环境科学学报
ACTA SCIENTIAE CIRCUMSTANTIAE

研究报告

符波,陈燕,姜谦,王燕,刘和.城市污泥中温厌氧消化中挥发性脂肪酸(VFA)对肠道病原菌的杀灭机理[J].环境科学学报,2012,32(12):2921-2928

城市污泥中温厌氧消化中挥发性脂肪酸(VFA)对肠道病原菌的杀灭机理

Pathogen inactivation by volatile fatty acids in sewage sludge during mesophilic anaerobic digestion

关键词：污泥 中温厌氧消化(MAD) VFA 病原菌 杀灭

基金项目：国家自然科学基金项目(No.50978124);中央高校基本科研业务费专项资金(No.JUSRP31105, JUSRP111A10)

作 者 单位

符 波 江南大学环境与土木工程学院环境生物技术研究室,无锡 214122

陈 燕 江南大学环境与土木工程学院环境生物技术研究室,无锡 214122

姜 谦 江南大学环境与土木工程学院环境生物技术研究室,无锡 214122

王 燕 江南大学环境与土木工程学院环境生物技术研究室,无锡 214122

刘 和 江南大学环境与土木工程学院环境生物技术研究室,无锡 214122

摘要：为探讨污泥中温厌氧消化(MAD)过程中挥发性脂肪酸(VFA)对肠道病原菌的杀灭机理,在连续流污泥MAD反应器中,研究了两种pH条件下VFA对埃希氏大肠杆菌(*E.coli*)、沙门氏菌(*Salmonella* spp.)和志贺氏菌(*Shigella* spp.)杀灭的影响.结果发现,中性条件下(pH≈7),污泥中大肠杆菌和沙门氏菌数量经厌氧消化处理后明显下降,均下降了2个数量级,但VFA浓度为1000~6000 mg·L^{-1}时大肠杆菌和沙门氏菌的杀灭效果差别不明显.在pH酸性条件下(pH≈5),高浓度VFA反应器中污泥的大肠杆菌、沙门氏菌和志贺氏菌数量分别下降了3、6和2个数量级,达到污泥A级标准.对于纯培养的大肠杆菌和沙门氏菌,在VFA浓度8000 mg·L^{-1}、pH=5条件下培养6 d后病原菌浓度低于检测限.结果表明,VFA对污泥厌氧消化中病原菌的杀灭效应与未解离状态的VFA浓度密切相关,高浓度VFA、低pH时,未解离态VFA浓度增加,从而提高病原菌杀灭效率.

Abstract：The changes in *E. coli*, *Salmonella* spp. and *Shigella* spp. contents during the continuous mesophilic anaerobic digestion (MAD) of sewage sludge supplemented with different VFA concentrations were investigated. Under pH 7, the MAD process was efficient to reduce *E.coli* and *Salmonella* spp. contents with the levels lowered by more than 2 orders of magnitude. However, the increase in VFA concentration ranging from 1000 to 6000 mg·L^{-1} had insignificant effect on the inactivation of *E.coli*. and *Salmonella* spp.. Under high VFA concentration with pH 5, the *E. coli*, *Salmonella* spp. and *Shigella* spp. contents decreased significantly with the reductions of 3, 6 and 2 orders of magnitude, respectively. For pure cultures of *E. coli* and *Salmonella* spp, the contents were below the detection limits after the incubation of 8000 mg·L^{-1} VFA concentration with pH 5 for 6 days. The results confirmed that high VFA concentration at low pH can achieve efficient reduction of bacterial pathogen in sewage sludge due to the increase in undissociated VFA concentration.

Key words：sewage sludge mesophilic anaerobic digestion (MAD) volatile fatty acids pathogen inactivation

关闭 下载PDF阅读器