

Reactive bed filter materials in wastewater treatment – removal and recycling of phosphorus

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Advanced on-site treatment systems can improve notably the quality of sedimentation tank effluents. Among these, compact filters have recently emerged in the market as a cost-effective option for meeting public health and water quality goals in society. They incorporate reactive filter media with a high phosphorus (P) removal capacity. After a certain time, the filter material is exhausted, and the material must be replaced. Then, it can be recycled as a soil amendment. Depending on the P concentration in the recycled substrate, it may add potential benefits as a fertilizer in agriculture. More than 15 filter materials were investigated in batch, column and field scale experiments. Among these, Nordkalk Filtra P and Polonite[®] has shown an effective performance in compact filters and the latter is produced on a large scale and is increasingly used in various types of facilities. The performance and lifetime of an on-site wastewater system using filter materials depend mainly on the filter material used, and therefore on its structure and particle size, chemical composition, and pH. Factors such as incoming wastewater properties, pre-treatment, size and arrangement of the system, hydraulic loading, contact time etc. are also of crucial importance. A promising way of P recovery for small flows is the novel reactive bed filter technology. Efficient sorbents such as Polonite and “Absolite” can remove 80-100% P from wastewater yielding a product containing up to 10% P. Absolite is a new filter material prepared from autoclaved aerated concrete. After wastewater filtration, both materials have significant amounts of crystalline calcium phosphates accumulated, the latter one substantial amounts of particularly amorphous calcium phosphate. Present on-site systems should be re-constructed for P recovery and recycling with the reactive bed filter technology as a treatment system for the future.