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# Dehydroxylation and $CO_2$ incorporation in annealed mica (sericite): An infrared spectroscopic study

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## ABSTRACT

Dehydroxylation and incorporation of $CO_2$ in mica (sericite-$2M_1$) during high-temperature annealing has been investigated in detail using infrared (IR) spectroscopy. The dehydroxylation is characterized by a dramatic change of the $OH^-$ ion spectrum and the appearance or development of different extra species ($CO_2$, $CO_3^{2-}$, and $OH^-$). A significant decrease in the K-O bond strength and a complex distortion of the silicon-oxygen tetrahedra were also observed. The general similarities between the spectra of the untreated and dehydroxylated sericite show that the layered framework is somewhat preserved in sericite dehydroxylate. The results suggest that the incorporation of $CO_2$ into the structures of the heated materials is associated with or enhanced by the dehydroxylation process, although the two processes have different reaction mechanisms. The $CO_2$ contents in heat-treated sericite show a correlation with the loss rate of hydroxyl. A weak O-H stretching absorption band near 3480 $cm^{-1}$ developed during dehydroxylation and it disappeared above 1100 °C. The results suggest that the developed additional O-H stretching signals and the thermally induced $CO_2$ do not structurally stabilize each other, as upon further heating the two different types of components vanished at different temperatures.