

熊智信,贾国正,殷紫,丁丽丽,万能,任洪强,许柯.锐钛矿型TiO₂光催化降解异噻唑啉酮废水研究[J].环境科学学报,2014,34(4):902-907

锐钛矿型TiO₂光催化降解异噻唑啉酮废水研究

Anatase-TiO₂ photocatalyst for isothiazolone wastewater treatment

关键词: [异噻唑啉酮模拟废水](#) [锐钛矿型TiO₂催化剂](#) [光降解](#)

基金项目: [国家高技术研究发展\(863\)计划\(No.2009AA063903\)](#); [国家自然科学基金\(No.61006011\)](#)

作者 单位

熊智信 污染控制与资源化研究国家重点实验室,南京大学环境学院,南京 210023

贾国正 污染控制与资源化研究国家重点实验室,南京大学环境学院,南京 210023

殷紫 污染控制与资源化研究国家重点实验室,南京大学环境学院,南京 210023

丁丽丽 污染控制与资源化研究国家重点实验室,南京大学环境学院,南京 210023

万能 MEMS教育部重点实验室,东南大学电子科学与工程学院,南京 210096

任洪强 污染控制与资源化研究国家重点实验室,南京大学环境学院,南京 210023

许柯 污染控制与资源化研究国家重点实验室,南京大学环境学院,南京 210023

摘要: 本文制备了自然光照条件下能有效降解异噻唑啉酮模拟废水(主要成分MI和CMI)的锐钛矿型TiO₂光催化剂,并通过电镜分析(TEM、HRTEM)和XRD手段对其进行表征,优化了光催化处理异噻唑啉酮模拟废水的反应条件,并分析了异噻唑啉酮的降解产物情况和自然光照条件下羟基自由基的产生情况.结果表明,合成的锐钛矿型TiO₂主要暴露面为{101}面,具有较好的异噻唑啉酮去除效果.在500 W氙灯照射下,12~53 mg·L⁻¹异噻唑啉酮模拟废水在催化剂投加量为677 mg·L⁻¹的条件下反应4 h,异噻唑啉酮去除率可以达到97%~100%;当异噻唑啉酮模拟废水浓度升高为141 mg·L⁻¹时,其去除率为77%~80%,最佳反应时间4 h.对异噻唑啉酮降解产物的分析显示,在光催化反应结束时,MI为主要的残留物质,CMI脱氯转化为氯离子和MI,并发现未知有机产物.

Abstract: In this paper, anatase-TiO₂ photocatalyst was synthesized to remove isothiazolone from wastewater effectively under natural light irradiation and its properties were analyzed by transmission electron microscopy (TEM), high-resolution TEM (HRTEM) and XRD. The optimal photocatalytic conditions for treating simulated isothiazolone wastewater were studied and the degradation metabolites of isothiazolone and the production of ·OH radicals in the solution by anatase TiO₂ under natural light irradiation were evaluated. Results show that the synthesized anatase-TiO₂, which possessed {101} facet as the major exposed plane, exhibited high isothiazolone removal efficiency. When isothiazolone concentration was at 12~53 mg·L⁻¹, 97%~100% of isothiazolone could be removed from wastewater after photoreaction with 677 mg·L⁻¹ of anatase-TiO₂ for 4 hours (from a 500 W Xe lamp); when the concentration of isothiazolone wastewater increased to 141 mg·L⁻¹, 77%~80% of isothiazolone could be removed. The optimum reaction time was 4 h. The analysis of photoreaction metabolites indicated that MI was the major residual substance at the end of photocatalytic reaction; CMI was degraded to chloride and MI. At the same time, another unknown intermediate was found after the degradation of isothiazolone.

Key words: [isothiazolone simulated wastewater](#) [anatase-TiO₂](#) [photocatalytic degradation](#)

摘要点击次数: 25 全文下载次数: 43

[关闭](#)[下载PDF阅读器](#)

您是第4275570位访问者

主办单位：中国科学院生态环境研究中心

单位地址：北京市海淀区双清路18号 邮编：100085

服务热线：010-62941073 传真：010-62941073 Email: hjkxxb@rcees.ac.cn

本系统由北京勤云科技发展有限公司设计