludge Model; Sewage sludge; Wastewater treatment; Phosphorus recovery; Phosphorus flow

* Corresponding author.

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