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REMOVAL OF METHYLENE BLUE BY AN AQUEOUS SUSPENSION OF NANO-SIZED TiO₂ CONTAINING DIFFERENT SALTS

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Abstract

The photocatalytic degradation (PCD) of methylene blue (MB) in aqueous suspensions of nano-sized TiO₂ particles containing high concentrations of NaCl, MgCl₂, and CaCl₂ was studied. The rates of PCD and adsorption of ions were monitored by measuring the total organic carbon (TOC) and using inductively coupled plasma-atomic emission spectrometry, respectively. The results showed that the removal rate decreased with increasing concentrations of NaCl, MgCl₂, and CaCl₂. The trend for the differences in the removal rates in MgCl₂ and CaCl₂ aqueous suspensions inverted as the salt concentration increased, which revealed that the influence of Ca²⁺ and Mg²⁺ is related to the ion concentration. In orthogonal experiments, the hindering effect occurred as follows in descending order: NaCl, CaCl₂, and MgCl₂. The rate decreased markedly under certain ratios of salt concentrations, and the mechanisms were explored.

Key words: CaCl₂, methylene blue, MgCl₂, NaCl, TiO₂

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