

Synthesis of Ni-Co-CNT nanocomposite and evaluation of its photocatalytic dye (Reactive Red 120) degradation ability using response surface methodology

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ABSTRACT

Herein, NiO and Co₂O₃, NiCo₂O₄ and NiCo₂O₄/multi-walled carbon nanotubes nanocomposite were synthesized by the hydrothermal method and characterized by scanning electron microscopy, energy dispersive spectroscopy, and X-ray diffraction. The photocatalytic activity of the synthesized materials was evaluated by Reactive Red 120 dye degradation. The photocatalytic activity of NiO and Co₃O₄ was enhanced not only by the formation of NiCo₂O₄, but also by its interaction with the functionalized multiwall carbon nanotubes support. The response surface methodology (RSM) was used to obtain the optimum parameters, including catalyst dosage, initial dye concentration, and pH on the dye degradation and reduction in total organic compounds (TOC). The dye removal and TOC reduction under optimum conditions (catalyst dose of 0.01 g, pH of 3, and dye concentration of 20 ppm) were 88.9% and 48.7%, respectively.

Keywords: Ni-Co-CNT nanocomposite; Synthesis and characterization; Photocatalytic dye degradation

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