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ZnO / TiO2 Nanoparticles for Degradation of Cyanide Ion

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Abstract : Advanced oxidation process (AOPs) is alternative method for the complete degradation many organic pollutants. When a photocatalyst absorbs radiation whose energy hν > Eg an ē from its filled valance band (VB) is promoted to its conduction band (CB) and valance band holes h+ are formed. Electron would reduce any available species, including O2, water and hydroxide ion to form hydroxyl radicals. ZnO and TiO2 are important photocatalysts with high catalytic activity that have attracted much research attention. TiO2 can only absorb a small portion of solar spectrum in the UV region and many methods such as dye sensitization, doping of other metals and using TiO2 with another semiconductor have been used to improve the photocatalytic activity of TiO2 under solar irradiation. Studies have shown that the use of metal oxides or sulfide such as WO3, MoO3, SiO2, MgO, ZnO, and CdS with TiO2 can significantly enhance the photocatalytic activity of TiO2. Due to similarity of photodegradation mechanism of ZnO with TiO2, it is a suitable semiconductor using with TiO2 and recently nanosized bicomponent TiO2-ZnO photocatalysts were prepared and used for degradation of some pollutants. In this study, Nano-sized ZnO/TiO2 composite was synthesized. Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD) and scanning electron microscope (SEM) were used to characterize the structure and morphology of it. The effect of photocatalytic activity of prepared ZnO/TiO2 on the degradation of cyanide ion under UV was investigated. The effect of various parameters such as ZnO/TiO2 concentration, amount of photocatalyst, amount of H2O2, initial dye or cyanide ion concentration, pH and irradiation time on were investigated. Results show that more than 95% of 4 mgL-1 cyanide ion degraded after 60-min reaction time and under UV irradiation.

Keywords : photodegradation, ZnO/TiO2, nanoparticle, cyanide ion
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