Influence of phosphate sorption on dispersion in mono- and divalent ion salts in a Ferralsol Soil

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Soil dispersion induces soil erosion. Accordingly loss of nutrients causes water contamination. Because phosphate sometimes affects the soil dispersion, the influence must be evaluated well in order to control soil erosion and leaching. In this work we study the influence of phosphate sorption on dispersion at different ion concentration in a Ferralsol Soil. Ferralsol which is a typical soil in rainy tropical region was used as the material. We have used monovalent (Na) and divalent (Ca) ions in 1mmol$_c$ L^{-1} equilibrium salt solution. The batch method of phosphate sorption experiments was conducted at different pH 4, 5.5, 7 and 8.5 by adding NaH_2PO_4 or $Ca(H_2PO_4)_2$. Salt concentration was supplemented by $NaNO_3$ or $Ca(NO_3)_2$ when the adding phosphate concentration was less than 1 mmol$_c$ L^{-1}. The dispersion-flocculation phenomena were investigated with absorbance of soil suspension at the same condition of phosphate sorption experiment. Zeta potential was also determined. The higher absorbance corresponds with the well dispersion condition, which also corresponds with the lower zeta potential. Fig. 1&2 showed that Na system is more dispersive than Ca system. For Ca system at pH 8.5, higher absorbance was detected at lower P sorption and around 250mmol/kg P sorption. Zeta potential also decreased in this value. The soil was well dispersive in this condition. The phenomenon at around 250mmol/kg P sorption was caused by the remarkable decrease of electrolyte concentration (about 0.32 mmol$_c$ L^{-1}) which was induced by Ca-P precipitation.

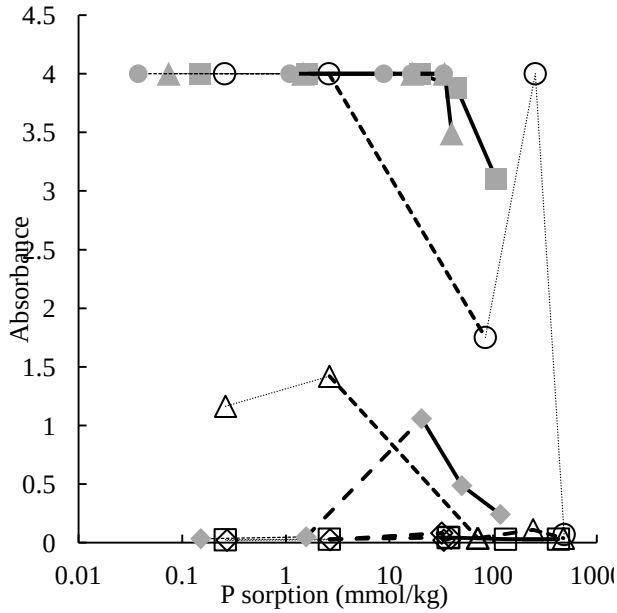

Figure 1. Relationship between phosphate sorption and absorbance.

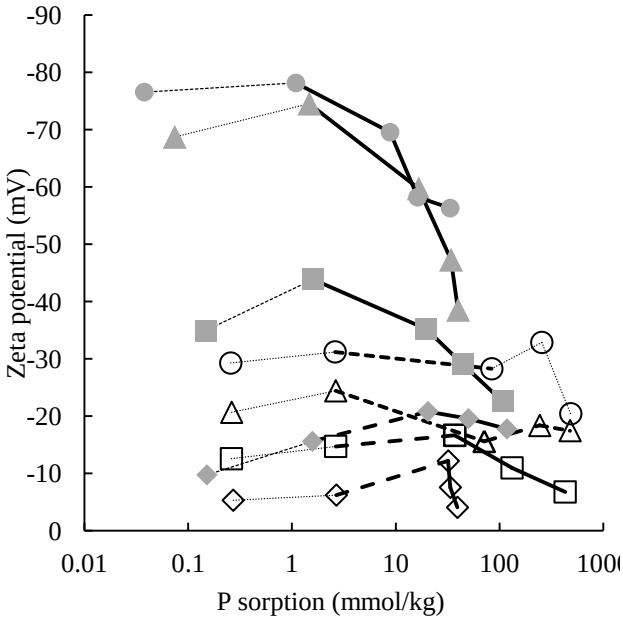

Figure 2. Relationship between phosphate sorption and repulsive potential energy.

◇pH 4, □pH 5.5, △pH 7, ○pH 8.5 for initial $Ca(NO_3)_2$ 1mmol$_c$ L^{-1}.

◆pH 4, ■pH 5.5, ▲pH 7, ●pH 8.5 for initial $NaNO_3$ 1mmol$_c$ L^{-1}.

electrolyte concentration ≤ 1 mmol$_c$ L^{-1}

1 mmol$_c$ L^{-1}< electrolyte concentration ≤ 10 mmol$_c$ L^{-1}

electrolyte concentration >10 mmol$_c$ L^{-1}