

---

# Physico-Chemical Properties of Synthetic Hydrotalcites in Relation to Composition

Shigeo Miyata

Kyowa Chemical industry Co., Ltd., Yashimanishi-machi, Takamatsu-shi, Japan

**Abstract:** Hydrotalcite solid solutions were prepared by coprecipitation followed by hydrothermal treatment between 150° and 250° C. Based on the structural formula  $[\text{Mg}_{1-x}\text{Al}_x(\text{OH})_2]^{X+}[(\text{CO}_3)_{x/2} \cdot m\text{H}_2\text{O}]^{X-}$ , pure solid solutions were formed in the range  $\text{Al}/(\text{Al} + \text{Mg}) = 0.2$  to 0.33, where  $m = (1 - 3x/2)$ . Maximum crystallite size was achieved by hydrothermal treatment between 180° and 200° C with  $x = 0.337$  to 0.429. Crystal strain was also minimized at these values of  $x$ . The adsorption capacity for Naphthol Yellow S increased as  $x$  increased and reached a maximum ( $1.56 \times 10^{-6}$  moles/m<sup>2</sup>) when  $x = 0.287$ , a value eight times larger than that of  $\text{Mg}(\text{OH})_2$ . A weak endothermic DTA peak at about 350° C is probably due to the loss of structural water in the main layer of the structure. On calcination between 400° and 700° C only periclase was detected, probably containing Al in solid solution. Hydration of the calcined product resulted in the reconstruction of the original hydrotalcite structure.

**Key Words:** Crystal strain • Hydrotalcite • Solid solution • Synthesis • Thermal stability

*Clays and Clay Minerals*; February 1980 v. 28; no. 1; p. 50-56; DOI: [10.1346/CCMN.1980.0280107](https://doi.org/10.1346/CCMN.1980.0280107)

© 1980, The Clay Minerals Society

Clay Minerals Society ([www.clays.org](http://www.clays.org))

---