

Study on the structure of porewater in bentonite by Raman spectroscopy

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Raman spectroscopy was applied to studying the structure of porewater in bentonite at room temperature. Intensity maxima of the spectra were observed near 3250, 3400, 3630 cm^{-1} . Ratio of intensity near 3400 cm^{-1} /3250 cm^{-1} decreased from 1.033 to 0.905 with a decrease in water content of 100wt(water) to 75wt. Since the Raman scattering near 3250 cm^{-1} can be attributed to strongly hydrogen bonded water molecule, those changes in intensity ratio suggests an increase in number of water molecule forming strong hydrogen bond in porewater. This is considered to be related to distribution of electrostatic potential from smectite surface to porewater.

Raman spectroscopy was applied to studying the structure of porewater in bentonite at room temperature. Bentonite (Kunipia F, 98-99wt% Na-smectite) was mixed with deionized water by 75 to 98wt% water or 0.5M NaCl aqueous solution by 75 and 80wt% NaCl solution. Raman spectra of porewater were different from those of deionized water and NaCl aqueous solution. Intensity maxima of the spectra of deionized water, NaCl solution and their porewater were observed near 3250, 3400, 3630 cm^{-1} . Ratio of intensity near 3400 cm^{-1} /3250 cm^{-1} decreased from 1.033 to 0.905 with a decrease in water content of 100wt(water) to 75wt. On the other hand, intensity ratio of 3400 cm^{-1} /3250 cm^{-1} of NaCl aqueous solution, 80wt% and 75wt% were 1.087, 0.804 and 0.772, respectively. Since the Raman scattering near 3250 cm^{-1} can be attributed to strongly hydrogen bonded water molecule, those changes in intensity ratio suggests an increase in number of water molecule forming strong hydrogen bond in porewater. This is considered to be related to distribution of electrostatic potential from smectite surface to porewater.