

- 《中国学术期刊综合评价数据库》统计源刊
- 《中国期刊全文数据库》全文收录期刊
- 《中国核心期刊(遴选)数据库》全文收录期刊

- 美国《化学文摘》(CA)重点收录期刊
- 全国石油和化工行业优秀期刊
- 广东省、广州市优秀科技期刊

ISSN 1001 - 9677

CN44 - 1228/TQ

第 11 期  
2018年6月  
(上半月)  
第 46 卷



广州化工期刊微信订阅号

# 广州化工

GUANGZHOU CHEMICAL INDUSTRY

广州化工研究设计院

广州市化工行业协会

广州市化学化工学会



## 梧州黄埔化工药业有限公司

### 蒎烯

本品是合成樟脑的中间体，也可广泛用于合成香精香料。

### 合成右旋龙脑

有开窍醒神清热止痛的作用，用于喉痹齿痛、口疮痛、目赤等的治疗，是众多中成药的重要配剂。

### 蒎烯

用于合成樟脑、冰片合成香料的原料，也用于合成蒎烯树脂和维生素E。

### 樟脑(合成)

批准文号：国药准字 H44024876  
执行标准：《中国药典》2015年版二部

### 樟脑(合成)

用作医药原料，是皮肤刺激药、樟脑磺酸钠、膏贴类、呼吸系统化痰镇咳类用药等的主要原料。

### 白雪牌 冰片(合成龙脑)

批准文号：国药准字 Z44023868

执行标准：《中国药典》2015年版一部

### 冰片(合成龙脑)

用于治疗中风痰厥、口疮、咽喉肿痛、耳道流脓等症状，冰片还是良好的食品、日常护理品和香精香料的原料。

地址：广西梧州市万秀区梧松路1号（扶典）

电话：0774-2063283

网址：<http://www.wzhphg.com>



# 广州化工

## GUANGZHOU HUAGONG

《中国学术期刊综合评价数据库》统计源刊  
《中国核心期刊(遴选)数据库》全文收录期刊

《中国期刊全文数据库》全文收录期刊  
高、中级化工职称资格评审认定期刊

1973年创刊(半月刊)

第46卷第11期

2018年6月(上半月)

主管:广州化工集团有限公司

主办:广州化工研究设计院

广州市化工行业协会

协办:广州市化学化工学会

编辑出版:《广州化工》编辑部

主编:吴文莉

副主编:林碧颖

编辑:刘倩婷、何启宏

广告:茅仁旭

地址:广州市白云区石井镇联和路2号

万力创新园D座

邮 码:510425

电 话:(020)36372165

邮 箱:gzhgbj@vip.126.com

网 址:http://www.gzhgbj.cn

印 刷:南方医科大学广州广卫印刷厂

发行范围:国内外公开发行

国外发行:中国出版对外贸易总公司

(北京782信箱)

国际标准刊号:ISSN1001-9677

国内统一刊号:CN44-1228/TQ

广告经营许可证:穗工商广字4401004002668号

出版物经营许可证:新出发粤刊总批字第226号

收款单位:广州化工研究设计院

开户银行:广州市工商银行石井支行

帐 号:3602025309000823574

国内定价:13.00元/期 全年295.00元(共24期)

### 第八届编委会成员名单

主任:崔英德

副主任:叶家灿 白 莉

秘书长:张 统

委员:(排名不分先后)

钱 宇 童叶翔 余 林 王乐夫 何榕友

杨育农 马小明 郑 成 麦堪成 彭 峰

赵建青 尹国强 刘自力 李大光 杨定乔

黄道平 李攻科 刘国光 陈国华 董新法

方岩雄 刘晓国 李雪辉 陈旭东 李锡安

梁基照 熊 亚 曾庆焕 罗国钦 余慧文

万方数据

# 目 次

## 特 稿

原油价格暴涨,化工产品交易价格大多小幅回落 ..... (1)

甲苯/二甲苯:一周内市场行情大幅暴涨,为此是否埋下隐患  
..... (3)

## 专论与综述

煤基双电层电容器电极材料研究现状 .....  
..... 侯彩霞,郭秉霖,樊丽华,孔碧华(4)

重复压裂用转向剂的研究及应用进展 ..... 李 锐,余维初(7)

污泥中重金属固化-稳定化技术进展 .....  
..... 程梦杰,徐丽华,严 明(11)

全透明皂制备方法浅析与展望 ..... 缙卫军,缙奕显(14)

## 科学实验

新型抗心衰化合物的合成及稳定性研究 .....  
..... 刘静怡,惠人杰,冯柏年(17)

磺化碳催化合成环己酮缩乙二醇系列缩酮 .....  
..... 刘 征,施芝香,白鹏飞,李中燕,袁 霖(20)

膦酸酯修饰的多壁碳纳米管的制备与表征 .....  
..... 史翔宇,苏 凯,唐茂伟,吴姗姗(23)

TiO<sub>2</sub>纳米管石墨烯凝胶吸附酸性大红热力学研究 .....  
..... 危 唯,孙新鹏,常城城,潘 银,张长飞,郑 凯(25)

酸性硅溶胶的制备及稳定性影响因素研究 .....  
..... 徐佳伟,梅光军,于明明,程 潜(29)

双醋瑞因微乳凝胶的制备及性质考察 .....  
..... 叶剑尔,叶丹玲,楼天灵(33)

β-环糊精修饰纳米聚合物微球的制备 .....  
..... 熊迅宇,王 旭,张 旭,李晓迪,赵 进,演 康(36)

多单体熔融接枝丁苯橡胶性能的研究 .....	赵红磊(38)
乙醇脱水 3A 分子筛吸附剂吸附性能的研究 .....	徐春玲,方世东,钱焕江(41)
氯化氢氧化反应流化床过程强化 .....	王兵威(44)
百香果籽油提取条件优化及其抗氧化活性的研究 .....	伍玉春,何世强,陈显玲,苏 龙(47)
利用水热法模拟建材孔隙液中 $\text{Na}^+$ 的固定化研究 .....	钟 晨(50)
皂土处理及其对染料脱色和重金属脱除的效果研究 .....	徐景峰(52)
废弃混凝土再生粉的胶凝性试验研究 .....	邓洪刚,吴福飞,赵 鹏,贾 敏,陈荣妃(55)
曝气方式对微生物燃料电池脱氮和产电性能的影响 .....	王秋辰,徐苏云,王重阳(58)
废水中富马酸的萃取研究 .....	费丽均,李盛姬(61)
环氧丙烷在 $\text{Li}_3\text{PO}_4(001)$ 表面吸附的密度泛函(DFT)研究 .....	王东宇,李智姍,张继海,马卫华(64)
POSS/PU-PS 的合成表征与热性能研究 .....	朱国军,梁士钰,丁伟良(68)

## 分析测试

两种方法测定地表水中叶绿素 a 的比较 .....	康 琦(71)
气相色谱法测定蕲艾移栽品中桉油精的含量 .....	龚 军,魏 来,任旻琼,张茂美,熊立春,朱贵珍(74)
微波干燥法快速测定无机磷化工产品水不溶物 .....	李 红,肖清燕,杜建侠,万晓璐,余晓英(77)
手持式 X 荧光分析仪分析不锈钢中 Cr、Ni、Mn 的不确定度评定 .....	王翠翠,郭 丹,郑会清,梁永涛(80)

## 环境保护

2016-2017 年练江水质变化趋势分析 .....	纪楷滨(82)
典型洗涤剂厂表层土壤污染特征分析 .....	杨玉洁,项 玮(84)
标准样品在环境监测中的管理及其应用中的问题分析 .....	高斌雄(87)

## 化工机械

浅谈 MTO 装置水洗-急冷塔平面布置及管道设计 .....	郑伟杰(89)
--------------------------------	---------

## 生产技术

渤海区域海洋采油平台高含水开发期的“水”问题 .....	王丽梅(91)
国内丙烯腈行业废水焚烧现状与重要性分析 .....	姜其舟(93)

## 教学园地

- 基于正交法创新化学实验的教学实践及探索 ..... 赵梦菲,丁沁文,张莲姬,权 波(95)
- 从熵的角度理解凝固点降低值大于沸点升高值 ..... 刘翔宇,梁 斌,杨 锐,倪 刚,宋伟明(98)
- 增加反应物的量对理想气体反应平衡移动的影响 ..... 戴 可,梁 华(101)
- 在物理化学教学中对化学热力学部分的几点理解 ..... 王建芳,杨和平,周春生,徐 杰,孙 楠(103)
- 基于结构的启发式教学在药物化学教学中的应用 ..... 金晓董,徐 杲(106)
- 应用型大学环境监测类实验课程体系研究 ..... 孔庆娜,姚 俊,宗恩敏,章志成,钱 易(109)
- 提高材料化学专业本科生毕业设计质量的方法探究 ..... 赵小军,蔡圳阳,肖来荣,陈志永,李 刚(112)
- 包装工程专业《材料科学基础》教学设计与实践 ..... 李中波,李倩文,梁 婷(115)
- “微时代”环境下提高制药专业教学效果的探索 ..... 刘建芳,郑卫平,齐彤辉(117)
- 高职药品生产技术专业《有机化学》教学改革初探 ..... 桑姝丽(119)
- 环境工程学科工程案例教学改革探究 ..... 唐晓旻,傅 敏,谭雪梅,贺有周(121)
- 应用型本科专业化工设备机械基础教学改革 ..... 王金龙,朱立刚(123)
- 非化学专业《大学化学》课堂教学方式探索与实践 ..... 吴青芸,韩 磊(125)
- 浅析高校物理化学实验室各资源的充分利用 ..... 陈凤贵,孙交通(128)
- 化学实验教学改革与创新人才培养 ..... 李仕辉,赵 艳,张永花(130)
- 浅谈应用化学专业实验的教学改革 ..... 蒋丽娟(132)
- 高校实验室队伍建设探索与思考 ..... 王吉林,吉钰纯,郑国源,胡长征(135)
- 赛事驱动教学法在化学实验实践教学中的应用 ..... 赵 刚,顾佳丽(138)
- 浅析高职化学实验教学中存在的问题及改革路径 ..... 吴军伟,赵俊松,钟先锦,仰玲玲(140)
- 混合式教学在无机化学课程中的探索 ..... 范文娟,常 会,马光强,邓 俊,尹海英(142)
- 发挥教师的主导作用和学生的主体作用 ..... 陈双莉(144)
- 新工科背景下地方高校化工专业实践教学体系改革与实践探讨 .....  
..... 龙华丽,刘建文,杨世芳,曾 嵘,王治国(147)
- 培养建材行业应用型人才的教学研究 ..... 王永刚,杨琳琳,石 磊(149)

## 化工信息

- 市场趋向 ..... (151)
- 产品开发 ..... (151)
- 配方精选与方数据 ..... (152)



# CONTENTS

Coal-based Activated Carbon Electrode for Double-layer Capacitor .....	.....
.....	<i>HOU Cai-xia, GUO Bing-lin, FAN Li-hua, KONG Bi-hua</i> (4)
Progress on Research and Application of Temporary Diverting Agent for Refracturing .....	<i>LI Rui, YU Wei-chu</i> (7)
Research Progress on Solidification-Stabilization of Heavy Metals in Sewage Sludge .....	.....
.....	<i>CHENG Meng-jie, XU Li-hua, YAN Ming</i> (11)
Analysis and Prospect on Preparation of Transparent Soap .....	<i>GOU Wei-jun, GOU Yi-xian</i> (14)
Synthesis of A Novel Anti-Heart Failure Compounds and Study on Its Stability .....	.....
.....	<i>LIU Jing-yi, HUI Ren-jie, FENG Bai-nian</i> (17)
Synthesis of 1,4-dioxaspiro[4.5]decane Catalyzed by Sulfonated Carbon .....	.....
.....	<i>LIU Zheng, SHI Zhi-xiang, BAI Peng-fei, LI Zhong-yan, YUAN Lin</i> (20)
Preparation and Characterization of Multi-walled Carbon Nanotubes Modified by Phosphonate .....	.....
.....	<i>SHI Xiang-yu, SU Kai, TANG Mao-wei, WU Shan-shan</i> (23)
Thermodynamic Study on Adsorption of Acid Scarlet Graphene Hydrogel with Titanium Nanotube .....	.....
.....	<i>WEI Wei, SUN Xin-peng, CHANG Cheng-cheng, PAN Yin, ZHANG Chang-fei, ZHENG Kai</i> (25)
Study on Preparation and Stability of Acidic Silica Sol .....	.....
.....	<i>XU Jia-wei, MEI Guang-jun, YU Ming-ming, CHENG Qian</i> (29)
Study on Preparation and Properties of Diacerein Microemulsion-based Gel .....	.....
.....	<i>YE Jian-er, YE Dan-ling, LOU Tian-ling</i> (33)
Preparation of Nanoscale Polymer Microspheres Modified by Beta Cyclodextrin .....	.....
.....	<i>XIONG Xun-yu, WANG Xu, ZHANG Xu, LI Xiao-di, ZHAO Jin, YAN Kang</i> (36)
Study on Properties of SBR-g-(GMA-co-St) Prepared by Multi-monomers Melt Grafting .....	.....
.....	<i>ZHAO Hong-lei</i> (38)
Study on Adsorption Performance of Ethanol Dehydration by 3A Molecular Sieve Adsorbent .....	.....
.....	<i>XU Chun-ling, FANG Shi-dong, QIAN Huan-jiang</i> (41)
Process Intensification of Hydrogen Chloride Oxidation .....	<i>WANG Bing-wei</i> (44)
Optimization of Extraction Conditions of Passion Fruit Seed Oil and Antioxidant Capacity of the Oil .....	.....
.....	<i>WU Yu-chun, HE Shi-qiang, CHEN Xian-ling, SU Long</i> (47)
Study on Immobilization of Na <sup>+</sup> in Pore Fluid of Building Materials by Hydro-thermal Method .....	.....
.....	<i>ZHONG Chen</i> (50)
Study on Bentonite Treatment and Its Effect of Decolorization on Dyes and Removal on Heavy Metals .....	.....
.....	<i>XU Jing-feng</i> (52)
Experimental Study on Cementation of Recycled Waste Concrete Powder .....	.....
.....	<i>DENG Hong-gang, WU Fu-fei, ZHAO Peng, JIA Min, CHEN Rong-fei</i> (55)
Effect of Aeration Modes on Microbial Fuel Cells for Nitrogen Removal and Electricity Generation .....	.....
.....	<i>万方数据</i> ..... <i>WANG Qiu-chen, XU Su-yun, WANG Chong-yang</i> (58)



Extraction of Fumaric Acid in Wastewater .....	<i>FEI Li-jun, LI Sheng-ji</i> (61)
Density Functional Theory (DFT) Study on Adsorption of Propylene Oxide on $\text{Li}_3\text{PO}_4(001)$ Surface .....	<i>WANG Dong-yu, LI Zhi-shan, ZHANG Ji-hai, MA Wei-hua</i> (64)
Synthesis and Characterization of POSS/PU-PS and Study on Its Thermal Property .....	<i>ZHU Guo-jun, LIANG Shi-yu, DING Wei-liang</i> (68)
Comparison of Determination for Chlorophyll a in Surface Water between Two Methods .....	<i>KANG Qi</i> (71)
Determination of Content of Eucalyptol in <i>Artemisia argyi</i> Transplant by Gas Chromatography .....	<i>GONG Jun, WEI Lai, REN Min-qiong, ZHANG Mao-mei, XIONG Li-chun, ZHU Gui-zhen</i> (74)
Determination of Water Insoluble Substance in Inorganic Phosphorus Chemical Product by Microwave Drying Method .....	<i>LI Hong, XIAO Qing-yan, DU Jian-xia, WAN Xiao-lu, YU Xiao-ying</i> (77)
Uncertainty Evaluation of Cr, Ni and Mn in Stainless Steel by Handheld X-ray Fluorescence Analyzer .....	<i>WANG Cui-cui, GUO Dan, ZHENG Hui-qing, LIANG Yong-tao</i> (80)
Analysis on Trend of Water Quality Variation of Lianjiang River in 2016-2017 .....	<i>JI Kai-bin</i> (82)
Pollution Characteristics of Surface Soil in A Typical Detergent Factory .....	<i>YANG Yu-jie, XIANG Wei</i> (84)
Management of Standard Samples in Environmental Monitoring and Problems Analysis in Its Application .....	<i>GAO Bin-xiong</i> (87)
Discussion on Layout and Pipeline Design of Water Scrubbing Tower in MTO Device .....	<i>ZHENG Wei-jie</i> (89)
“Water” Problem of Bohai Gulf Offshore Oil Platform during High Water-cut Stage .....	<i>WANG Li-mei</i> (91)
Status and Importance of Wastewater Incineration in Domestic Acrylonitrile Industry .....	<i>JIANG Qi-zhou</i> (93)
Teaching Practice and Exploration of Innovative Chemical Experiment Based on Orthogonal Method .....	<i>ZHAO Meng-fei, DING Qin-wen, ZHANG Lian-ji, QUAN Bo</i> (95)
Interpreting Freezing Point Depression More Than Boiling Point Elevation from Viewpoint of Entropy .....	<i>LIU Xiang-yu, LIANG Bin, YANG Rui, NI Gang, SONG Wei-ming</i> (98)
Influences of Increasing the Amount of Reactant on Chemical Equilibrium in Ideal Gas Systems .....	<i>DAI Ke, LIANG Hua</i> (101)
Understanding of Chemical Thermodynamics in Physical Chemistry Course .....	<i>WANG Jian-fang, YANG He-ping, ZHOU Chun-sheng, XU Jie, SUN Nan</i> (103)
Application of Heuristic Teaching Based on Drug Structure in Medicinal Chemistry Teaching .....	<i>JIN Xiao-dong, XU Gao</i> (106)
System Study on Environmental Monitoring Experimental Course in Applied University .....	<i>KONG Qing-na, YAO Jun, ZONG En-min, ZHANG Zhi-cheng, QIAN Yi</i> (109)
Study on Methods to Improve the Quality of Graduation Design for Material Chemistry Undergraduates .....	<i>ZHAO Xiao-jun, CAI Zhen-yang, XIAO Lai-rong, CHEN Zhi-yong, LI Gang</i> (112)
Teaching Design and Practice on Fundamentals of Materials Science for the Major of Packaging Engineering .....	<i>LI Zhong-bo, LI Qian-wen, LIANG Ting</i> (115)
Exploration on Improving Teaching Effect of Pharmaceutical Engineering Courses under “Micro-era” Environment .....	<i>LIU Jian-fang, ZHENG Wei-ping, QI Tong-hui</i> (117)



Teaching Reform on Organic Chemistry of Pharmaceutical Production  
Technology Specialty in Vocational Colleges .....  
..... *SANG Shu-li*(119)

Study on Teaching Reform of Engineering Case in Environmental  
Engineering Subject .....  
*TANG Xiao-min, FU Min, TAN Xue-mei, HE You-zhou* (121)

Teaching Reform on Mechanical Basis of Chemical Equipment for  
Application-oriented Undergraduate Majors .....  
..... *WANG Jin-long, ZHU Li-gang*(123)

Exploration and Practice on Teaching of College Chemistry for Non-  
chemical Majors ..... *WU Qing-yun, HAN Lei*(125)

Some Opinion on Full Utilization of Resources in Physical Chemistry  
Laboratory ..... *CHEN Feng-gui, SUN Jiao-tong*(128)

Chemical Experiment Teaching Reform and Innovation of Talent  
Cultivation ... *LI Shi-hui, ZHAO Yan, ZHANG Yong-hua*(130)

Discussion on Teaching Reform of Applied Chemistry Experiment  
..... *JIANG Li-juan*(132)

Exploration and Thinking on Current Condition of Laboratory Team  
Construction in Universities .....  
*WANG Ji-lin, JI Yu-chun, ZHENG Guo-yuan, HU Chang-zheng*(135)

Application of Competition-based Teaching Method in Chemistry  
Experiment Teaching ..... *ZHAO Gang, GU Jia-li*(138)

Discussion on Problems and Reform Ways of Chemical Experiment  
Teaching in Higher Vocational College .....  
*WU Jun-wei, ZHAO Jun-song, ZHONG Xian-jin, YANG Ling-ling*(140)

Exploration of Blending Teaching in Inorganic Chemistry Course  
..... *FAN Wen-juan,*  
*CHANG Hui, MA Guang-qiang, DENG Jun, YIN Hai-ying*(142)

Play the Leading Role of Teachers and the Main Role of Students  
..... *CHEN Shuang-li*(144)

Reform and Practice of Practical Teaching System for Chemical  
Engineering in Local Colleges under the New Engineering Background  
..... *LONG Hua-li,*  
*LIU Jian-wen, YANG Shi-fang, ZENG Rong, WANG Zhi-guo*(147)

Study on Teaching of Application-oriented Talent Training for  
Building Material Industry .....  
..... *WANG Yong-gang, YANG Lin-lin, SHI Lei*(149)

## GUANGZHOU CHEMICAL INDUSTRY

Open Publishing

Established in 1973(Semimonthly)

Vol. 46 No. 11

Jun. 2018

### Managed by:

Guangzhou Chemical Industrial Group Co., Ltd.

### Sponsored by:

Guangzhou Research & Design Institute of Chemical Industry  
Guangzhou Society of Chemistry and Chemical Engineering

### Assisted by:

Guangzhou Chemical Industry Association

### Edited by:

Editorial Office of "GUANGZHOU CHEMICAL  
INDUSTRY"

**Chief Editor:** WU Wen-li

**Vice Chief Editor:** LIN Jun-ying

**Editor:** LIU Qian-ting, HE Qi-hong

**Advertisement Department:** MAO Ren-xu

**Address:** Building D, Vanlead Innovation Park, No. 2  
Lianhe Road, Shijing Town, Baiyun District,  
Guangzhou, P. R. China

**Postcode:** 510425

**Tel:** (020) 36372165

**E-mail:** gzhgbjb@vip.126.com

**Website:** <http://www.gzhgbjb.cn>

### Printed by:

Guangzhou Guangwei Printing Plant of Southern  
Medical University

### Overseas Distributed by:

China National Publishing Industry Trading Corporation

**Journal Code:** ISSN 1001-9677  
CN 44-1228/TQ

**Advertising Business License No.:** 4401004002668