عنوان مقاله:

Synthesis, characterization and photocatalytic application of ZnWO۴/ZrO۲ nanocomposite towards degradation of methyl orange dye

محل انتشار:

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خلاصه مقاله:

Visible light active ZnWO۴/ZrO۲ nanocomposite was prepared via hydrothermal method. The nanocomposite was characterized by UV-visible diffuse reflectance spectroscopy (UV-vis-DRS), Fourier transform infrared spectroscopy (FT-IR), X-ray diffraction (XRD), Scanning Electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDX) and transmission electron microscopy (TEM) techniques. The XRD results showed that average particle size of ZrO۲, ZnWO۴ and ZnWO۴/ZrO۲ were found to be ۲۹.۲۰ nm, ۲۳.۷۸ nm and ۲۰.۱۴ nm respectively and the phase structure for ZrO۲ and ZnWO۴ in the composite was Rhombohedral and Monoclinic respectively. The UV–vis absorption spectra of the ZnWO۴/ZrO۲ nanocomposite noticeably shifted to the visible light region compared to that of the ZrO۲. The prepared photocatalyst were composed of plate and spongy sphere with little agglomeration was seen from SEM result. The photocatalytic activities of the prepared nanocomposite was evaluated for the degradation of methyl orange (MO) under visible light irradiations. The effect of operational parameters such as initial dye concentration, pH, catalyst concentration and irradiation time have been investigated in detail. The photocatalytic degradation efficiency of ZnWO۴/ZrO۲, ZnWO۴ and ZrO۲ for ۹۵%, ۷۲% and ۶۰ % respevtively. The high photocatalytic activity can be attributed to stronger absorption in the visible light region, a greater specific surface area, smaller crystal sizes, more surface OH groups, and to the effect of ZnWO۴ doping, which resulted in a lower band gap energy.

کلمات کلیدی:

ZnWO۴/ZrO۲, Photocatalysis, Visible light, Methyl orange