



## 论文摘要

中南大学学报(自然科学版)

ZHONGNAN DAXUE XUEBAO(ZIRAN KEXUE BAN)

Vol.41 No.2 Apr.2010

[PDF全文下载] [全文在线阅读]

文章编号: 1672-7207(2010)02-0784-09

### 超声辐照降解MC-RR动力学的影响因素

欧桦瑟, 高乃云, 隋铭皓, 黎雷, 姚娟娟

(同济大学 污染控制与资源化研究重点实验室, 上海, 200092)

**摘要:** 利用超声辐照技术降解水中微囊藻毒素-RR(MC-RR), 考察MC-RR初始质量浓度、超声频率、初始pH值、声能密度以及水中几种典型阴离子对降解效果的影响并探讨其动力学机理。HPLC检测结果表明: 超声辐照能有效降解MC-RR且与初始质量浓度无关; 超声频率改变水中空化泡分布和特性, 影响反应速率; pH值改变MC-RR存在形态和亲疏水性, pH从1.90到12.21变化时, 降解速率常数 $k$ 由 $0.400 \text{ min}^{-1}$ 降至 $0.082 \text{ min}^{-1}$ ;  $\text{CO}_3^{2-}$ 能阻碍MC-RR的降解, 但 $\text{SO}_4^{2-}$ 和 $\text{Cl}^-$ 对其无影响, 其反应速率常数由大到小为:  $\text{CO}_3^{2-}$ ,  $\text{SO}_4^{2-}$ ,  $\text{Cl}^-$ ; 声能密度的提高对去除有利; 反应符合准一级动力学。

**关键字:** 超声辐照; 降解; MC-RR; 动力学

### Influence factors in kinetics during degradation of MC-RR by ultrasonic irradiation process

OU Hua-se, GAO Nai-yun, SUI Ming-hao, LI Lei, YAO Juan-juan

(State Key Laboratory of Pollution Control and Resource Reuse, Tongji University, Shanghai 200092, China)

**Abstract:** The process and kinetics of microcystin-RR (MC-RR) degradation by ultrasonic irradiation were studied. The effects of initial concentration of MC-RR, ultrasonic frequency, initial pH value, energy density and several typical anions were investigated. The concentration of MC-RR was detected by HPLC and results show that the rate constant ( $k$ ) is invariable with different MC-RR initial concentrations. Different ultrasonic frequencies can change the distribution and characteristic of vapour cavity, while pH value changes the structure and hydrophilic property of MC-RR and finally affects the reaction. When pH changes from 1.90 to 12.21, the rate constant decreases from  $0.400 \text{ min}^{-1}$  to  $0.082 \text{ min}^{-1}$ . The degradation of MC-RR is inhibited by  $\text{CO}_3^{2-}$  but  $\text{SO}_4^{2-}$  and  $\text{Cl}^-$  can be omitted, while the sequence of influence from large to small is  $\text{CO}_3^{2-}$ ,  $\text{SO}_4^{2-}$ ,  $\text{Cl}^-$ . When sound-energy density increases, the rate constant increases. The degradation of MC-RR by ultrasonic followed a pseudo first-order kinetics.

**Key words:** ultrasonic irradiation; degradation; MC-RR; kinetics

版权所有：《中南大学学报(自然科学版、英文版)》编辑部

地址：湖南省长沙市中南大学 邮编：410083

电话：0731-88879765 传真：0731-88877727

电子邮箱：zngdxb@mail.csu.edu.cn 湘ICP备09001153号