

### Effective phosphorus removal using sulfate-coated vermiculite

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This study evaluated whether phosphorus in an aqueous solution can be effectively adsorbed and removed by sulfuric acid (SA)-coated vermiculite (SCV), which was synthesized by heating a mixture of expanded vermiculite (EV) and SA at 300°C. Phosphorus was removed from the aqueous solution and its removal characteristics were evaluated by batch kinetic, batch adsorption, and column tests. The phosphate removal rates ( $h^{-1}$ ) for 1, 2.5, 5, 7.5, 12.5, and 25  $g \cdot L^{-1}$  of SCV were 0.00015, 0.0011, 0.0044, 0.0087, 0.0648, and 0.5002, respectively. The  $Q_{max}$  of the Langmuir model and the partition coefficients of the linear and Freundlich models were 8.92  $mg \cdot g^{-1}$ , 0.65  $L \cdot g^{-1}$ , and 4.60  $L \cdot g^{-1}$  ( $1/n = 0.354$ ), respectively. The equilibrium phosphorus adsorptions ( $q_e$ ) were 7.47, 14.69, and 19.53  $mg \cdot g^{-1}$  at initial concentrations of 10, 25, and 50  $mg \cdot L^{-1}$ , respectively. These results show that SCV can efficiently adsorb phosphorus in an aqueous solution.