ADVANCED MATERIALS FOR ADSORPTION PROCESS AND OXIDATION OF WASTEWATER TREATMENT

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Emerging Organic Pollutants (EOPs) exist in many commercial products and have been detected in various aquatic environments and in different parts of the world. EOPs have become a matter of concern because they are potentially toxic and persistent and tend to accumulate in human tissues. New materials consisting of solid matrixes that act as active, selective, and recyclable heterogeneous catalysts during EOP degradation need to be prepared and better studied. Clays/TiO_2 nanocomposites can help to overcome problems related to pollution caused by EOPs. This work aims to prepare and characterize an inorganic solid based on clay and titanium with potential use in ibuprofen degradation. The present work used the clay kaolinite obtained from the deposit of São Simão, state of São Paulo, Brazil. First, the clay was purified by the dispersion-decantation method. The infrared spectrum of the purified kaolinite showed the characteristic bands of pure clay. The bands at 3696, 3668, and 3653 cm^{-1} corresponded to vibrations of the OH interlamellar group, while the band at 3619 cm^{-1} was due to vibrations of the OH intralamellar group. After purification, the kaolinite was used to synthesize the compound clay-Ti-Fe by reaction of titanium (IV) isopropoxide with iron (III) chloride; the sol-gel process (non-hydrolytic route) was employed. The resulting material was thermally treated at different temperatures and characterized by infrared spectroscopy and X-ray diffraction. Compared to pure kaolinite, the infrared spectra and the X-ray diffraction pattern of the composite clay-Ti-Fe did not change significantly, evidencing that functionalization occurred at the lateral hydroxyl groups and the silanol aluminol.

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