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CHARACTERIZATION OF THE EFFECT PRODUCED IN THE FORMATION AND MORPHOLOGY OF FUNCTIONAL NANOTUBES (IMOGOLITE) BY THE PRESENCE OF CR (III)

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Nanotubular materials are promising in terms of their potential technological applications, mainly due to their specific properties, such as their surface structure, mechanical resistance, reactivity, etc. An example of these is imogolite, a nanotubular aluminosilicate, which has been studied due to its great industrial potential, especially for its surface differentiation, with two different active sites (Al-OH and Si-OH, external and internal surface, respectively). In the search for new properties that allow extending applications of this material, incorporation of elements with similar properties has been proposed, in order to obtain structural and superficial modifications of this material, such as the reported replacement of Al by Fe and Si by Ge. In this context, in the present work, the synthesis and characterization of a new imogolite isostructure was performed, with the substitution of Al (III) by Cr (III), called Cr-Imogolite, with Al / (Al + Cr) ratio = 0.01 (Cr-Imo-1); 0.05 (Cr-Imo-5) and 1 (Cr-Imo-100), to evaluate the effect of chromium incorporated in the formation and morphology of nanotubes. The experimental procedure used is similar to that described by Denaix et al. (1999), using $Al(NO_3)_3 \cdot 9H_2O$, $CrCl_3$ and TEOS as reagents. The images obtained from the transmission electron microscopy (TEM) of Cr-Imo-1 and Cr-Imo-5 exhibit the presence of nanotubes like imogolite in their characteristics, however, with small variations in diameter and length, while in the micrographs of Cr-Imo-100, amorphous structures are observed. In addition, when evaluating surface behavior through isoelectric point determination (IEP), curves and IEP of the first two samples are like that reported for imogolite of, with a different behavior for Cr-Imo-100, which exhibits a considerably lower PIE. In conclusion, the chromium present in the synthesis directly affects the formation and size of the nanotube formed, depending on the percentage of substitution in the material.

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