

Mineralogical, characterisation and Electrokinetic Properties of Kaolins from Eskisehir (Turkey)

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In this work, two kaolin samples from the Mihalıccik kaolin deposits (Eskisehir, Turkey) are investigated, comparing their mineralogical and electrokinetic properties in water. In order to determine mineralogical and physicochemical features of the Mihalıccik kaolin samples, X-ray diffractometer (XRD), scanning electron microscope (SEM), Fourier transform infrared spectroscopy (FT-IR), thermal analyses (DTA/TGA), BET-specific surface area were performed on the samples collected from clay deposits in the villages Ahirozu and Ucbasli of Mihalıccik. The mineralogical composition of the kaolin samples is similar: kaolinite appeared in two samples studied in different proportions, and small amounts of illite and dickite have been identified. Zeta potential measurements have been performed to determine the effect of pH, mono-, di- and trivalent electrolyte type and concentrations of these electrolytes on the zeta potential of the two kaolin samples. Isoelectric point of Ahirozu kaolin was determined as ~pH 4.2, while that of Ucbasli kaolin was determined as ~pH 3.2. Ucbasli kaolin has a more negatively charged surface than Ahirözü kaolin in the pH range of 2-11. This difference probably results from the differences in their mineralogical and chemical contents. However, both of the two kaolin samples showed the similar surface charge behaviour against mono-, di- and trivalent electrolytes. Monovalent electrolytes such as NaCl and KCl make the ZP of the kaolins more negative, whereas divalent (CaCl_2 and MgCl_2) and trivalent ($\text{Al}(\text{NO}_3)_3$) electrolytes decreases the ZP as its absolute value. Change in the surface sign of the kaolins from negative to the positive is only possible in the presence of trivalent electrolytes (Al-nitrate) due to specific adsorption of Al^{3+} cations on the edge surface of the kaolin layers.