

CONTENTS 目录



三恩时科技： 用数字技术演绎化工色彩

P01

特别报道

广东作为涂料强省，涂料产业发展壮大与数字化应用技术密不可分，利用计算技术测量色差、光泽度并进行颜色管理，对产业精细化发展功不可没。在第三十三届中国国际塑料橡胶工业展览会上，国家高新技术企业深圳市三恩时科技有限公司就带来了国内领先的色差仪、分光测色仪、光泽度仪、标准光源灯箱等颜色管理设备，让用户现场体验智能化颜色管理解决方案。

广化视点

硫酸：需求不佳 开工七成.....	周惠君	03
环氧树脂：双原料处于价格两极.....	陆婉鸿	04
双氧水：多地市场价格每吨破千元.....	龚燚良	05
丙烯腈：产能释放不佳 市场仍看空.....	唐伟民	06

企业与法

这是预付款还是定金？	蔡培展（摘编）	07
法律问答.....	胡大飞	09

化工与生态

化工三废：史上最严的垃圾分类.....	周文俊	11
---------------------	-----	----

CONTENTS 目录

化工大数据·图说国内甲醛市场..... 资讯部 13

专论与综述

可逆加成断裂链转移聚合及链转移剂的制备进展.....	邓博 廖文平 杨子腾 任红军 钟磊	14
芸香宁碱及其衍生物的合成研究进展.....	罗稳 赵永梅 吕剑伍 王婷	19
高密度聚乙烯改性的研究进展.....	付海 郑兴莉 吴会敏 班大明 尹晓刚 龚维	21
碘氧化铋光催化复合材料的制备及其应用进展.....	刘著扬 丁旋 董慧玲 陈梦云	24
石墨烯量子点的制备方法与表征技术.....	赵博 杨永忠 白斌 张小庆 朱端旭	27
改性纳米零价铁修复有机污染地下水研究现况.....	张海涛 刘文静 刘叶 傅玲子 寇明月	30
船板钢在海洋环境下腐蚀研究进展.....	罗思维 刘泉兵 黄承勇 李桦铿 陈金娣 胡杰珍	33
铪在高温合金中的应用及回收.....	郭树军 董雪平	38
硅对镉胁迫下植物生长影响的研究进展.....	孙梦梦 徐勘 张玲玲 施德剑 赵玺童	41
氧化钇稳定氧化锆涂层的研究现状.....	彭春玉	44

科学实验

PPy包覆LiMn ₂ O ₄ 作为水系锂离子电池中的正极材料.....	丁伟 卓泽旭 Ibinewo Michael 刘志凤 王高军	47
八元瓜环与二亚甲基吡啶三硫配合物晶体结构.....	吴敏 张垠 陈明华 郑玉国 易君明	50
含苯环的萝卜硫素类似物的合成及抗肿瘤活性研究.....	张雪映 宋莹莹 陈煜 王雪松 王砾今 李友宾	53
具末端Boc氨基的硫代氨基甲酸酯的合成研究.....	王雨佳 游丹 危俊吾 林峰 钱杨杨 毕韵梅	57
低分子量有机硅改性聚丙烯酸酯的合成及应用.....	徐四喜 范方强 瞿金清	59
水性阻尼涂料用核壳乳液的合成及应用研究.....	莫杨妙 陈绵峰 张湛垚 杨斌	62
Co(CO ₃) _{0.35} Cl _{0.20} (OH) _{1.10} 纳米线的制备及其超级电容器性能.....	周鹏 郑璐 文晓刚	66
4-丁基二苯胺的合成及其在润滑油中的抗氧化性能研究.....	卢文倩 房子鑫 苗长庆 吴珊	69
碳五溶剂脱氯研究.....	范凯 全其祥 刘允攀 孙庆冬 刘连鹏 刘治	72
高浓度水性涂料废水预处理的研究.....	庄晓杰 郑冲祥 宋林啸 罗江	74
电化学预处理对污泥性质影响的研究.....	李佳欣 俞强 吕会静 张兴华 李佳 张启凯 王曦哲	76
Pickering 乳液在菊酯类农药水乳液中的应用.....	宫楼楼 王晨昱 林伟强 孙萍 鲍淑榕 谢丹华	80
22MnB5超高强度钢冷冲压成形的数值模拟.....	李琦 纪沙沙 刘永刚 谷海容 王章忠 吕学鹏	83
含亚微米银无水甘油悬浮液的制备和杀菌性能研究.....	缪卫峰 熊英 杨洁 钟良 陈硕平	85
多酸抗菌剂接枝木塑材料表面抑菌性研究.....	张程理 杨万丽 陈林 马荣华	90
聚磷酸铵表面疏水改性研究.....	姚光旭 张孝果 张峰榛 杜怀明	94
紫薯中花青素的提取研究.....	冯亮 彭周羽 谭曾勇 杨艳	97

CONTENTS 目录

响应面优化超声辅助提取赤芍中黄酮的研究.....	王鑫 郝晓亮 王勇 高云 全艳玲	101
不同微量元素对平菇代谢及吸收的影响研究.....		
.....	傅真杰 朱长俊 高颖 陈寅瑞 朱梦霞 王盟星 张丹 黄乐	104
水处理用高性能压力容器的材料和性能设计.....	邱东 王威力	107
徐州市城区土壤pH值、有机质与磁化率特征研究.....	毛应明 缪洁茹 朱土豪 闫长永	109
Box-Behnken响应面法优化枇杷叶总多酚闪式提取工艺.....	张云 杨晨 黄金秋 徐秀泉	112

分析测试

桦褐孔菌乙酸乙酯提取物柱层析分离产物检测.....		
.....	李咏欣 朱长俊 张运洋 孙丽容 范轩宇 李子龙 朱红薇	117
加速溶剂萃取-气相色谱法测定刺梨中11种有机氯农药.....	赵君 吴坤 兰世超	120
电感耦合等离子体质谱测定绿辉石中稀土元素.....	张楠 曾红萍 郑智慷 魏双 王家松 王力强	123
气质联用法测定柴油中间馏分组成.....	周立 徐嘉 刘召贵	125
异烟酸-巴比妥酸法测定尿中硫氰酸盐.....	唐双双 郭嘉明 袁豪乾 吴诗华 周丽屏 刘移民	128
废气中乙酸酯类的热脱附GC-MS测定法.....	施琴芝 高飞 周彦凯 张璐 方明月 林峰	130
FTIR-ATR红外光谱法多级鉴别不同种类的绿茶.....	沈娜娜 武晓霞	133
不锈钢锰磷化膜重测量的改进研究.....	穆俊宏 刘晓燕 朱建国	135
探讨气相色谱法测定水中三氯甲烷的影响因素.....	刘洁纯	138

环境保护

320 m ² 烧结烟气超低排放工程实例分析.....		
.....	周威 华玉龙 孙红丽 高正来 刘锡梁 何惠强 张宏伟	141
原位热脱附技术——适用于低渗透性土质的土壤修复技术.....	方兴斌 诸毅	144
垃圾焚烧厂周围环境2,3,7,8-TCDF的测定和分析.....	黄宇轩 宋佳玲 黄满红 张月洋	148
保定市百草沟河流环境及其水质COD变化研究.....	王晓晨 王玮晨 杜忠文	151
重庆某污染场地土壤修复工程案例.....	白娟 程曦 殷俊 白瑞 陈婷	154
洪泽湖水体溶解性有机氮分布特征研究.....	孙静 水怀瑞 田剑锋 孙伟杰 黄进	158
奎河铜山段重金属污染与农灌风险.....	曾安容 杨伟华 茹凌宇 陈思睿 秦超 高程	161

化工机械

连续重整装置焊板式换热器化学清洗.....	杨帆	165
-----------------------	----	-----

CONTENTS 目录

生产技术

加氢脱硫和溶剂抽提组合技术生产清洁汽油应用情况.....谢举文 黄志鸿 169

教学园地

基于药化设计性实验培养学生创新与科研能力.....	张吉泉 杨元勇 董永喜 毛远湖 樊玲玲 傅晓钟 汤磊 172
Aspen Plus在萃取精馏实验教学中的应用探索.....	贺楚华 阳鹏飞 刘慧君 杜可杰 王延飞 175
提标改造背景下的水污染控制工程教学改革探讨.....	谭雪梅 龙良俊 钟成华 唐晓旻 177
无极及分析化学实验探究式教学模式的构建.....	于智慧 于长顺 宋宇 蔡伟杰 翟滨 陈丽凤 180
信息化教学设计实例——反应热的测量及计算.....	梁小蕊 孙晓伟 郭云超 李荫 吴世永 182
3D动画提升本科生化学工程实践能力.....	薛峰 王晟 居沈贵 184
《高分子材料成型工程》课堂教学方法的探索.....	陈荣源 刘欣 张忠厚 张晓静 韩琳 马丽 187
工程热力学蒸汽动力循环教学中工程思维的培养.....	张伟 白玉石 王德武 刘燕 张少峰 邓会宁 189
基于CDIO理念的环境工程应用型人才培养模式探索.....	董怡华 王英刚 王辉 魏建兵 191
新工科背景下《化工基础》课程教学改革与体会.....	周继亮 金士威 肖杨 陈胜慧 赵福真 195
环境工程专业《环境学》教学内容刍议.....	朱岸东 王忠全 钟建军 197
基于O2O教学模式的有机化学实验教学改革与探索.....	张劲 彭天英 贺国文 张令君 199
仪器分析实验教学模式改革研究.....	魏泉增 张永清 郭孝辉 201
高等农业院校普通化学课程现况及教学策略.....	秦向东 赵红梅 203
《工程化学》课程思政的创新教学案例分析.....	刘焕英 蔡静 于旭蓉 杨春光 张博宇 206
“三全育人”体系下关于物理化学实验教学过程的思考.....	乔洪涛 石玉芳 郭敏敏 209
药物分析教学改革心得.....	王聪 211
生物化学类大型仪器共享平台的实验室安全管理.....	张成家 董楠楠 214

我所看到的也好，我经历了的也好，我现在本人的公司也好，我都非常兴奋。追求工业的进步，追求技术的进步，追求产品的竞争力，希望和国际上最好的公司做标杆的比较，我觉得现在在中国是非常普遍的。

——中化集团董事长：宁高宁

高
管
微
语

CONTENTS

RAFT Polymerization and Progress on Preparation of Chain Transfer Agents.....	
.....DENG Bo LIAO Wen-ping YANG Zi-teng REN Hong-jun ZHONG Lei	14
Review on Synthesis of Graveolinine and Its Derivatives.....	
.....LUO Wen ZHAO Yong-mei LV Jian-wu WANG Ting	19
Research Progress on Modification of High Density Polyethylene.....	
.....FU Hai ZHENG Xing-li WU Hui-min BAN Da-ming YIN Xiao-gang GONG Wei	21
Research Progress on Preparation and Application of BiOI-based Photocatalytic Composites.....	
.....LIU Zhu-yang DING Xuan DONG Hui-ling CHEN Meng-yun	24
Preparation and Characterization of Graphene Quantum Dots.....	
.....ZHAO Bo YANG Yong-zhong BAI Bin ZHANG Xiao-qing ZHU Duan-xu	27
Research Status on Modified Nanoscale Zero-valent Iron for Repairing the Groundwater Polluted by Organic Pollutants.....	
.....ZHANG Hai-tao LIU Wen-jing LIU Ye FU Ling-zi KOU Ming-yue	30
Research Progress on Corrosion of Shipboard Steel in Marine Environment.....	
.....LUO Si-wei LIU Quan-bing HUANG Cheng-yong LI Hua-keng CHEN Jin-di HU Jie-zhen	33
Application and Recovery of Hafnium in Superalloys.....	
.....GUO Shu-jun DONG Xue-ping	38
Research Progress on Effects of Silicon on Plant Growth under Cadmium Stress.....	
.....SUN Meng-meng XU Jie ZHANG Ling-ling SHI De-jian ZHAO Xi-tong	41
Research Progress on Failure Mechanism of Thermal Barrier Coating.....	
.....PENG Chun-yu	44
PPy Coating LiMn ₂ O ₄ as Positive Material of Aqueous Lithium Ion Batteries.....	
.....DING Wei ZHUO Ze-xu Ibinewo Michael LIU Zhi-feng WANG Gao-jun	47
Crystal Structure of Self-assembly Complex of Cucurbit[8]uril with 3-((3-(Pyridin-3-ylmethyl)trisulfanyl)methyl)Pyridine.....	
.....WU Min ZHANG Yin CHEN Ming-hua ZHENG Yu-guo YI Jun-ming	50
Synthesis and Antitumor Activity of Sulforaphane Analogues Containing Benzene Ring Structure.....	
.....ZHANG Xue-ying SONG Ying-ying CHEN Yu WANG Xue-song WANG Shuo-jin LI You-bin	53

Study on Synthesis of Thiocarbamate with A Terminal Boc Amine Group.....	WANG Yu-jia YOU Dan WEI Jun-wu LIN Feng QIAN Yang-yang BI Yun-mei	57
Synthesis and Application of Low Molecular Weight Silicone Modified Polyacrylate.....	XU Si-xi FAN Fang-qiang QU Jin-qing	59
Synthesis and Application of Core-shell Emulsion for Waterborne Damping Coating.....	MO Yang-miao CHEN Mian-feng ZHANG Zhan-yao YANG Bin	62
Synthesis and Supercapacitor Performance of $\text{Co}(\text{CO}_3)_{0.35}\text{Cl}_{0.20}(\text{OH})_{1.10}$ Nanowire.....	ZHOU Peng ZHENG Lu WEN Xiao-gang	66
Synthesis of 4-butyl Diphenylamine and Its Oxidation Resistance in Lubricating Oils.....	LU Wen-qian FANG Zi-xin MIAO Chang-qing WU Shan	69
Study on Antichloration of C5 Solvent.....	FAN Kai TONG Qi-xiang LIU Yun-pan SUN Qing-dong LIU Lian-peng LIU Zhi	72
Study on Pretreatment of High Concentrated Wastewater from Waterborne Coating Production.....	ZHUANG Xiao-jie ZHENG Chong-xiang SONG Lin-xiao LUO Jiang	74
Study on Effect of Electrochemical Pretreatment on Sludge Properties.....	LI Jia-xin YU Qiang LV Hui-jing ZHANG Xing-hua LI Jia ZHANG Qi-kai WANG Xi-zhe	76
Application of Pickering Emulsion in Pyrethroid Pesticide Water Emulsion.....	GONG Lou-lou WANG Chen-yu LIN Wei-qiang SUN Ping BAO Shu-rong XIE Dan-hua	80
Numerical Simulating on Cold Stamping of 22MnB5 Ultra-high Strength Steel.....	LI Qi JI Sha-sha LIU Yong-gang GU Hai-rong WANG Zhang-zhong LV Xue-peng	83
Synthesis and Bactericidal Performance of An Anhydrous Glycerol Suspension Contained Submicron Silver.....	MIAO Wei-feng XIONG Ying YANG Jie ZHONG Liang CHEN Shuo-ping	85
Study on Antibacterial Activity of Polyacid Antibacterial Agent Grafted Wood Plastic Materials.....	ZHANG Cheng-li YANG Wan-li CHEN Lin MA Rong-hua	90
Study on Hydrophobic Modification of Ammonium Polyphosphate Surface.....	YAO Guang-xu ZHANG Xiao-guo ZHANG Feng-zhen DU Huai-ming	94

Study on Extracted Technology of Anthocyanin from Purple Sweet Potato.....	FENG Liang PENG Zhou-yu TAN Zeng-yong YANG Yan 97
Optimization of Ultrasound-assisted Extraction of Flavonoids from Radix Paeoniae Rubra by Response Surface.....	WANG Xin HAO Xiao-liang WANG Yong GAO Yun QUAN Yan-ling 101
Effects of Different Trace Elements on Metabolism and Absorption of Pleurotus Edodes.....	
FU Zhen-jie ZHU Chang-jun GAO Ying CHEN Yin-rui ZHU Meng-xia WANG Meng-xing ZHANG Dan HUANG Le 104	
Material and Property Design of High Performance Pressure Vessel for Water Treatment.....	QIU Dong WANG Wei-li 107
Survey of pH, Organic Matter and Magnetic Susceptibility of Urban Soil in Xuzhou City.....	
MAO Ying-ming MIAO Jie-ru ZHU Shi-hao YAN Chang-yong 109	
Optimization of Flash Extraction of Total Polyphenols from Leaves of <i>Eriobotrya japonica</i> Lind by Response Surface Methodology.....	ZHANG Yun YANG Chen HUANG Jin-qiu XU Xiu-quan 112
Detection of Product Isolated from Crude Ethyl Acetate Extract of <i>Inonotus obliquus</i>	
LI Yong-xin ZHU Chang-jun ZHANG Yun-yang SUN Li-rong MAO Xuan-yu LI Zi-long ZHU Hong-wei 117	
Determination of 11 Kinds of Organochlorine Pesticides in Rose Roxburghii Tratt by Gas Chromatography with Accelerated Solvent Extraction.....	ZHAO Jun WU Kun LAN Shi-chao 120
Determination of Rare Earth Elements in Omphacite by ICP-MS.....	
ZHANG Nan ZENG Jiang-ping ZHENG Zhi-kang WEI Shuang WANG Jia-song WANG Li-qiang 123	
Determination of Composition of Diesel Middle Distillate by Gas Chromatography-mass Spectrometry.....	ZHOU Li XU Jia LIU Zhao-gui 125
Determination of Thiocyanate in Urine by Isonicotinic Acid-Barbituric Acid Method.....	
TANG Shuang-shuang GUO Jia-ming YUAN Hao-qian WU Shi-hua ZHOU Li-ping LIU Yi-min 128	

Determination of Acetic Esters in Waste Gas by Thermal Desorption GC-MS.....	SHI Qin-zhi GAO Fei ZHOU Yan-kai ZHANG Lu FANG Ming-yue LIN Feng	130
Identification of Four Kinds of Green Tea by Fourier Transform Infrared Spectroscopy(ATR)	SHEN Na-na WU Xiao-xia	133
Test Method for Coating Weight of Manganese Phosphide.....	MU Jun-hong LIU Xiao-yan ZHU Jian-guo	135
Study on Influencing Factors of Determination of Trichloromethane in Water by Gas Chromatography...	LIU Jie-chun	138
Analysis of 320 m ² Sintering Flue Gas Ultra-low Emission Project.....	ZHOU Wei HUA Yu-long SUN Hong-li GAO Zheng-lai LIU Xi-liang HE Hui-qiang ZHANG Hong-wei	141
In-situ Thermal Desorption Technology: A Soil Remediation Technology for Low Permeability Soil.....	FANG Xing-bin ZHU Yi	144
Determination and Analysis of 2,3,7,8-TCDF in Environment around Waste Incineration Plants.....	HUANG Yu-xuan SONG Jia-ling HUANG Man-hong ZHANG Yue-yang	148
Study on River Environment and Water COD Change of Baicaogou in Baoding City.....	WANG Xiao-chen WANG Wei-chen DU Zhong-wen	151
Case of Soil Remediation Project of A Contaminated Site in Chongqing.....	BAI Juan CHENG Xi YIN Jun BAI Rui CHEN Ting	154
Study on Distribution Characteristics of Dissolved Organic Nitrogen in Hongze Lake.....	SUN Jing SHUI Huai-rui TIAN Jian-feng SUN Wei-jie HUANG Jin	158
Heavy Metal Pollution and Its Risk for Irrigation in Tongshan Section of Kuihe River.....	ZENG An-rong YANG Wei-hua RU Ling-yu CHEN Si-rui QIN Chao GAO Cheng	161
Chemical Cleaning for Welded Plate Heat Exchanger of Continuous Reforming Unit.....	YANG Fan	165
Situation and Problems of Intermittent Liquid Phase Body Method Petrochemical Device.....	XIE Ju-wen HUANG Zhi-hong	169

Cultivation of Students' Innovative and Scientific Ability Based on Designing Experiment of Medicinal Chemistry.....

ZHANG Ji-quan YANG Yuan-yong DONG Yong-xi MAO Yuan-hu FAN Ling-ling FU Xiao-zhong TANG Lei 172

Exploration of Aspen Plus Applied in Teaching of Extractive Distillation Experiment.....

.....HE Chu-hua YANG Peng-fei LIU Hui-jun DU Ke-jie WANG Yan-fei 175

Discussion on Teaching Reform and Practice of Water Pollution Control Engineering under the Background of Upgrade and Reconstruction Engineering.....

.....TAN Xue-mei LONG Liang-jun ZHONG Cheng-hua TANG Xiao-min 177

Construction of Inquiry Teaching Mode of Inorganic and Analytical Chemistry Experiment.....

.....YU Zhi-hui YU Chang-shun SONG Yu CAI Wei-jie ZHAI Bin CHEN Li-feng 180

A Case Study of Information Teaching Design of Measurement and Calculation of Reaction Heat.....

.....LIANG Xiao-rui SUN Xiao-wei GUO Yun-chao LI Yin WU Shi-yong 182

Promotion of Undergraduates' Practical Ability in Chemical Engineering by Aid of 3D Animation.....

.....XUE Feng WANG Sheng JU Shen-gui 184

Exploration on Classroom Teaching Methods of Polymer Materials Processing Engineering.....

.....CHEN Rong-yuan LIU Xin ZHANG Zhong-hou ZHANG Xiao-jing HAN Lin MA Li 187

Cultivation of Engineering Thinking in Teaching of Steam Power Cycle in Engineering Thermodynamics Course.....

.....ZHANG Wei BAI Yu-shi WANG De-wu LIU Yan ZHANG Shao-feng DENG Hui-ning 189

Study on Training Mode of Environmental Engineering Applied Talents Based on CDIO.....

.....DONG Yi-hua WANG Ying-gang WANG Hui WEI Jian-bing 191

Teaching Reform and Teaching Experience of Elementary Chemical Engineering under the Background of New Engineering.....

.....ZHOU Ji-liang JIN Shi-wei XIAO Yang CHEN Sheng-hui ZHAO Fu-zhen 195

Discussion on Course Contents of Environmentology for Environmental Engineering Major.....	
.....	
..ZHU An-dong WANG Zhong-quan ZHONG Jian-jun	197
Reform and Exploration on Organic Chemistry Experimental Teaching Based on O2O Teaching Model.....	
.....	
ZHANG Jin PENG Tian-ying HE Guo-wen ZHANG ling-jun	199
Reform on Teaching Mode of Instrumental Analysis Experiment.....	
.....WEI Quan-zeng ZHANG Yong-qing GUO Xiao-hui	201
Current Situation and Teaching Strategies of General Chemistry in Agricultural Universities.....	
.....	
.....QIN Xiang-dong ZHAO Hong-mei	203
Exploration of Ideological and Political Reform in Universities from the Perspective of Whole Course Education.....	
.....LIU Huan-ying	206
CAI Jing YU Xu-rong YANG Chun-guang ZHANG Bo-yu	
Reflections on Teaching Process of Physical Chemistry Experiment under “Three-wide Education” System	
.....	
.....QIAO Hong-tao SHI Yu-fang GUO Min-min	209
Reflection on Teaching Innovation about Pharmaceutical Analysis.....	
.....	
.....WANG Cong	211
Laboratory Safety Management of Biochemical Core Facilities Sharing Platform.....	
.....ZHANG Cheng-jia DONG Nan-nan	214

GUANGZHOU CHEMICAL INDUSTRY

Open Publishing

Established in 1973 (Semimonthly)

Vol.47 No.13

Jul. 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 : gzhgbjb@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