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EXPERIMENTAL STUDY ON ADSORPTION OF PHOSPHORUS ON SEDIMENT COMPONENTS WITH DIFFERENT PARTICLE SIZES

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Abstract

The adsorption of phosphorus (P) on sediment plays a significant role in phosphorus transport in aquatic systems. This research examined the effect of the main components of sediments (including iron (Fe), manganese (Mn) oxides and organic matter (OM)) on P adsorption and to evaluate their relative contribution with different sediment particle sizes. The sediments were separated into four particle-size fractions: 0-30 μm , 30-62 μm , 62-90 μm , and 90-125 μm , and then selective chemical extractions were conducted to remove OM, Fe+Mn oxides, and Fe+Mn oxides and OM from the raw sediments, respectively. A series of adsorption isotherm experiments were conducted to investigate the P adsorption on the raw and extracted sediments. Then, a nonlinear regression model was used to determine the maximum P adsorption capacity of each component. The results showed that the maximum P adsorption capacities of extracted sediments were lower than that of raw sediments. The nonlinear regression analysis showed that the relative contribution on a mass basis was dominated by Fe+Mn oxides, followed by OM and residues. In addition, their relative contributions in sediments with different particle sizes were on the same order of magnitude.

Key words: iron and manganese oxides, organic matter, phosphorus adsorption, relative contribution, sediment, selective extraction

Received: October, 2014; *Revised final:* February, 2015; *Accepted:* February, 2015

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