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# Selective Adsorption of Zinc on Halloysite

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**Abstract:** Zn- and Ca-adsorption equilibria of five Ca-saturated halloysite samples were measured at equilibrium Zn concentrations up to  $10^{-2}$  M in  $10^{-4}$  to  $10^{-2}$  M  $\text{CaCl}_2$ . The results were interpreted on  $K_{\text{Ca Zn}}$  vs.  $[\text{Zn}]/\text{CEC}$  (%) plots, where  $K_{\text{Ca Zn}}$  is the selectivity coefficient ( $=[\text{Zn}][\text{Ca}]/[\text{Ca}][\text{Zn}]$ ),  $Zn$  and  $Ca$  represent the adsorbed species, and CEC is the cation-exchange capacity. All Zn adsorption occurred at cation-exchange sites, and 0.77 to 36.0 meq Zn/100 g clay, which constitutes 9 to 83% of the CEC, was adsorbed with "high selectivities" ( $K_{\text{Ca Zn}} > 10$ ). The higher values were found for two spherical and one "filmy" halloysites, whereas the lower values were found for two tubular halloysites. The magnitude of their 001 intensity, hydration in interlayer space, CEC, and "free" iron oxide content did not correlate with the selective Zn adsorption, but a good correlation was found between the proportion of "high selectivity" sites for Zn and proportion of "high affinity" sites for  $\text{H}^+$ . The adsorption of Zn at the "high selectivity" sites was not completely reversible, and  $K_{\text{Ca Zn}}$  values  $> 1000$  were recorded in 0.5 M  $\text{CaCl}_2$  for Zn which occupied 10–40% of the exchange sites. Selective Zn adsorption decreased with decreasing pH, and all adsorbed Zn was extracted with 0.1 M HCl.

**Key Words:** Adsorption • Cation exchange • Halloysite • Selectivity • Zinc

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