



The preparation and photocatalytic activity of phosphotungstic acid-reduced graphene oxide composites

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ABSTRACT

In this work, phosphotungstic acid-reduced graphene oxide composites (denoted as HPW-RGO) were synthesized using phosphotungstic acid and self-made graphene oxide as starting materials via a facile hydrothermal method. The prepared materials were characterized by scanning electron microscopy, X-ray diffraction analysis, infrared spectroscopy, X-ray photoelectron spectroscopy and thermogravimetric analysis. The results showed that the phosphotungstic acid particles were loaded on reduced graphene oxide. The optimal mass ratio of graphite oxide to HPW was 3.0 wt% in preparation process. Under the same experimental condition (pH 3.0, 20 mg/L methyl orange (MO) and 1.0 g/L dosage), the adsorption removal ratio of MO over HPW-3RGO was 46.34%, the photocatalytic degradation removal ratio is about 40.00%, and the total removal ratio was 86.34%. While the adsorption removal ratio of MO over HPW was only 2.67%, the photocatalytic degradation removal ratio is about 32.00% and the total removal ratio was only 34.66%. The degradation rate constant of HPW-3RGO (0.00892 min^{-1}) was 3.4 times of the HPW (0.00264 min^{-1}).

Keywords: Photocatalysis; Phosphotungstic acid; Graphene; Methyl orange

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