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Forms of phosphorus bound to reactive material – results from a flow-through experiment with the focus on P reuse

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ABSTRACT

P-reactive materials (P-RMs) are used for removing phosphorus (P) from wastewater, surface water, agricultural runoff, green roof runoff and other sources, to protect the water environment against eutrophication. The efficiency of P-RMs in various applications has been widely tested, but there is still a need to expand knowledge of the mechanisms and forms in which retained phosphorus is bound. This is particularly important in regard to possible P recovery. The aim of the study was to evaluate forms of phosphorus bound to reactive material loaded with different P-carrying media: a solution prepared in laboratory from KH_2PO_4 (C1) and an effluent from a septic tank (C2). P fractions bound in RM that are fed with P solution and septic tank effluent show different patterns. The Ca- and Mg-bound P are dominant in a filter fed with septic tank effluent (C2), while labile inorganic phosphorus is dominant in a filter fed with PO_4–P solution (C1). It can be stated that tests with P solution did not reflect the P removal mechanisms observed in a filter fed with wastewater, and the suitability of the reactive material as a fertilizer should be inferred from its behavior under real conditions of use.

Keywords: Phosphorus; Reactive material; Sorption mechanisms; P recovery

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