Structural Fluorine in Sepiolite

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Abstract: Sepiolite from Vallecas-Vicálvaro, Spain, contains 1.3% fluorine. Laser microprobe mass spectrometry of this sepiolite suggests the presence of fragments of $(SiO_2)_nOMgF$ and $(SiO_2)_nOMgOH$, which are typical of the sepiolite structure. During thermal dehydroxylation, the fluorine in this sepiolite is removed simultaneously with OH groups at about 750 ° C. Nuclear magnetic resonance spectroscopy (NMR) of ^{19}F indicates that the fluorine is located in the interior of the sepiolite structure, probably substituting for OH groups, and is homogeneously distributed. In the Vallecas-Vicálvaro sepiolite, about one of every four OH groups bound to Mg^{2+} is substituted by fluorine. The kinetics of extraction of Mg^{2+} and F^- ions by acid treatment (1 N HCl) shows a more rapid extraction of Mg^{2+}, with a monotonous decrease of the Mg/F ratio as the extent of extraction increases. These results support the internal location of the fluorine, as suggested by the NMR data.

Key Words: Fluorine • Hydroxyl • Laser microprobe mass spectrometry • Dissolution • Nuclear magnetic resonance • Sepiolite

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