

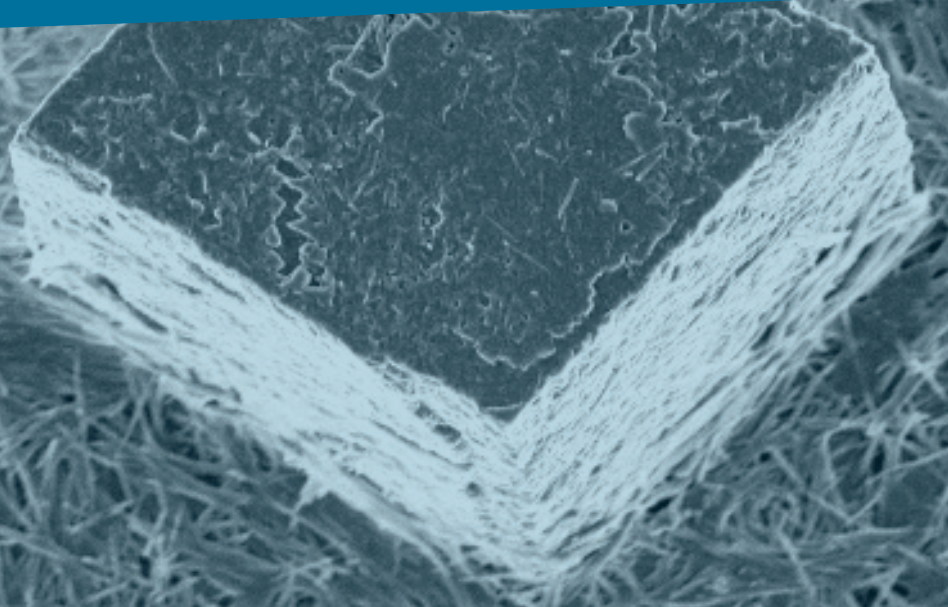
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INFLUENCE OF PRESENCE OF AMMONIUM IN THE HYDROTHERMAL ILLITIZATION OF SMECTITE

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During diagenesis, several reactions induce changes both in phyllosilicates and organic matter, which in basins associated to the production of hydrocarbons leads to ammonium fixation in illite and micas [1] and to dissolution induced by organic acids [2] [3]. Dissolution processes may contribute to the smectite-to-illite transformation, stabilized by fixation of K (and NH_4^+). Ammonium is a weak acid in solution. Under neutral conditions where the concentration of hydronium is very low ($<10^{-7}$ M), ammonium contributes to smectite dissolution. The effect of organic acid on silicates dissolution is partially known, but the potential role of ammonium is completely novel.

In order to study the possible influence of NH_4^+ in the smectite-to-illite transformation reaction, a series of hydrothermal experiments were carried out at 100, 150 and 200 °C, for 15 to 90 reaction days and two NH_4^+ concentrations (0.1 and 0.01 M). Solids were characterized after alteration by XRD and FTIR.

The results show that in these conditions, the smectite incorporates NH_4^+ in the structure, and smectite dissolution is corroborated by the formation of K- and NH_4^+ -zeolites, at pH basic, and of K-feldspars and buddingtonite. Nevertheless, the XRD patterns reveal that, in addition these phases, the solid products include a small peak at ~ 10 Å, suggesting formation of illite

Thus, presence of NH_4^+ seems to promote smectite-to-illite transformation reaction through the mechanism: NH_4^+ -smectite \rightarrow interstratified I/S \rightarrow illite.

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