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Photocatalytic removal of Cr(VI) with illuminated TiO_2

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ABSTRACT

The effect of dissolved oxygen on the photocatalytic reduction of Cr(VI) with illuminated TiO_2 was studied in this work with variation of the solution pH, contact time, and initial Cr (VI) concentration. Oxygen or nitrogen gas was used as a purging gas. Overall, the removal efficiency of Cr(VI) decreased as the solution pH increased. The removal of Cr(VI) by UV/TiO_2 increased by decreasing the solution pH because of the increased potential difference between the conduction band of TiO_2 and Cr(VI)/Cr(III) as well as the anionic-type adsorption of Cr(VI) onto the TiO_2 surface. The removal efficiency of Cr(VI) increased in purging of nitrogen gas compared to that of oxygen gas because of less competition between dissolved oxygen and Cr(VI) in the reaction with the electron in the conduction band of TiO_2. The reduction pattern was better described by the first-order kinetic model.

Keywords: Dissolved oxygen; Photocatalysis; Cr(VI); TiO_2

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