

# 广州化工

## GUANGZHOU CHEMICAL INDUSTRY



扫码关注

第 6 期  
2019年3月  
(下半月)  
第 47 卷

- 《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



广州化工交易中心有限公司  
主办单位

多彩化工  
• 专业视角

### 2019中国石油和化工绿色发展峰会·专题报道 坚守绿色化工产业初心 雕琢粤港澳大湾区未来

化学工业规划院副院长白颐：新材料产业转型 环保节能政策先行  
中国国际经济交流中心李金波：广东省应加快打造全球新贸易中心  
广州开发区经济和信息化局王澍：“金镶玉”引来“金凤凰”

#### 中国石油和化工行业绿色发展倡议书

2019中国石油和化工绿色发展峰会





# CONTENTS 目录



## P01 坚守绿色化工产业初心 雕琢粤港澳大湾区未来

2019 中国石油和化工绿色发展峰会

3月21日,由中国化工情报信息协会、广东卫视、金发科技股份有限公司、广州化工交易中心有限公司共同举办,广州市黄埔区人民政府、广州开发区管委会指导的2019中国石油和化工绿色发展峰会在广州隆重揭幕。聚焦粤港澳大湾区绿色大化工产业深度融合发展,中国石油和化工绿色蓝图引发业界高度关注。

### 2019中国石油和化工绿色发展峰会专题

绿色峰会·瞬间.....	03
化学工业规划院副院长白颐:新材料产业转型 环保节能政策先行.....	05
中国国际经济交流中心李金波:广东省应加快打造全球新贸易中心.....	06
广州开发区经济和信息化局王澍:“金镶玉”引来“金凤凰”.....	07
分会场精彩发言.....	08

### 广化视点

2019年2月轮胎市场行情走势分析.....	鲁思聪 唐伟民	09
“两会”后市场迎来新一轮提涨.....	龚焱良	12



# CONTENTS 目录

## 化工与生态

化工大数据·图说氢能源.....资讯部 13

## 专论与综述

异氰酸酯胶黏剂的改性及研究进展.....胡修波 吴欣怡 吕鑫 王文娟 万里海 夏英 杨萍 14

改性二氧化硅气凝胶研究进展.....刘金玲 郭慰彬 白欣 陈登龙 16

CO<sub>2</sub>跨临界循环系统性能影响的研究进展.....王宁宁 刘燕妮 丁云飞 19

VOCs吸附材料的研究进展.....张文涛 叶京达 余俊文 余初彬 傅浩 陈忻 许锋 22

废气中二氧化碳有机胺吸收剂的研究进展.....李晓朋 李云飞 25

环保型泥土原电池的工作原理及其应用研究.....黄敏仪 洪海辉 唐小勇 28

新能源汽车冷却液管路的发展趋势.....王娟 31

## 科学实验

γ-聚谷氨酸的保湿性研究.....邓星波 邹水洋 朱丹 魏雄伟 赖旭杰 33

PP-g-MAH的制备与性能研究.....娄金分 罗筑 李杨 杨乐 36

金属离子种类对蛋白质保留特征的影响.....李萌 康玉梅 刘英 宋春燕 王丽 贺茂芳 39

玻纤增强PBT/PCT合金性能研究.....杨汇鑫 李闻达 麦杰鸿 姜苏俊 蒋智强 42

超高韧性聚甲醛/聚氨酯复合材料的性能与结构研究.....陈锋 曹绍强 叶坤豪 禹权 丁超 46

混凝土用磷酸基缓凝剂的制备与性能研究.....韩正 范士敏 亓帅 王涛 杨勇 49

离子交换法除硫酸锰溶液中钴镍的中试研究.....邹晓勇 陈民仁 52

炭泡沫对水溶液中罗丹明B的吸附行为研究.....李妮鸿 莫俏 李泽安 沈飞 李益华 55

活性炭对实验室废水中金属铬的动态和静态吸附研究.....孙雅珂 李婷 梁转转 张曼 李广超 58

介孔碳的合成及吸附性能研究.....田喜强 姬静怡 赵东江 赵宏吉 董艳萍 60

实验室高浓度含银废水的树脂吸附处理研究.....张鑫 付渊 刁敏倩 葛晓薇 贺刑 贾光轶 62

羧甲基马铃薯淀粉高吸水树脂合成工艺研究.....杨冠宇 付渊 张茹意 宋佳 刘艳艳 潘玉桐 64

无磷药剂在中低碱度硬度水系统中的应用研究.....何好启 67

铁包金果实花青素提取工艺研究.....刘康莲 毛海立 杨再波 王润平 武或 70

树脂砂轮角磨片圆整度的正交实验设计.....金去非 金雪霞 73

减压精馏-熔融结晶分离1,3-丙烷磺内酯的研究.....周建新 王帮应 76

## 分析测试

自动电位滴定仪测定氯化钾中钾量.....邢银娟 杨军红 甘建壮 翟德通 李佗 张斌 78



# CONTENTS 目录

关于工业三氯化磷中游离磷分析方法的研究.....	龚兆鸿	80
NIRS法测定液碱中氢氧化钠含量的方法研究.....	魏钠 陈安梅 王明 夏锦正 王伟 徐宝学	83
ICP-AES法检测银合金电触头中稀土元素.....	张小琴	86
电感耦合等离子体质谱法测定餐具洗涤剂中Pb、As、Cd、Cr、Hg、Sb的含量.....		
.....	白彦坤 刘金鹏 韩贞年 彭彦泽 司存 仇晓龙	88
气-质联用法测定水中三氯乙醛的研究.....	姚德昌 李贤舟 鲍海霞	91
金线莲中六种黄酮成分的含量测定及其主成分、聚类分析.....		
.....	马迟 张嘉嘉 张松柏 张勋 陈抒云 徐伟 林羽	95
水芹与家芹总黄酮含量测定及清除羟基自由基研究.....	吴娜怡郁 郭晓青 陈晓靓 代甜甜	99
碘酸钾-酸性铬蓝K催化动力学光度法测定人发中微量铁.....	开小明 徐伟 吴健 崔晓峰	101

## 环境保护

水浴消解-原子荧光法测定土壤中硒、锑的研究.....	谭芳维 黄菲 唐秀龙 韦永兴	103
----------------------------	----------------	-----

## 化工机械

一种多剂型普药固体口服制剂车间设计方案.....		
.....	徐嘉浩 吴俊楠 莫贵友 李冬梅 陈美芳 刘媛 黄毅 郑仁林	106

## 生产技术

页岩气压裂用暂堵剂优化设计.....	秦旭 曾斌 李文洪 徐太平 胡志朋 卢家孝	109
掺炼高酸渣油对延迟焦化装置的影响.....	张鹏波	113

## 教学园地

对分课堂在制药工程专业药理学的应用和体会.....	陈超杰 詹玉莲 田春林 杨红梅 叶美麟	116
面向卓越工程师培养的材料专业实践教学改革的.....	杨正龙 袁伟忠 邱军	119
“材料之星”课程体系中无机化学教学与实践.....		
.....	葛素香 李大鹏 谷龙艳 李知声 李婷婷 于笑寒 李静	121
PBL联合Seminar教学模式在《晶体学基础》教学中的应用.....	惠贞贞 唐婧 郑胜彪 丁志杰 张晨嵩	123
有机化学教学改革中的探索与实践.....	赵慧茹 杨祺 焦景超 唐林	126
环境类专业《有机化学》课程教学改革初探.....	王永花 陆光华	128



# CONTENTS 目录

O2O模式的翻转课堂在有机化学教学中的运用.....	陈艳艳 李芳耀 吴燕花	130
基于创新能力培养的功能高分子课程教学改革与实践.....		
.....	苗蔚 程文喜 李金玲 刘国勤 林浩伟 彭进	132
培养创新型人才的物理化学教学改革与实践.....	杨景帅 王军 何荣桓	134
矿物加工工程环境保护课程教学方法探索.....	沈亮 刘令云 蔡川川 周伟 王超	137
《塑料模具设计》校企合作课程建设的探索.....	李莹莹 朱新军 郭福全 余东升 范吉昌 彭琦	139
提升化工安全概论课程教学效果的实践与体会.....	马磊 张爱华 郭莉 焉海波 李慧芳 付华	141
惠州学院化工专业毕业生培养质量的跟踪调查与分析.....	王春花 刘婧	144
以史育人，以德树人，绽放化学课堂精彩.....	黄雪 武彧	148
新工科背景下专业实验独立设课思考.....	徐丹	151
在有机化学实验中渗透“课程思政”元素的探索与研究.....	朱敏	153
线上学习模式在药物分析实验教学中的应用.....	潘薛波 向铮 蔡跃飘 蔡小军	156
化学实验室废弃物安全管理与处置的探索和思考.....	李群良 李艳琳 鲁浩远	158
高校化学实验室安全在线教育的设计与应用.....	杜慧 张换平 侯绍刚 郑永军	160
高校化学实验室安全管理探究.....	尹梦云	164

通过品牌精神引起消费者感性上对我们品牌的热爱，通过热爱来呼唤对我们品牌的好感，而不只是通过一种产品。做得好的品牌都是一种精神诉求，而不单单是一种产品。

——通用汽车全球执行副总裁、通用汽车北美地区兼雪佛兰全球总裁：贝亚伦

经营企业就是要经营人，经营人首先要尊重人。员工齐心，管理用心，对用户真心。

——海尔集团董事局主席、首席执行官：张瑞敏

高  
管  
微  
语



# CONTENTS

Modification and Research Progress on Isocyanate Adhesive.....	
..... <i>HU Xiu-bo WU Xin-yi LV Xin WANG Wen-juan WAN Li-hai XIA Ying YANG Ping</i>	14
Research Progress on Modified Silica Aerogels..... <i>LIU Jin-ling GUO Wei-bin BAI Xin CHEN Deng-long</i>	16
Research Progress on System Performance of CO <sub>2</sub> Transcritical Cycle.....	
..... <i>WANG Ning-ning LIU Yan-ni DING Yun-fei</i>	19
Research Progress on VOCs Adsorption Materials.....	
..... <i>ZHANG Wen-tao YE Jing-da YU Jun-wen YU Chu-bin FU Hao CHEN Xin XU Feng</i>	22
Research Progress on Carbon Dioxide Absorbers for Exhaust Gases..... <i>LI Xiao-peng LI Yun-fei</i>	25
Earthen Battery Power Generation and Its Application in Street Lamps.....	
..... <i>HUANG Min-yi HONG Hai-hui TANG Xiao-yong</i>	28
Development Trend of Coolant Pipe for New Energy Vehicle..... <i>WANG Juan</i>	31
Study on Moisture Retention Capacity of $\gamma$ -polyglutamic Acid.....	
..... <i>DENG Xing-bo ZOU Shui-yang ZHU Dan WEI Xiong-wei LAI Xu-jie</i>	33
Preparation and Properties of PP-g-MAH..... <i>LOU Jin-fen LUO Zhu LI Yang YANG Le</i>	36
Influences of Metal Ions on Adsorption Characters of Protein on Metal Chelate Adsorbents.....	
..... <i>LI Meng KANG Yu-mei LIU Ying SONG Chun-yan WANG Li HE Mao-fang</i>	39
Study on Properties of Glass Fiber Reinforced PBT/PCT Alloy.....	
..... <i>YANG Hui-xin LI Wen-da MAI Jie-hong JIANG Su-jun JIANG Zhi-qiang</i>	42
Study on Properties and Structure of Ultra-high Toughness Polyoxymethylene/Polyurethane Composites	
..... <i>CHEN Feng CAO Shao-qiang YE Kun-hao YU Quan DING Chao</i>	46
Preparation and Properties of Phosphate Retarders for Concrete.....	
..... <i>HAN Zheng FAN Shi-min QI Shuai WANG Tao YANG Yong</i>	49
Pilot Study on Removing Cobalt and Nickel from Manganese Sulfate Solution by Ion Exchange Method..	
..... <i>ZOU Xiao-yong CHEN Min-ren</i>	52
Study on Adsorption Behavior of Rhodamine B Dyes from Aqueous Solution by Carbon Foam.....	
..... <i>LI Ni-hong MO Qiao LI Ze-an SHEN Fei LI Yi-hua</i>	55
Dynamic and Static Adsorption of Chromium in Laboratory Wastewater by Activated Carbon.....	
..... <i>SUN Ya-ke LI Ting LIANG Zhuan-zhuan ZHANG Man LI Guang-chao</i>	58



Study on Synthesis and Adsorption Properties of Mesoporous Carbon.....  
.....TIAN Xi-qiang JI Jing-yi ZHAO Dong-jiang ZHAO Hong-ji DONG Yan-ping 60

Study on Adsorption Treatment of High Concentration Laboratory Silver-containing Wastewater by Superabsorbent.....  
.....ZHANG Xin FU Yuan DIAO Min-qian GE Xiao-wei HE Xing JIA Guang-yi 62

Study on Synthesis of Carboxymethyl Potato Starch Super Absorbent Resin.....  
.....YANG Guan-yu FU Yuan ZHANG Ru-yi SONG Jia LIU Yan-yan PAN Yu-tong 64

Application of Non-phosphorous Agent in Water System with Low Alkalinity and Hardness.....  
.....HE Hao-qi 67

Study on Extraction Technology of Anthocyanin from Berchemia lineata by Biological Enzyme Method..  
.....LIU Kang-lian MAO Hai-li YANG Zai-bo WANG Run-ping WU Yu 70

Orthogonal Experiment Design of Spherical Degree in Resin Bond Abrasive Grinding Wheel.....  
.....JIN Qu-fei JIN Xue-xia 73

Study on Separation of 1,3-Propanesultone by Vacuum Distillation and Melt Crystallization .....  
.....ZHOU Jian-xin WANG Bang-ying 76

Determination of Palladium in Palladium Chloride by Automatic Potentiometric Titrator.....  
.....XING Yin-juan YANG Jun-hong GAN Jian-zhuang ZHAI De-tong LI Tuo ZHANG Bin 78

Study on Analytical Method of Free Phosphorus in Industrial Phosphorus Trichloride.....  
.....GONG Zhao-hong 80

Determination of Sodium Hydroxide Content in Liquid Caustic Soda by Near Infrared Spectrometer.....  
.....WEI Na CHEN An-mei WANG Ming XIA Jin-zheng WANG Wei XU Bao-xue 83

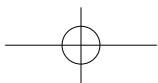
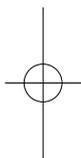
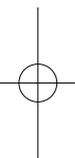
Determination of Lanthanum in Silver-alloy Electrical Contact by ICP-AES.....ZHANG Xiao-qin 86

Determination of Pb As, Cd, Cr, Hg and Sb in Dishwashing Detergent by ICP-MS.....  
.....BAI Yan-kun LIU Jin-peng HAN Zhen-nian PENG Yan-ze SI Cun QIU Xiao-long 88

Determination of Chloral Hydrate in Water by Using GC/MS.....  
.....YAO De-chang LI Xian-zhou BAO Hai-xia 91

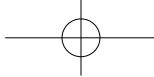
Determination of Six Flavonoids in *Anoectochilus roburghii* and Its Principal Component and Cluster Analysis  
.....MA Chi ZHANG Jia-jia ZHANG Song-bai ZHANG Xun CHEN Shu-yun XU Wei LIN Yu 95

Study on Determination of Total Flavonoids in Cress and Celery and Scavenging of Hydroxyl Radicals.....  
.....WU Na-yi-yu GUO Xiao-qing CHEN Xiao-jing DAI Tian-tian 99





Determination of Microamount Iron of Human Hair by Catalytic Kinetic Spectrophotometry with Potassium Iodate Oxidation Acidic Chromium Blue K.....	
.....KAI Xiao-ming XU Wei WU Jian CUI Xiao-feng	101
Determination of Selenium and Antimony in Soil by Water Bath Digestion-atomic Fluorescence.....	
.....TAN Fang-wei HUANG Fei TANG Xiu-long WEI Yong-xing	103
Workshop Design of OSD with Various Dosage Forms.....	
..XU Jia-hao WU Jun-nan MO Gui-you LI Dong-mei CHEN Mei-fang LIU Yuan HUANG Yi ZHENG Ren-lin	106
Optimized Design of Temporary Plugging Agent for Shale Gas Hydraulic Fracturing.....	
.....QIN Xu ZENG Bin LI Wen-hong XU Tai-ping HU Zhi-peng LU Jia-xiao	109
Effect of Blending High Acid Residue on Delayed Coking Unit.....	
.....ZHANG Peng-bo	113
Application and Experience of PAD Class in Pharmacology for Pharmacy Engineering Specialty.....	
.....CHEN Chao-jie ZHAN Yu-lian TIAN Chun-lin YANG Hong-mei YE Mei-lin	116
Study on Reform of Practice Teaching of Materials Science and Engineering Specialty for Professional Outstanding Engineers.....	
.....YANG Zheng-long, YUAN Wei-zhong, QIU Jun	119
Teaching and Practice of Curriculum of Inorganic Chemistry for “Material Star” Curriculum System.....	
.....GE Su-xiang LI Da-peng GU Long-yan LI Zhi-sheng LI Ting-ting YU Xiao-han LI Jing	121
Application of Integration of PBL and Seminar Teaching Method in Crystallography Teaching.....	
.....HUI Zhen-zhen TANG Jing ZHENG Sheng-biao DING Zhi-jie ZHANG Chen-song	123
Exploration and Practice on Teaching Reform of Organic Chemistry.....	
.....ZHAO Yi-ru YANG Zhen JIAO Jing-chao TANG Lin	126
Exploration on Teaching Reform of Organic Chemistry in Environmental Majors.....	
.....WANG Yong-hua LU Guang-hua	128
Application of Flipped Classroom Based on O2O Model in Organic Chemistry Teaching.....	
.....CHEN Yan-yan LI Fang-yao WU Yan-hua	130
Teaching Reform and Practice of Functional Polymer Course Based on Innovative Ability Training.....	
.....MIAO Wei CHENG Wen-xi LI Jin-ling LIU Guo-qin LIN Hao-wei PENG Jin	132
Teaching Reform and Practice of Physical Chemistry Course for Cultivating Innovative Talents.....	
.....YANG Jing-shuai WANG Jun HE Rong-huan	134
Exploration on Teaching Methods of Environmental Protection Course in Mineral Processing Engineering..	
.....SHEN Liang LIU Ling-yun CAI Chuan-chuan ZHOU Wei WANG Chao	137



Exploration on Construction of School-enterprise  
Cooperation Course in Plastic Mould Design.....  
.....*LI Ying-ying ZHU Xin-jun*  
*GUO Fu-quan YU Dong-sheng FAN Ji-chang PENG Qi* 139

Practice and Reflections on Improving Teaching Effect of  
Curriculum of Chemical Safety.....*MA Lei*  
*ZHANG Ai-hua GUO Li YAN Hai-bo LI Hui-fang FU Hua* 141

Follow-up and Analysis of Graduate Training Quality of  
Chemical Engineering in Huizhou University.....  
.....*WANG Chun-hua LIU Jing* 144

Educating People with History, Cultivating People with  
Virtue and Developing Chemistry Class Wonderful.....  
.....*HUANG Xue WU Yu* 148

Thoughts on Independent Courses for Specialized  
Experiments under the Background of New Subjects..  
.....*XU Dan* 151

Exploration and Research of Infiltrating Curriculum  
Thinking Elements on Experiment of Organic Chemistry.  
.....*ZHU Min* 153

Application of Online Learning Mode in Teaching of  
Pharmaceutical Analysis Experiment.....  
.....*PAN Xue-bo XIANG Zheng CAI Yue-piao CAI Xiao-jun* 156

Exploration and Thinking on Safety Management and  
Disposal of Wastes in the Chemical Laboratory.....  
.....*LI Qun-liang LI Yan-lin LU Hao-yuan* 158

Design and Application of Online Education for Chemical  
Laboratory Safety in Colleges and Universities.....  
*DU Hui ZHANG Huan-ping HOU Shao-gang ZHENG Yong-jun* 160

Study on Safety Management of University Chemistry  
Laboratory.....*YIN Meng-yun* 164

## GUANGZHOU CHEMICAL INDUSTRY

Open Publishing

Established in 1973 (Semimonthly)

Vol.47 No.6

Mar. 2019

**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 :** CHEN Liang

**Address :** Building D, Vanlead Innovation Park,  
No.229, Helian Street, Baiyun District,  
Guangzhou, P.R. China

**Postcode :** 510425

**Tel :** (020) 36372165

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

**Website :** <http://gzha.cbpt.cnki.net>

**Printed by :**

Guangdong Haifeng Printing Company Limited

**Overseas Distributed by :**

China National Publishing Industry Trading Corporation

**Journal Code :** ISSN 1001-9677

CN 44-1228/TQ

**Adverxising Business License No. :**4401004002668