



化工进展

Chemical Industry and Engineering Progress

2020
第39卷
EI收录期刊

4

ATW 安特威
助您安心享受美好生活

蝶片式三偏心蝶阀

蝶片厚度0.5~0.8mm，才是好蝶阀

- 双向密封、零泄漏
- 大于1000000次开关寿命
- 是频繁开关长寿命蝶阀的理想选择

助您安心享受美好生活

0.5~0.8mm蝶片厚度

深冷蝶阀 全金属三偏心蝶阀 高温蝶阀

扫码获取更多产品案例



主办



中国化工学会



化学工业出版社有限公司



目 次

特约评述

- 笼型水合物膜分离和捕获二氧化碳研究进展 樊栓狮, 尤莎莉, 郎雪梅, 王燕鸿, 李文涛, 刘元直, 周政(1211)

化工过程与装备

- 高密度流体声速测量中脉冲回波传播时间的测定 张凯, 武多多, 刘强, 彭越, 杨震, 段远源(1219)
超亲水毛细芯环路热管启动及热性能分析 郭浩, 纪献兵, 周儒鸿, 彭家略, 徐进良(1227)
多蒸发器低温回路热管的运行特性 鲁得浦, 谢荣建, 文佳佳(1235)
气液喷射器的结构设计与性能分析 何磊, 苏毅, 揭涛, 梁健, 唐昭帆, 杨冰冰, 张世程(1245)
 CO_2 跨临界热泵系统特性再分析 胡余生, 刘雪涛, 李敏霞, 徐嘉, 李昱翰(1252)
单相自然循环回路的强化对流传热特性 曾龙, 雷海燕, 戴传山(1259)
基于多元统计方法的过程单元缓变故障识别 马方圆, 林德溪, 许明阳, 王璟德, 孙巍(1267)
正弦波纹挡板式沉降器内流动特性 张玉辉, 龚斌, 王学平, 张静, 吴剑华(1273)
低速横流作用下液体射流初次破碎实验 兰天, 孔令真, 陈家庆, 王奎升(1282)

能源加工与技术

- 生物质燃烧和热解中钾的释放规律研究进展 王洋, 董长青(1292)
生物炭催化生物质热化学转化利用的研究进展 毛俏婷, 胡俊豪, 姚丁丁, 杨海平, 陈汉平(1302)
矿物基化学吸附储热技术的研究进展 苗琪, 张叶龙, 贾旭, 金翼, 谈玲华, 丁玉龙(1308)
 β -环糊精协同乙烯基咪唑离子液体脱除溶剂油中的萘 李恩田, 徐洋, 姚培, 朱媛媛, 张怿涵, 朱霞石(1321)
基于熵权-层次分析法的中国现代煤化工行业可持续发展综合评价 李俊杰, 程婉静, 梁媚, 严晓辉, 杨靖东, 张岳玲, 冯连勇, 田亚峻, 谢克昌(1329)
蜡油加氢脱硫集总动力学模型研究 朱永红, 霍鹏举, 杨天华, 李伟, 韩磊, 杨程(1339)
间歇流条件下二氧化碳水合物生成诱导特性 何骋远, 周诗崇, 秦天成, 张文文, 吕晓方, 王树立, 姬浩洋(1348)

工业催化

- $\text{Ni}-\text{CeO}_2-\text{K}/\gamma-\text{Al}_2\text{O}_3$ 催化剂上沼气联合重整制合成气 盖希坤, 杨丹, 吕鹏, 邢闯, 吕成学, 杨瑞芹(1357)
水热处理和钨添加对低钒催化剂高温脱硝性能的影响 刘雪松, 汪澜, 房晶瑞, 陈洪锋, 潘驰(1363)
燃煤烟气低温 NH_3 -SCR 脱硝工艺中试 郭林, 任景行, 赵勇刚, 孔伟, 董林, 曹鹏(1371)

材料科学与技术

- 复合调湿材料的研究现状及最新进展 郑旭, 袁丽婷(1378)
表面修饰GO改性无胺型水性聚氨酯-丙烯酸酯乳液制备与性能 赖小娟, 张引引, 刘佳慧, 王磊(1389)
低黏吸附型酸化缓速剂的合成及性能评价 叶正荣, 全红平, 裘智超, 路强英, 王睿, 蒋庆英, 伊然(1396)
基于机械力化学作用制备荧光纳米纤维素 张松华, 熊明诚, 王梓, 林凤采, 王婷, 林咏梅, 黄彪(1405)
 Ag 掺杂 Ti/PbO_2 电极的制备及其在苯酚降解中的应用 张君泽, 王红宁, 陈若愚(1414)

- 磁性石墨烯/聚氨酯柔性复合材料的制备及自修复效能 武思蕊, 李斌, 赵梁成, 李仲明(1422)
改性SiO₂杂化层相变微胶囊的制备与表征 王鑫, 方建华, 吴江, 刘坪, 冯彦寒, 刘娜, 林旺(1431)
纳米羟基磷灰石增强聚己内酯/明胶纤维膜的制备及其性能 任欣, 金蜀鄂, 李玉宝, 李吉东(1439)

生物与医药化工

- 喹诺酮类药物印迹仿生抗体的研制及应用进展 杜晓芳, 李兆周, 陈秀金, 王耀, 高红丽, 李道敏, 任国艳, 吕璞(1447)
肌酐酶在枯草芽孢杆菌中的异源表达及分泌机制 陶政宇, 付刚, 闻建平, 张大伟(1458)

精细化工

- 多乙烯多胺桥联受阻酚类抗氧剂的合成及其清除DPPH·性能 李翠勤, 李杨, 郭苏月, 高宇新, 李锋(1469)
含油污泥化学热洗的药剂配方及工艺优化 黄朝琦, 秦志文, 尚绪敏, 侯影飞(1478)

资源与环境化工

- 二噁英生成抑制剂及其阻滞机理研究现状与展望 章骅, 杨瑞, 邵立明, 何品晶(1485)
改性柱撑黏土用于烟气脱硝的研究进展 杨建成, 张芹, 沈伯雄, 袁世磊, 王诗宁(1493)
水体中微塑料的环境影响行为研究进展 王琼杰, 张勇, 陈雨, 汪金晓雪, 汪贻妹(1500)
我国剩余污泥厌氧转化的主要影响因素及影响机制研究进展 陈思思, 杨殿海, 庞维海, 董滨, 戴晓虎(1511)
生物炭持久性自由基形成机制及环境应用研究进展 唐正, 赵松, 钱雅洁, 薛罡, 贾汉忠, 高品(1521)
土壤中环境持久性自由基的形成与稳定及其影响因素 张若瑄, 王朋, 张绪超, 段文焱(1528)
污泥生物炭中氮硫行为及环境效应研究进展 王彦, 左宁, 姜媛媛, 陈芳媛(1539)
糠醛渣木质素/聚乙烯亚胺微球的制备 朱春山, 毛正鑫, 高琳(1550)
改性高岭土捕集CdCl₂、PbCl₂蒸气 樊聪慧, 黄亚继, 夏志鹏, 查键锐, 于梦竹, 丁守一, 胡华军, 戚二兵(1558)
不同pH环境下CMS改性纳米铁在异质多孔介质中的迁移 王祎啸, 张永祥, 井琦, 黄雪征, 田振军(1567)
二氧化碳联合核桃壳提取液促进单针藻 *Monoraphidium sp.* QLZ-3 的生长和油脂积累
..... 邢海亮, 董训赞, 韩本勇, 耿树香, 宁德鲁, 马婷, 余旭亚(1575)
自养硝化颗粒污泥吸附铜离子性能及吸附等温线 张斌超, 曾敏静, 张立楠, 王洪欣, 曾玉, 黄思浓, 吴俊峰, 程媛媛, 龙培(1583)
低强度超声波对短程硝化污泥的影响 任黎晔, 朱易春, 张光明, 连军锋, 章璋, 李鑫, 黄书昌, 田帅, 袁佳彬(1591)

化工园区

- 考虑时变风险的成品油二次配送路径优化 韦金银, 郭琪, 史彬, 鄢烈祥(1597)

信息交流

学生社团对高校大学生发展的促进研究(文后1);中国高校多声部民歌教育的理论与体系研究(文后2);新形势下高校教育管理学发展新思路(文后3);地域美术资源对广西高校艺术设计教学的影响研究(文后4);创新人才培养背景下提升大学生岗位胜任力的系统论证(文后5);非遗视角下的高校博物馆文创理论体系建构研究(文后6);时势下的大学生社团建设工作中的桎梏与突破(文后7);新时代高校推进全面从严治党的经验总结和创新探索(文后8、9)

责任编辑：郑宇印

英文顾问：郭梅芳，李保庆，龙秉文，王运东

Contents

Invited review

Separation and capture carbon dioxide by clathrate–hydrate membranes: a review

.....FAN Shuansi, YOU Shali, LANG Xuemei, WANG Yanhong, LI Wentao, LIU Yuanzhi, ZHOU Zheng (1211)

Chemical processes and equipment

Determination of time of flight of pulse–echo burst for sound speed measurement in high density fluids

.....ZHANG Kai, WU Duoduo, LIU Qiang, PENG Yue, YANG Zhen, DUAN Yuanyuan (1219)

Analysis of start–up and thermal performance of super–hydrophilic porous wick loop heat pipe

.....GUO Hao, JI Xianbing, ZHOU Ruhong, PENG Jialie, XU Jinliang (1227)

Operating characteristics of multi–evaporator cryogenic loop heat pipe

.....LU Depu, XIE Rongjian, WEN Jiajia (1235)

Structural design and performance analysis of gas–liquid ejector

.....HE Lei, SU Yi, JIE Tao, LIANG Jian, TANG Zhaofan, YANG Bingbing, ZHANG Shicheng (1245)

Reanalysis of characteristics of CO₂ transcritical heat pump system

.....HU Yusheng, LIU Xuetao, LI Minxia, XU Jia, LI Yuhan (1252)

Heat transfer performance of a convection–enhanced heat transfer element—single–phase natural circulation loop

.....ZENG Long, LEI Haiyan, DAI Chuanshan (1259)

Early identification of small shift in process unit based on multivariate statistical method

.....MA Fangyuan, LIN Dexi, XU Mingyang, WANG Jingde, SUN Wei (1267)

Flow field characteristics in sinusoidal corrugated baffle settler

.....ZHANG Yuhui, GONG Bin, WANG Xueping, ZHANG Jing, WU Jianhua (1273)

Experimental studies on primary breakup of liquid jets injected into low–speed air crossflow

.....LAN Tian, KONG Lingzhen, CHEN Jiaqing, WANG Kuisheng (1282)

Energy processes and technology

Release of K during biomass combustion and pyrolysis: a review

.....WANG Yang, DONG Changqing (1292)

Biochar for thermo–chemical conversion of biomass: a review

.....MAO Qiaoting, HU Junhao, YAO Dingding, YANG Haiping, CHEN Hanping (1302)

Research progress of mineral–based chemical adsorption heat storage technology

.....MIAO Qi, ZHANG Yelong, JIA Xu, JIN Yi, TAN Linghua, DING Yulong (1308)

Remove naphthalene from solvent oil by vinyl imidazole ionic liquid and β–cyclodextrin

.....LI Entian, XU Yang, YAO Pei, ZHU Yuanyuan, ZHANG Yihan, ZHU Xiashi (1321)

Comprehensive evaluation on sustainable development of China's advanced coal to chemicals industry based on EWM–AHP

.....LI Junjie, CHENG Wanjing, LIANG Mei, YAN Xiaohui, YANG Jingdong, ZHANG Yueling, FENG Lianyong, TIAN Yajun, XIE Kechang (1329)

Lumped kinetic models for VGO hydrodesulfurization

.....ZHU Yonghong, HUO Pengju, YANG Tianhua, LI Wei, HAN Lei, YANG Cheng (1339)

Induction characteristics of carbon dioxide hydrate formation under intermittent flow

.....HE Chengyuan, ZHOU Shidong, QIN Tiancheng, ZHANG Wenwen, LÜ Xiaofang, WANG Shuli, JI Haoyang (1348)

Industrial catalysis

Mixed–reforming of biogas to syngas over the Ni–CeO₂–K/γ–Al₂O₃ catalyst

.....GAI Xikun, YANG Dan, LÜ Peng, XING Chuang, LÜ Chengxue, YANG Ruiqin (1357)

Synergistic effects of hydrothermal aging and tungsten addition on the high–temperature SCR performance of low vanadium catalysts

.....LIU Xuesong, WANG Lan, FANG Jingrui, CHEN Hongfeng, PAN Chi (1363)

Pilot test on low temperature NH₃–SCR denitrification of coal–fired flue gas

.....GUO Lin, REN Jinghang, ZHAO Yonggang, KONG Wei, DONG Lin, CAO Peng (1371)

Materials science and technology

Recent progress on composite humidity control materials

.....ZHENG Xu, YUAN Liting (1378)

Preparation and properties of surface modified GO modified amine–free waterborne polyurethane–acrylate emulsion

.....LAI Xiaojuan, ZHANG Yinyin, LIU Jiahui, WANG Lei (1389)

Synthesis and characterization of low viscosity adsorption acid retarder	.....<i>YE Zhengrong, QUAN Hongping, QIU Zhichao, LU Qiangying, WANG Rui, JIANG Qingying, YI Ran</i> (1396)
Preparation of fluorescent cellulose nanocrystals based on mechanical force chemical effect	.....<i>ZHANG Songhua, XIONG Mingcheng, WANG Zi, LIN Fengcai, WANG Ting, LIN Yongmei, HUANG Biao</i> (1405)
Preparation of silver doped Ti/PbO₂ electrode and its application in phenol degradation	.....<i>ZHANG Junze, WANG Hongning, CHEN Ruoyu</i> (1414)
Preparation and self-repairing efficiency of magnetic graphene/polyurethane flexible composites	.....<i>WU Sirui, LI Bin, ZHAO Liangcheng, LI Zhongming</i> (1422)
Preparation and characterization of SiO₂ hybrid phase change microcapsules	.....<i>WANG Xin, FANG Jianhua, WU Jiang, LIU Ping, FENG Yanhan, LIU Na, LIN Wang</i> (1431)
Preparation and performance of nano-hydroxyapatite reinforced polycaprolactone/gelatin fibrous membrane for guided tissue regeneration	.....<i>REN Xin, JIN Shu'e, LI Yubao, LI Jidong</i> (1439)

Biochemical and pharmaceutical engineering

Development and application progress of quinolone imprinted biomimetic antibody	.....<i>DU Xiaofang, LI Zhaozhou, CHEN Xiujin, WANG Yao, GAO Hongli, LI Daomin, REN Guoyan, LÜ Pu</i> (1447)
Secretion exploration and heterologous expression of creatininase in <i>Bacillus subtilis</i>	.....<i>TAO Zhengyu, FU Gang, WEN Jianping, ZHANG Dawei</i> (1458)

Fine chemicals

Synthesis and antioxidant activity of polyethylene polyamine bridged hindered phenolic antioxidants	.....<i>LI Cuiqin, LI Yang, GUO Suyue, GAO Yuxin, LI Feng</i> (1469)
Formulation and process optimization of chemical thermal washing of oily sludge	.....<i>HUANG Zhaoqi, QIN Zhiwen, SHANG Xumin, HOU Yingfei</i> (1478)

Resources and environmental engineering

Progresses in the inhibitors for suppressing <i>de novo</i> formation of PCDD/Fs: a review	.....<i>ZHANG Hua, YANG Rui, SHAO Liming, HE Pinjing</i> (1485)
Review on denitrification mechanism of modified pillared clays	.....<i>YANG Jiancheng, ZHANG Qin, SHEN Boxiong, YUAN Shilei, WANG Shining</i> (1493)
Research progress on environmental influence behavior of microplastics in water	.....<i>WANG Qiongjie, ZHANG Yong, CHEN Yu, WANG Jinxiaoxue, WANG Yimei</i> (1500)
Main influencing factors and mechanisms of anaerobic transformation of excess sludge in China	.....<i>CHEN Sisi, YANG Dianhai, PANG Weihai, DONG Bin, DAI Xiaohu</i> (1511)
Formation mechanisms and environmental applications of persistent free radicals in biochar: a review	.....<i>TANG Zheng, ZHAO Song, QIAN Yajie, XUE Gang, JIA Hanzhong, GAO Pin</i> (1521)
Formation, stability and influencing factors of environmentally persistent free radicals in soil: a review	.....<i>ZHANG Ruoxuan, WANG Peng, ZHANG Xuchao, DUAN Wenyan</i> (1528)
Behavior and environmental effects of nitrogen and sulfur in sludge biochar	.....<i>WANG Yan, ZUO Ning, JIANG Yuanyuan, CHEN Fangyuan</i> (1539)
Preparation of furfural residue lignin/polylethyleneimine microspheres	.....<i>ZHU Chunshan, MAO Zhengxin, GAO Lin</i> (1550)
Adsorption capacity of modified kaolin for gaseous CdCl₂ and PbCl₂	.....<i>FAN Conghui, HUANG Yaji, XIA Zhipeng, ZHA Jianrui, YU Mengzhu, DING Shouyi, HU Huajun, QI Erbing</i> (1558)
Transport of CMS modified nano-iron in heterogeneous porous media under different pH environments	.....<i>WANG Yixiao, ZHANG Yongxiang, JING Qi, HUANG Xuezhang, TIAN Zhenjun</i> (1567)
Cell growth and lipid accumulation of <i>Monoraphidium</i> sp. QLZ-3 in walnut shell extracts with carbon dioxide	.....<i>XING Hailiang, DONG Xunzan, HAN Benyong, GENG Shuxiang, NING Delu, MA Ting, YU Xuya</i> (1575)
Adsorption of Cu²⁺ by autotrophic nitrifying granular sludge and its adsorption isotherm	.....<i>ZHANG Binchao, ZENG Minjing, ZHANG Linan, WANG Hongxin, ZENG Yu, HUANG Sinong, WU Junfeng, CHENG Yuanyuan, LONG Bei</i> (1583)
Effect of low-intensity ultrasonic on partial nitrification sludge	.....<i>REN Liye, ZHU Yichun, ZHANG Guangming, LIAN Junfeng, ZHANG Zhang, LI Xin, HUANG Shuchang, TIAN Shuai, YUAN Jiabin</i> (1591)

Chemical industry park

Route optimizing on secondary distribution of refined oil considering time-dependent risk <i>WEI Jinyin, GUO Qi, SHI Bin, YAN Liexiang</i> (1597)
--	---

Executive Editor: ZHENG Yuyin

English Consultant: GUO Meifang, LI Baoqing, LONG Bingwen, WANG Yundong