

# THE STEPWISE HYDRATION OF CLAY-ORGANIC COMPLEXES<sup>1</sup>

*by*

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## ABSTRACT

A novel phenomenon, the stepwise hydration of clay-organic complexes, has been observed.

In the dry state, pyridine forms a 14.8 Å and a 19.4 Å complex with a montmorillonite clay, depending on the amount of pyridine adsorbed. When increasing amounts of water are added to the clay-pyridine system, the 19.4 Å complex forms two distinct hydrates with basal spacings of 23.3 Å and 29.3 Å, respectively.

In the dry state,  $\alpha$ -picoline forms a 15.9 Å complex only. In the presence of increasing amounts of water, five discrete hydrates are observed which have basal spacings of 21.9, 25.7, 27.9, 31.8, and 33.8 Å respectively.

A tentative interpretation of the structure of these complexes and of the hydration mechanism is based on the assumption that in the anhydrous complexes the nitrogen groups and associated exchange cations occupy a midway position between the unit layers. Upon hydration, discrete amounts of water associate with the cations and nitrogen groups in the midway position to form the discrete hydrates with increased basal spacing.

<sup>1</sup> Full paper published in *Nature*, v. 194 (1962), pp. 176-177.