HYDROTHERMAL SYNTHESIS OF HIERARCHICAL CORAL-LIKE Na₂Ti₃O₇ STRUCTURES FOR HIGHLY METHYLENE BLUE ADSORPTION

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Water pollution caused by industrial waste discharge is extremely harmful to the environment and people. Among the different pollutant, special attention is put on organic dyes used in the textile, paper, leather, cosmetic and food industries because the low concentration (ppm) necessary to cause injury. Adsorption processes on activated carbon is by far the most used for removal of dyes, but is still considered expensive adsorbent. As an alternative, the adsorption ability of Na₂Ti₃O₇ powders is recently explored. Thus, this work deals with the synthesis of hierarchical coral-like Na₂Ti₃O₇ structures for the adsorption of methylene blue (MB). The Na₂Ti₃O₇ powders were obtained by a facile hydrothermal method under highly basic conditions controlled by the NaOH addition. The chemical, structural and morphological properties of the powders obtained were analyzed by FTIR spectroscopy, x-ray diffraction and scanning electron microscopy. By RXD, the crystal structure was indexed to Na₂Ti₃O₇. The hierarchical structures were confirmed by SEM images, where Na₂Ti₃O₇ microspheres are conformed of small nanosheets. Finally, the adsorption ability of Na₂Ti₃O₇ powders were analyzed with the two-parameter isotherms by means of Langmuir, Freundlich, Dubinin-Raduchkevich, Tempkin, and Flory-Huggins. The Langmuir model fix perfectly with the adsorption process of MB with 85 mg·g⁻¹ as the maximal dye amount of dye adsorbed on Na₂Ti₃O₇ powders.

Keywords: adsorption, Na₂Ti₃O₇, hierarchical structures

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