

## **Hydrothermal reactivity of Lu-saturated smectites: Part I. A long-range order study**

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### **ABSTRACT**

Changes produced after hydrothermal treatments at 400 °C and at different pressures in a set of Lu-saturated smectites have been compared with those occurring in a mixture of  $2\text{SiO}_2:1\text{Lu}_2\text{O}_3$ . The effect of the mineralogical composition of the smectite on the reactivity has been analyzed. The growth of a new crystalline phase,  $\text{Lu}_2\text{Si}_2\text{O}_7$  (detected by means of X-ray diffraction), at a different pressure for each smectite, has allowed us to establish a reactivity order among the samples. All the samples were much more reactive than the mixture of oxides. The reactivity of the smectites was modulated by their different mineralogical compositions. First, smectites having Al in the tetrahedral sheet were the most reactive. This finding is interpreted as due to a strong electrostatic interaction created by the Al that activates neighboring Si for the reaction. Second, a higher reactivity was observed for the smectites with total occupancy of the octahedral sheet, due to the simultaneous disruption of the tetrahedral-octahedral shared oxygen layer and the diffusion of octahedral cations into the interlayer space. Third, the layer charge of the smectite does not induce any variation in the reactivity for the set of samples analyzed.