# Salinity and pH dependence of decanoic acid - kaolinite and pyrophyllite interactions

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**Introduction**

Understanding how clay-oil interactions determine the wettability state of oil reservoris is of critical importance in the development of enhanced oil recovery techniques. In this work, we aim to understand how two clay minerals (kaolinite and pyrophyllite) and polar oil interact as a function of different chemical parameters of aging (formation) water.

**Methods**

Kaolinite and pyrophyllite clays have a similar, low permanent charge, but exhibit different type of facets. Samples were aged for 24 hrs on either $CaCl_2$ or NaCl brines (0.001 and 1M) and pH (5.6, 6.5, and 8). Then, all samples were aged in model oil (1M mixture of decanoic acid in dodecane). The chemical interations were analysed using FTIR.

**Resutls and discussion**

Figure 1 shows samples aged in 1M $CaCl_2$ (at all pHs) exhibited strong absorptions near 1620-1640 $cm^{-1}$ ($H_2O$ bending) and 3400-3500 $cm^{-1}$ ($H_2O$ streching); and weak intensity of $COO^-$ (band at 1550 $cm^{-1}$ is characteristic of $COO^-$ antisymmetric strech) due to the pKa of dodecanoic acid (pKa = 5.3). In contrast, these peaks were not observed at lower $Ca^{2+}$ concentrations or in the presence of $Na^+$. This supports the presence of $COO^-$ cation bonds in the presence of $Ca^{2+}$ but not in the presence of $Na^+$.

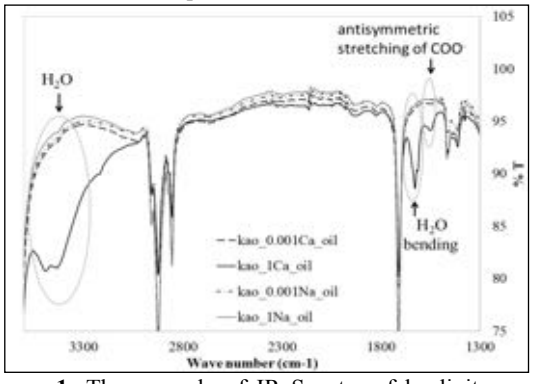


**Figure 1**: The example of IR Spectra of kaolinite aged in different brine at pH 5.6 and model oil.