AN ABSTRACT OF A THESIS

PHOSPHORUS REMOVAL USING WIRE MESH CONTAINING ZEROVALENT IRON (FE^0)

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A series of batch tests were performed in oxic and anoxic aquatic conditions with varying surface areas of zerovalent iron wire to investigate the removal of phosphorus (P) from solution. The solution pH, E_h, DO, and EC were also monitored during each test. Surface area of the iron bars significantly (α=0.1) affected the removal of phosphorus in oxic and anoxic conditions. The corrosion of iron was significantly (α=0.1) affected by the surface area of the iron bars in anoxic conditions but not in oxic conditions. Maximum of 55% of phosphorus removal was obtained in oxic conditions with high surface area bars (HSB) after a period of 96hrs. An empirical relationship was established between the P removal and the particulate iron.

Microcosm studies were conducted to determine the effects of hydraulic retention time (HRT) and mass of iron (M) on effluent phosphorus concentrations. HRT and mass of iron significantly (α=0.05) affected the release of total iron (TFe) and the dissolved iron in the effluent samples. The HRT and mass of iron significantly (α=0.05) affected the total phosphorus (TP) and orthophosphate (PO_4^{3-}) removal. The percent phosphorus remove ranged from 17.63±6.39% to 59.01±8.60%. The decrease in total phosphorus was due to the retention of precipitants in the reactor. A plug flow reaction rate model was developed for the removal of orthophosphosphate concentrations and the removal of iron as a precipitant in the microcosms.