



## Comparative study of cadmium, copper, nickel and zinc adsorption by brazilian variable charge soils

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A comparative study of cadmium (Cd), copper (Cu), nickel (Ni) and zinc (Zn) adsorption by highly weathered soils was conducted using quantitative adsorption parameters: (i) parameter  $D = \%ads / (100 - \%ads)$ , calculated and considered as  $\log \{ [M]_{ads} / [M]_{sol} \}$  in order to transform the S-shaped curves obtained from  $\%ads$  vs pH (Kurbatov plots); (ii)  $pH_{50}$ , defined as the pH value at which 50% of the initial metal concentration is adsorbed, and; (iii)  $\Delta pH_{50-100\%}$ , the difference between the pH of 100 and 50 percent metal adsorption. Surface (0-0.2m) and subsoil (B horizon) samples were taken from a Rhodic Kandiudalf (RH), an Anionic "Xanthic" Acrudox (XA) and an Anionic "Rhodic" Acrudox (RA), located in Brazilian humid tropical area. Kurbatov plots for Cd, Ni and Zn adsorption could be distinguished into three linear parts, correspond to regions I, II and III. Relevant curves for Cu adsorption exhibited only one region along the 4.0 to 7.0 pH range. Cadmium and Cu exhibited the highest and the smallest  $pH_{50}$  values, respectively, while Ni and Zn presented intermediate  $pH_{50}$  values.  $pH_{50}$  values for Cd, Ni and Zn increased as the ionic strength increased, but not for Cu. This behavior indicated the weak electrostatic bonding mechanisms involved in the formation of outer-sphere complex between these metal ions and the soil adsorbents. The smallest  $pH_{50}$  values for Cu, indicated that Cu retention can preferentially occur. Additionally, as the smaller the  $pH_{50}$ , the more selective the adsorbent for the metal, and then, the following affinity sequence was suggested:  $Cu > Zn > Ni = Cd$ .  $\Delta pH_{50-100\%}$  indicated that Cu was preferentially adsorbed, as the adsorption increase from 50 to 100% of the initial concentration added occurred in very narrow pH interval, never upper 2.3 units.