Geophysical Research Abstracts
Vol. 12, EGU2010-1278-1, 2010
EGU General Assembly 2010

Adsorption of Cadmium, Nickel and Zinc in a Brazilian Oxisoil

José Carlos Casagrande (1), Susian Christian Martins (2), and Marcio Roberto Soares (1)

(1) Federal University of São Carlos, Natural Resources and Environmental Protection, Araras - São Paulo, Brazil (bighouse@power.ufscar.br), (2) Nuclear Energy Center for Agriculture, University of São Paulo, Avenida Centenário, 303, 13.416-000, Piracicaba – SP, Brazil.

The adsorption reactions mechanisms provide the understanding of the pollutant fate metals and often control the bioavailability and transport of heavy metals ions in soil, indicating the preventive environmental control. The cadmium, nickel and zinc behavior in the soils are explained by the reactions of adsorption, influenced by pH and ionic strength. The objective of this work was to study the influence of those factors on cadmium, nickel and zinc adsorption in an oxisol.
It was studied the Cd, Ni and Zn adsorption in soil samples of the State of São Paulo (Anionic "Xanthic" Acrudox), collected in surface and in depth and submitted to solutions of Ca(NO3)2 1,0; 0,1 and 0,01 mol L-1. The pH of the samples from 3,0 to 10,0 was varied adding NaOH or HCl 4 mol L-1 not surpassing 2% of the electrolyte volume. The soil samples received 5,0 mg dm-3 of cadmium, nickel and zinc, ratio 1:10 (2,0 g of soil: 20 solution ml) and were shacked for 24 hours.
The cadmium, nickel and zinc adsorption increased with pH, reaching it picks at pH 7,0 for cadmium and approximately at pH 6,0 for nickel and zinc. This indicates that zinc and nickel have higher affinity than cadmium with the soil colloids, because it reached the maximum adsorption in a small pH value. In other words, the amount of negative charges necessary to promote the maximum adsorption was small for zinc. The influence of ionic strengths was small for cadmium, nickel and zinc adsorption, being similar from pH 3,0 to 10,0, in surface soil layer and in depth, demonstrating that competition with Ca2+ for the retention colloid sites of the soils didn't interfere in the adsorption. In that way, it is supposed that cadmium, nickel and zinc binding energy is high in a soil rich in Fe and Al oxides. Adsorption of cadmium, nickel and zinc was similar for the ionic strengths, not depending on PZSE.
The cadmium, nickel and zinc adsorption increased with pH elevation, with small ionic strength influence. Nickel and zinc have higher affinity than cadmium with the oxisoil, resulting in maximum adsorption at small pH values.