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# Mechanisms of Nickel Sorption on Illite : A Molecular Approach
# Mécanismes d'adsorption du nickel sur l'illite : approche moléculaire

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Retention of heavy metal ions on soil mineral surfaces is a crucial process for maintaining environmental quality since sorption reactions at solid-water interfaces decrease the solute mobility and often control the fate, bioavailability, and transport of trace metal ions such as Zn, Cd, Ni, and Cu in aquatic and soil environments. Correctly determining the sorption mechanisms of metals on clay surfaces such as illite is therefore of great importance for understanding the fate of such pollutants in contaminated soils and sediments, and will facilitate successful environmental remediation procedures.
Nickel sorption on illitic clays can take place at four different sorption sites: edge sites, planar sites, interlattice sites, and wedge zone sites. To characterize the mechanisms of different Ni sorption processes on illite, Ni sorption was studied as a function of pH, reaction time, type of illite (K treated and K untreated), and ionic strength. Extended x-ray fine structure absorption spectroscopy (EXAFS) was used as a tool to study Ni sorption mechanisms on a molecular level. Our results show that sorption at interlattice sites does not play a significant role in the overall sorption process, and that reaction time has a strong effect on the observed Ni sorption behavior. At pH values above 6.2 the formation of a multinuclear Ni/Al hydroxide phase takes place. In this paper, macroscopic and spectroscopic EXAFS data on Ni sorption studies on illite are presented. The Ni sorption behavior as a function of experimental conditions will be described, and the operative sorption mechanisms will be discussed.

Key words: illite, nickel, sorption mechanisms, EXAFS
Mots clés : illite, nickel, mécanisme d'adsorption, EXAFS