

## **H<sub>2</sub>O and the dehydroxylation of phyllosilicates: An infrared spectroscopic study**

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### **ABSTRACT**

As shown by in situ infrared spectroscopy and analysis of quenched samples, phyllosilicates (muscovite, sericite, pyrophyllite, and talc) under dehydroxylation conditions lack the characteristic bands near 1600 cm<sup>-1</sup> (bending) and 5200 cm<sup>-1</sup> (combination) of H<sub>2</sub>O, and they contain virtually no H<sub>2</sub>O but an abundance of OH. This observation appears to be at variance with the formal description of dehydroxylation in bulk samples as 2(OH) → H<sub>2</sub>O + O, whereas it is suggested that hydrogen diffuses in the form of (OH)<sup>-</sup> or/and H<sup>+</sup> in dehydroxylation. The upper limit of H<sub>2</sub>O in the dehydroxylated bulk is likely to be at the parts per million level in phyllosilicates that contain structural OH ions equivalent to 4–5 wt% H<sub>2</sub>O. The observations suggest that H<sub>2</sub>O molecules are probably formed near the surface of the sample.

**Keywords:** Dehydroxylation, phyllosilicates, H<sub>2</sub>O, infrared spectroscopy