photocatalytic degradation of pentachlorophenol in aqueous solution employing immobilized TiO$_2$ supported on titanium metal

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Abstract

A study on photocatalytic degradation of pentachlorophenol (PCP) in aqueous solution employing immobilized TiO$_2$ on titanium metal has been conducted. TiO$_2$ film was prepared via a deep coating in a sol–gel system of titanium (IV) bis (ethyl acetoacetato)-diisopropoxide precursor, followed by calcinations at 525 °C. Two catalysts sheets (5 cm × 5 cm, each) were put in a batch reactor containing 10 ppm PCP and irradiated by a UV black light. The occurrence of PCP degradation was indicated by decrease in pH, increase of conductivity, and formation of chloride ion. Moreover, the UV spectra observation indicate that the degradation of PCP solely by UV light (photolysis) was observed due to in part dechlorination of PCP molecules, while aromatic moiety remained. The aromatic intermediate could be further degraded in the presence of TiO$_2$ and UV light (photocatalysis). The determination of intermediate degradation products by HPLC revealed that oxalic acid was detected consistently.

Keywords: PCP; Immobilized TiO$_2$; Photocatalytic degradation; Aromatic moiety; Chloride ion

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