Zeta potentials of kaolinite and montmorillonite in concentrated solutions of various 1-1 electrolytes

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The zeta potentials of commercial powders of kaolinite and montmorillonite were studied by means of two different instruments based on the electroacoustic method in the presence of LiNO\textsubscript{3} (up to 2 M), NaCl, NaBr, KCl, KI, and CsCl (up to 1 M). The effect of the nature of the anion on the zeta potential was rather insignificant, but different cations had different effects. Concentrated solutions of CsCl induced a shift in the IEP of both clay minerals to high pH-values, and KCl only for kaolinite. In contrast, a shift in the IEP to high pH was not observed for Li or Na. This high-ionic-strength behavior of clay minerals is different from the behavior of metal oxides, in which lithium salts induce a shift in the IEP to high pH while the effect of Cs salts is rather insignificant. The difference between metal oxides and clay minerals was explain in terms of hard-soft acid-base principle. The hard surfaces of metal oxides show high affinity to hard lithium cations, while soft surfaces of clay minerals show a high affinity to soft cesium cations.