

论文

载铜蒙脱石及其杀灭大肠杆菌机制的研究

马玉龙;郭彤

1. 宁夏大学 化学化工学院, 宁夏 银川 750021; 2. 宁夏天然药物工程技术研究中心, 宁夏 银川 750021

摘要:

为制备载铜蒙脱石(Cu-MMT)并研究其杀菌活性及机制,采用离子交换法制得Cu-MMT,对其结构与表面特性进行表征。以大肠杆菌为试验菌株,检测Cu-MMT对细菌的最小抑菌浓度(MIC)和最小杀菌浓度(MBC),Cu-MMT杀菌过程中菌液胞内酶活性的变化,并观察细菌形态。结果显示,载铜后蒙脱石的离子交换容量增大,但比表面积和表面负电荷密度下降;Cu-MMT对大肠杆菌的MIC和MBC分别为0.16和0.64 mg·mL⁻¹;Cu-MMT可使细菌细胞膜受损,胞内酶诸如氨基酸氨基转移酶、乳酸脱氢酶和丙氨酸氨基转移酶等外泄。Cu-MMT对细菌具有较强的杀灭活性,其杀菌机制:Cu-MMT与细菌发生吸附作用,使细菌细胞膜形态和通透性改变,胞内物外泄而死亡。

关键词: 蒙脱石;铜离子;大肠杆菌;抗菌活性;杀菌机制

Preparation of Cu²⁺-loaded montmorillonite and its bactericidal mechanism against *Escherichia coli*

MA Yu-Long; GUO Tong

Abstract:

The aims of this study were to prepare Cu²⁺-loaded montmorillonite (Cu-MMT) and investigate its bactericidal activity and mechanism. Cu-MMT was prepared by the method of ion exchange reaction. The structure and surface characteristic of Cu-MMT were determined. Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of Cu-MMT against the strain of *Escherichia coli* were determined. The activities of intracellular enzyme in bacterial solution were measured, and the morphology of *E. coli* was observed during the interaction between Cu-MMT and bacteria. The results showed that treatment with Cu²⁺ increased cation exchange capacity of montmorillonite, but specific surface area and surface negative charge density were decreased. The MIC and MBC of Cu-MMT against the tested *E. coli* were 0.16 and 0.64 mg·mL⁻¹, respectively. Cu-MMT could destroy bacterial cellular membrane and then resulted in leakage of intracellular enzymes such as aspartate aminotransferase, lactate dehydrogenase and alanine aminotransferase. These suggest that Cu-MMT has a strong bactericidal activity. The bactericidal mechanism of Cu-MMT may be that bacteria are adsorbed by Cu-MMT, and then morphology and permeability of cellular membrane are changed. This leads to an efflux of intracellular contents and the death of bacteria.

Keywords: copper ion *Escherichia coli* antibacterial activity bactericidal mechanism montmorillonite

收稿日期 2006-07-14 修回日期 网络版发布日期

DOI:

基金项目:

通讯作者: 马玉龙

作者简介:

参考文献:

本刊中的类似文章

文章评论 (请注意:本站实行文责自负,请不要发表与学术无关的内容!评论内容不代表本站观点.)

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(173KB)
- ▶ [HTML全文]
- ▶ 参考文献

服务与反馈

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ 引用本文
- ▶ Email Alert
- ▶ 文章反馈
- ▶ 浏览反馈信息

本文关键词相关文章

- ▶ 蒙脱石;铜离子;大肠杆菌;抗菌活性;杀菌机制

本文作者相关文章

- ▶ 马玉龙
- ▶ 郭彤

PubMed

- ▶ Article by
- ▶ Article by

反馈人	<input type="text"/>	邮箱地址	<input type="text"/>
反馈标题	<input type="text"/>	验证码	<input type="text"/> 2641