

# THERMODYNAMICS OF THE VARIOUS HIGH-TEMPERATURE REACTIONS OF KAOLINITE

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## ABSTRACT

In spite of the fact that the kaolinite–mullite reaction series had been the subject of extensive investigations since the work of Le Chatelier in 1887, nevertheless many problems are still remaining. One of the major problems is the interpretation of the first exothermic peak at 980°C.

Based on sufficiently accurate thermodynamic data of kaolinite and its high temperature products, equations were derived, expressing the changes of free energy with temperature for all various possible reactions of kaolinite between 298°K and 2300°K.

The most favourable reaction at 980°C, (1253°K), is that which yields mullite and  $\beta$  quartz.

The exothermic peak at 980°C is neither due to crystallization of  $\gamma\text{Al}_2\text{O}_3$  and  $\text{SiO}_2$ , nor to mullite,  $\gamma\text{Al}_2\text{O}_3$  and  $\text{SiO}_2$  but most probably due to crystallization of mullite and silica. The values of  $\Delta G_{1250^\circ\text{K}}$  are: -40,919, -88,991 and -105,022 cal/mol respectively.