

---

# Kaolinite Synthesis. I. Crystallization Conditions at Low Temperatures and Calculation of Thermodynamic Equilibria. Application to Laboratory and Field Observations

A. La Iglesia and M. C. Van Oosterwyck-Gastuche

Departamento de Cristalografía, Mineralogía, y Mineralotecnía Facultad de Geología, Sección de Genesis y Síntesis Mineral Instituto " Lucas Mallada" del C.S.I.C., Madrid, Spain  
Musée royal de l'Afrique centrale, Département de Géologie et de Minéralogie, B-1980 Tervuren, Belgium

**Abstract:** The equilibrium diagrams developed for Al-hydroxide and for kaolinite by Garrels and Christ (1965) have been modified by taking into account the existence of gels. From the stability zones obtained, the " appropriate" concentrations can be deduced and utilized for synthesizing these species, provided the requirements to insure good crystal growth are observed. Among procedures to promote these crystallizations, homogeneous precipitation processes (La Iglesia et al., 1974, 1976) appear to be particularly adequate.

The theoretical considerations provide an explanation for most of the processes observed until now, both successful and unsuccessful syntheses, and also give an explanation for many field observations. The crystallizations, however, remain poorly reproducible, indicating that many factors are still poorly known. Some points requiring further investigation include (i) better values for  $\Delta G_f^0$  (ii) the influence of organic complexes, (iii) the effect of preexisting crystalline phases, (iv) those involving dehydration processes in these systems.

**Key Words:** Aluminum • Hydroxide • Kaolinite • Synthesis • Thermodynamic

*Clays and Clay Minerals*; December 1978 v. 26; no. 6; p. 397-408; DOI: [10.1346/CCMN.1978.0260603](https://doi.org/10.1346/CCMN.1978.0260603)  
© 1978, The Clay Minerals Society  
Clay Minerals Society ([www.clays.org](http://www.clays.org))

---