

环境工程学报

HUANJING GONGCHENG XUEBAO

月刊 1980 年创刊

2022 年 4 月 第 16 卷 第 4 期

主管 中国科学院

主办 中国科学院生态环境研究中心

主编 刘俊新

编辑 《环境工程学报》编辑部

北京市海淀区双清路 18 号

邮政编码 100085

电话/传真 010-62941074

E-mail cjee@rcees.ac.cn

网址 www.cjee.ac.cn

出版 科学出版社

北京东黄城根北街 16 号

邮政编码 100071

印刷装订 北京科信印刷有限公司

国内发行

中国邮政集团有限公司北京市报刊发行局

广告发布登记

京海工商广登字 20170090 号

出版日期 每月 26 日

国际标准连续出版物号 ISSN 1673-9108

国内统一连续出版物号 CN 11-5591/X

国内外公开发行

国内邮发代号 82-448

国内定价 150.00 元

订阅 全国各地邮局

科学出版社期刊发行处

电话 010-64017032, 64017539

Chinese Journal of Environmental Engineering

Monthly Started in 1980

Vol.16 No.4 April 2022

Supervised by Chinese Academy of Sciences

Sponsored by Research Center for

Eco-Environmental Sciences, Chinese

Academy of Sciences

Editor-in-Chief LIU Junxin

Edited by The Editorial Board of Chinese

Journal of Environmental Engineering

Published by Science Press

16 Donghuangchenggen North Street

Beijing 100717, China

Printed by Beijing Kexin Printing Co., Ltd.

Foreign Distributed by China National

Publishing Industry Trading Corporation

(CNPITC)

P.O.Box 782, Beijing 100011, China

目次

专论

1055 国家自然科学基金环境工程学科发展探讨

杨静

1063 地下水监测在污染场地管理中的重要作用、存在问题与对策建议

马杰

1068 医疗废物消毒集中处理工程技术规范修订思路及实施建议

张箐,程亮,冯钦忠,陈扬,于晓东,陈刚

废气生物处理技术应用专题

1074 城镇污水处理厂生物除臭技术的关键影响因素及案例分析

贾体沛,王灿,张亮,赵琪,彭永臻

1083 生物滴滤塔脱除污泥干化尾气中的 SO_2

丁炼,汤明亮,杨亮,李喜龙,杨帆,文明烜,梁莎,杨家宽

1094 生物转鼓工艺好氧同步处理工业废气中的 SO_2 和 NO_x

蔡鲁祥,沈家辰,黄梦霞,贯文瑶,毛芝娟,沙昊雷

1102 某 A^2/O 工艺污水处理厂恶臭气体处理设施性能评估

崔环宇,李若愚,齐飞,常江,赵珊,沈秀娥,孙德智

1111 活性污泥洗涤净化餐饮油烟 VOCs 及其生物降解过程

刘鸿泉,张桓,廖雷,覃爱苗,贾力强,周小斌,王洪强,魏建文

1123 闽南地区低温下复合填料强化生物滤柱除臭及微生物分析

谢嘉倩,辛晓东,洪俊明,李艳星

水污染防治

1133 Fe_3O_4 负载非晶态(碳酸)氧化锆复合材料对磷的吸附性能及机理

刘晨阳,王毅力,李小林,刘文芬

1145 TiO_2 纳米管阳极光电催化氧化次磷酸盐同时阴极回收金属铜

张娟娟,刘蕴晗,乔梦,赵旭

1154 原位铁氧化物载铁活性炭的制备及其对水中 $\text{As}(\text{III})$ 的去除性能

黄智研,郑俊,马雅倩,孔艳丽,马江雅,储航宇,丁磊,盛广宏,陈昊

1165 酸碱改性生物质炭-纳米零价铁增强六价铬去除的机理

龙颖,钱林波,李云桂,张文影,魏子斐,董欣竹,杨磊,武文培,

晏井春,陈梦舫

1175 高锰酸钾改性生物炭对水中噻虫胺吸附性能及机理

姜晶,黄晓月,白金龙,何岸飞,丁静,盛光遥

1186 $\text{Fe}^0/\text{Fe}_3\text{O}_4$ 复合材料同时去除水中多种重金属的效果

姜维,杨芳俐,吴永红,陈冠忠,陈红凤,唐次来

1199 CQDs/g- C_3N_4 的制备及其光催化降解四环素性能

赵岳,鲁雅梅,孙远博,冯威

1208 N- TiO_2/rGO 纳米材料可见光下催化降解微囊藻毒素-LR 的效果

张宇晨,陈俊伟,郑育毅,王菲凤

1218 PA/葱醌/PVDF 复合纳滤膜结构与性能及其应用

姜泽源,陶瑞,王军

1227 基于 CFD 的超薄平板膜 MBR 流态模拟及优化分析

吴欣岳,杨炼,岳佳妮,肖峰,高攀,刘国梁

1238 基于三维荧光光谱-平行因子分析法的工业园区污水溶解性有机

物溯源与归趋

梁月清,刘会来,崔康平,陈奕涵,郭志,陈星

大气污染防治

- 1248 钙基半干法燃煤烟气脱硫技术的影响因素
付瑞超,罗春欢,苏庆泉
- 1256 高性能铝基固态胺吸附剂的制备及其对 CO₂ 的吸附
沈雪华,李春艳,曲凡,陈黑锦,颜枫,张作泰
- 1265 以脱硫废水电解产物活性氯为氧化剂的湿法脱汞工艺
李潇祎,龙一飞,刘世念,赵宁,尹雅洁,胡将军

土壤污染防治

- 1272 原位热修复过程中土壤内热质传递研究现状与展望
詹明秀,刘立朋,顾海林,张涛,韦金义,徐旭,焦文涛,籍龙杰,
田汪洋,池作和
- 1284 电阻加热修复佳乐麝香污染土壤的工艺优化
杨顺美,焦文涛,刘峰,陈芒,王安宇,李焯楨,蒲生彦
- 1294 电子垃圾拆解区不同用地类型土壤重金属空间分布特征与风险评价
赵梓霖,王璋强,王锐,黄侯轩,郑家桐,石航源,肖荣波,卢桂宁,
黄飞

固体废物处理与资源化

- 1303 电解液循环对废手机线路板碱性矿浆电解回收的影响
梁倩,王继钦,陈奇奇,黄银,黄荣,周松山,陈梦君,舒建成,王蓉
- 1313 复合调理剂对废弃建筑泥浆脱水性能的影响
夏新星,陈文峰,王龙涛
- 1323 中试条件下稻秸干法厌氧发酵搅拌方式的优化
王晨,张敏,王振旗,王国良,钱晓雍,沈根祥,张心良,林天杰

环境生物技术

- 1331 温度变化对不同污泥形态厌氧氨氧化菌活性的影响
陈子玲,吕恺,彭党聪
- 1340 微纳米曝气对水库沉积物细菌及磷功能菌群落的影响
刘彩凤,余晨兴,苏玉萍,张太阳女,黄磊,林志蓉,陈文婷,林映津
- 1353 基于曝气方式控制的碳捕获预处理黑水部分亚硝化工艺
钱瑞波,江海鑫,刘世婷,文叶轩,黄伟平,唐贤春,陈洪斌
- 1363 基于异养-硫自养反硝化耦合技术的陶粒-硫磺混合生物填料对城市污水处理厂尾水的深度脱氮
史航,隆添翼,柳聪,吴圣凯,范遥,刘波
- 1373 活性污泥-生物膜一体化反应器对废水中苯酚的降解性能
潘宏,朱经纬,彭方,张天翼,罗艾虎,彭怡欣,宋慧婷
- 1381 染料类型对膜生物反应器性能的影响
许桃,刘鹏举,梁潇,杨旭,陈伟伟
- 1391 基于宏基因组学的亚硝酸盐氧化菌属的新陈代谢功能分析
常焕焕,杨昕怡,于雪,李晓强,王光杰,孙洪伟

相关研究

- 1400 负压排水真空便器冲水噪声的影响因素
韩彦召,程世昆,严巾堪,王天聪,闫政序,李子富

《环境工程学报》

第3届编辑委员会

指导委员会委员

曲久辉 郝吉明 张全兴
任南琪 侯立安 张远航
贺泓 张福锁 马军

主 编 刘俊新

副主编 王晓昌 崔福义 李金惠
高宝玉 刘会娟 王爱杰

编委(以姓氏笔画为序)

马军 王凯军 王洪臣 王跃思
仇荣亮 吕锡武 全燮 刘双江
刘勇弟 刘维屏 孙德智 李玉友
李爱民 杨敏 何强 何品晶
余刚 宋存义 张付申 张福锁
陈卫 陈少华 陈光浩 陈嘉平
季民 金波 周琪 单保庆
赵勇胜 郝晓地 俞汉青 党志
徐向阳 黄勇 曾光明 解跃峰

编委会秘书 张利田 金曙光

编辑部主任 张利田

副主任 郑晓梅

学术编辑 郑晓梅 靳炜
金曙光 曲娜

校对出版 靳炜

特邀编辑 王毅力 刘振刚
豆小敏 杨晓芳
宋冀营

终审终校 张利田

制 图 邵鑫

封面设计 松迪科技(北京)
有限公司

排 版 北京仁和汇智信息
技术有限公司

CONTENTS

- 1055 **The development of environmental engineering disciplinary in context of National Natural Science Foundation of China**
YANG Jing
- 1063 **Significance, problems and countermeasures of groundwater monitoring for contaminated site management**
MA Jie
- 1068 **Revision ideas and implementation suggestions on technical specifications for disinfection centralized treatment engineering of medical waste**
ZHANG Zheng, CHENG Liang, FENG Qinzhong, CHEN Yang, YU Xiaodong, CHEN Gang
- 1074 **Key influencing factors and case analysis of biological deodorization technology in urban wastewater treatment plants**
JIA Tipei, WANG Can, ZHANG Liang, ZHAO Qi, PENG Yongzhen
- 1083 **Removal of sulfur dioxide from exhaust gas of sludge drying by biotrickling filter tower**
DING Lian, TANG Mingliang, YANG Liang, LI Xilong, YANG Fan, WEN Mingxuan, LIANG Sha, YANG Jiakuan
- 1094 **Simultaneous treatment of SO₂ and NO_x in industrial waste gas by aerobic rotating drum biofilter**
CAI Luxiang, SHEN Jiachen, HUANG Mengxia, GUAN Wenyao, MAO Zhijuan, SHA Haolei
- 1102 **Performance evaluation of odor gas treatment facilities in A²O wastewater treatment plant**
CUI Huanyu, LI Ruoyu, QI Fei, CHANG Jiang, ZHAO Shan, SHEN Xiue, SUN Dezhi
- 1111 **Purification of VOCs in cooking fume by activated sludge washing and its biodegradation process**
LIU Hongquan, ZHANG Huan, LIAO Lei, QIN Aiming, JIA Liqiang, ZHOU Xiaobin, WANG Hongqiang, WEI Jianwen
- 1123 **Efficiency and microbial analysis of deodorization process of biofilter enhanced by composite filler under low temperature in Southern Fujian**
XIE Jiaqian, XIN Xiaodong, HONG Junming, LI Yanxing
- 1133 **Fe₃O₄ loaded amorphous zirconium (carbonate) oxides composite for phosphate adsorption: Performance, mechanism and treatment effect in real wastewater**
LIU Chenyang, WANG Yili, LI Xiaolin, LIU Wenfen
- 1145 **Photoelectrocatalytic oxidation of hypophosphite with TiO₂ nanotube arrays anode and simultaneous recovery of copper on the cathode**
ZHANG Juanjuan, LIU Yunhan, QIAO Meng, ZHAO Xu
- 1154 **Preparation of in situ iron oxides-loaded activated carbon and its performance on arsenite removal from water**
HUANG Zhiyan, ZHENG Jun, MA Yaqian, KONG Yanli, MA Jiangya, CHU Hangyu, DING Lei, SHENG Guanghong, CHEN Hao
- 1165 **Mechanism of enhanced removal of Cr(VI) by acid and alkali modified biochar-nanoscale zero-valent iron**
LONG Ying, QIAN Limbo, LI Yungui, ZHANG Wenyong, WEI Zifei, DONG Xinzhu, YANG Lei, WU Wenpei, YAN Jingchun, CHEN Mengfang
- 1175 **Adsorption of clothianidin by potassium permanganate modified biochar in aqueous solution**
JIANG Jing, HUANG Xiaoyue, BAI Jinlong, He Anfei, DING Jing, SHENG Guangyao
- 1186 **Simultaneous removal of multiple heavy metals from water using Fe⁰/Fe₃O₄ composite materials**
JIANG Wei, YANG Fangli, WU Yonghong, CHEN Guanzhong, CHEN Hongfeng, TANG Cilai
- 1199 **Synthesis of CQDs/g-C₃N₄ for visible light photocatalytic degradation of tetracycline**
ZHAO Yue, LU Yamei, SUN Yuanbo, FENG Wei
- 1208 **Visible-light photodegradation of Microcystin-LR by N-TiO₂/rGO nanomaterials**
ZHANG Yuchen, CHEN Junwei, ZHENG Yuyi, WANG Feifeng
- 1218 **Structure, properties and application of PA/Anthraquinone/ PVDF composite nanofiltration membrane**
JIANG Zeyuan, TAO Rui, WANG Jun
- 1227 **CFD based-flow pattern simulation and optimization analysis of ultra-thin flat membrane MBR**
WU Xinyue, YANG Lian, YUE Jiani, XIAO Feng, GAO Pan, LIU Guoliang
- 1238 **Tracing and regression of dissolved organic matter in wastewater from the industrial park based on 3D-fluorescence spectrum-parallel factor analysis**
LIANG Yueqing, LIU Huilai, CUI Kangping, CHEN Yihan, GUO Zhi, CHEN Xing
- 1248 **Influencing factors of coal-fired flue gas desulfurization by calcium-based semi-dry method**
FU Ruichao, LUO Chunhuan, SU Qingquan
- 1256 **Preparation and CO₂ adsorption of high-performance aluminum-based solid amine adsorbent**
SHEN Xuehua, LI Chunyan, QU Fan, CHEN Heijin, YAN Feng, ZHANG Zuotai
- 1265 **Experimental study on wet demercury removal by active chlorine electrolysis products in desulfurization wastewater**
LI Xiaoyi, LONG Yifei, LIU Shiniang, ZHAO Ning, YIN Yajie, HU Jiangjun
- 1272 **Recent advances and prospects of heat and mass transfer in soil during in-situ thermal remediation**
ZHAN Mingxiu, LIU Lipeng, GU Hailin, ZHANG Tao, WEI Jinyi, XU Xu, JIAO Wentao, JI Longjie, TIAN Wangyang, CHI Zuohe
- 1284 **Optimization of Response Surface Process for Remediation of Galaxolide Contaminated Soil by Electric Resistance Heating**
YANG Shunmei, JIAO Wentao, LIU Feng, CHEN Mang, WANG Anyu, LI Xuanzhen, PU Shengyan
- 1294 **Spatial distribution characteristics and risk assessment of heavy metals for different land-use types in electronic waste disposal area**
ZHAO Zilin, WANG Zhangqiang, WANG Rui, HUANG Yuxuan, ZHENG Jiatong, SHI Hangyuan, XIAO Rongbo, LU Guining, HUANG Fei
- 1303 **Influence of electrolyte circulation on recycling waste printed circuit boards of mobile phones by alkaline slurry electrolysis**
LIANG Qian, WANG Jiqin, CHEN Qiqi, HUANG Yin, HUANG Rong, ZHOU Songshan, CHEN Mengjun, SHU Jiancheng, WANG Rong
- 1313 **Effect of composite conditioner on dewatering performance of high alkaline construction slurry**
XIA Xinxing, CHEN Wenfeng, WANG Longtao
- 1323 **Optimization of stirring methods for rice straw dry anaerobic digestion under pilot test**
WANG Chen, ZHANG Min, WANG Zhenqi, WANG Guoliang, QIAN Xiaoyong, SHEN Genxiang, ZHANG Xinliang, LIN Tianjie
- 1331 **Effect of temperature change on anammox activities with different sludge morphology**
CHEN Ziling, LYU Kai, PENG Dangcong
- 1340 **Effects of micro-nanometer aeration on bacterial and phosphorus functional bacterial communities in reservoir sediments**
LIU Caifeng, SHE Chenxing, SU Yuping, ZHANG Taiyangnv, HUANG Lei, LIN Zhirong, CHEN Wenting, LIN Yingjin
- 1353 **Partial nitrification based on aeration control strategies for carbon-captured blackwater pretreatment**
QIAN Ruiibo, JIANG Haixin, LIU Shiting, WEN Yexuan, HUANG Weiping, TANG Xianchun, CHEN Hongbin
- 1363 **Deep nitrogen removal from urban wastewater by ceramsite-sulfur mixed biological fillers based on heterotrophy-sulfur autotrophic denitrification coupling technology**
SHI Hang, LONG Tianyi, LIU Cong, WU Shengkai, FAN Yao, LIU Bo
- 1373 **Degradation performance of phenol in wastewater by activated sludge - biofilm integrated reactor**
PAN Hong, ZHU Jingwei, PENG Fang, ZHANG Tianyi, LUO Aihu, PENG Xinyi, SONG Huiting
- 1381 **Influence of dye type on the performance of membrane bioreactor**
XU Tao, LIU Pengju, LIANG Xiao, YANG Xu, CHEN Weiwei
- 1391 **Metabolic function analysis of nitrite oxidizing bacteria based on metagenomics**
CHANG Huanhuan, YANG Xinyi, YU Xue, LI Xiaoqiang, WANG Guanjie, SUN Hongwei
- 1400 **Influencing factors of flushing noise of vacuum toilet with negative pressure drainage**
HAN Yanzhao, CHENG Shikun, YAN Jinkan, WANG Tiancong, YAN Zhengxu, LI Zifu