研究报告

蔡苏彦,孙琼,许宜铭.锌铝水滑石负载羧酸基酞菁锌可见光降解水中氯苯酚[J].环境科学学报,2012,32(11):2725-2731

锌铝水滑石负载羧酸基酞菁锌可见光降解水中氯苯酚

Immobilization of zinc phthalocyaninecarboxylate onto Zn/Al-hydrotalcites for chlorophenol degradation in water under visible light

关键词：酞菁锌 水滑石 氯苯酚 可见光 降解

基金项目：国家重点基础研究发展计划 (No.2011CB936003)

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摘要：以锌铝类水滑石为载体,1.0%(质量分数)水溶性羧酸基酞菁锌为光敏剂,制备了不溶于水的负载型光敏剂,并对其结构进行表征.结果表明,在可见光和氧气作用下,该复合催化剂能够引发水中对氯苯酚、2,4-二氯苯酚和2,4,6-三氯苯酚的降解.但有机物降解的速率与载体的锌铝比和煅烧温度有关.研究表明,最佳的锌铝比和煅烧温度分别为2.0和300 ℃.在反应过程中,载体及其煅烧产物具有电子导体的功能,可加快光敏剂与氧气之间的电子转移过程,进而引发氯苯酚的降解.此外,该复合催化剂能被重复循环使用,但光敏活性逐渐降低.

Abstract：Layered double hydroxides (LDH) with different Zn/Al atomic ratios were used as a support of water soluble zinc tetracarboxylphthalocyanine (ZnPc) at 1.0%. In the presence of visible light and O_2,this immobilized sensitizer was very active for the degradation of 4-chloro-,2,4-dichloro- and 2,4,6-trichlorophenol in water at pH 6.5,whereas in the presence of LDH or ZnPc,organic degradation was absent or very slow. However,the rate of organic degradation was influenced by the Zn/Al ratio and sintering temperature of LDH. The optimum Zn/Al ratio was 2.0 and sintering temperature was 300 ℃. It is proposed that both LDH and its thermally decomposed products are able to function as an electron conductor for the electron transfer from the electronically excited ZnPc to O_2,resulting in organic degradation. Moreover,the immobilized sensitizer could be repeatedly used,but its activity gradually decreased mainly due to slow bleaching of ZnPc sensitizer.

Key words：Zinc phthalocyanine hydrotalcites chlorophenol visible light degradation

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