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MICROWAVE-ASSISTED HYDROTHERMAL SYNTHESIS OF COMPOSITE MATERIALS BASED ON ZEOLITE-TiO₂ NANOCRYSTALS

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Abstract

The composite materials based on natural zeolite and undoped and N-doped TiO₂, i.e., Z-Na-TiO₂ and Z-Na-TiO₂-N, were successfully synthesized by solid-state reaction in microwave-assisted hydrothermal conditions. Undoped TiO₂ and N-doped TiO₂ nanocrystals were previously synthesized by sol-gel method. The X-rays diffraction results of TiO₂ nanocrystals indicated that anatase TiO₂ is the dominant crystalline type. The composite materials were structural and morphological characterized by X-ray diffraction, DRUV-VIS spectroscopy, FT-IR spectroscopy and SEM/EDX analysis. The presence of N into Z-Na-TiO₂-N was confirmed by EDX analysis. Photocatalytic activity of composite materials was investigated using humic acid as a model pollutant. The enhanced photocatalytic activity of Z-Na-TiO₂-N catalyst is proved through the degradation and mineralization of humic acid under ultraviolet and visible irradiation.

Key words: degradation, humic acid, microwave treatment, natural zeolite, TiO₂

Received: September, 2011; Revised final: February, 2012; Accepted: March, 2012

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