Adsorption of phosphate on hydrous ferric oxides at different pHs and salinities

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The adsorption of phosphate on hydrous ferric oxides (HFO) was studied as a function of pH and salinity. The adsorption experiments were conducted at 3 pH values (6.5, 7.5 and 8.5) and at 5 salinities (0, 2.5, 5, 15 and 35). Different electrolyte solutions containing Na^{+}, Cl^{-}, Mg^{2+} and SO_4^{2-} ions were used.

Phosphate adsorption was found to be dependent on pH with a higher adsorption at lower pH. This could be attributed to the protonation of sorbent surface at lower pH, leading to an increase in phosphate adsorption. Our results also show that phosphate adsorption increases significantly with salinity going from 0 to 5. With further increase in salinity, phosphate adsorption continues to increase slightly in NaCl solutions while it decreases in solutions containing both NaCl and $MgSO_4$. The difference in adsorption behaviour at higher salinities could be explained by the presence of greater sulfate concentrations causing a decrease in phosphate adsorption. In the 0-5 salinity range, the increase in adsorption at pH 8.5 is greater in solutions containing both NaCl and $MgSO_4$ compared to that in solutions containing only NaCl. The effect of salinity on phosphate adsorption in difference electrolyte solutions could also be explained by the formation of various Na- and/or Mg-phosphate complexes such as $MgHPO_4^0$, $NaH_2PO_4^0$, $MgPO_4^-$ and $NaHPO_4^-$.

These findings are important for the undertanding of phosphate sorption dynamics during estuarine mixing. They will be presented and discussed.