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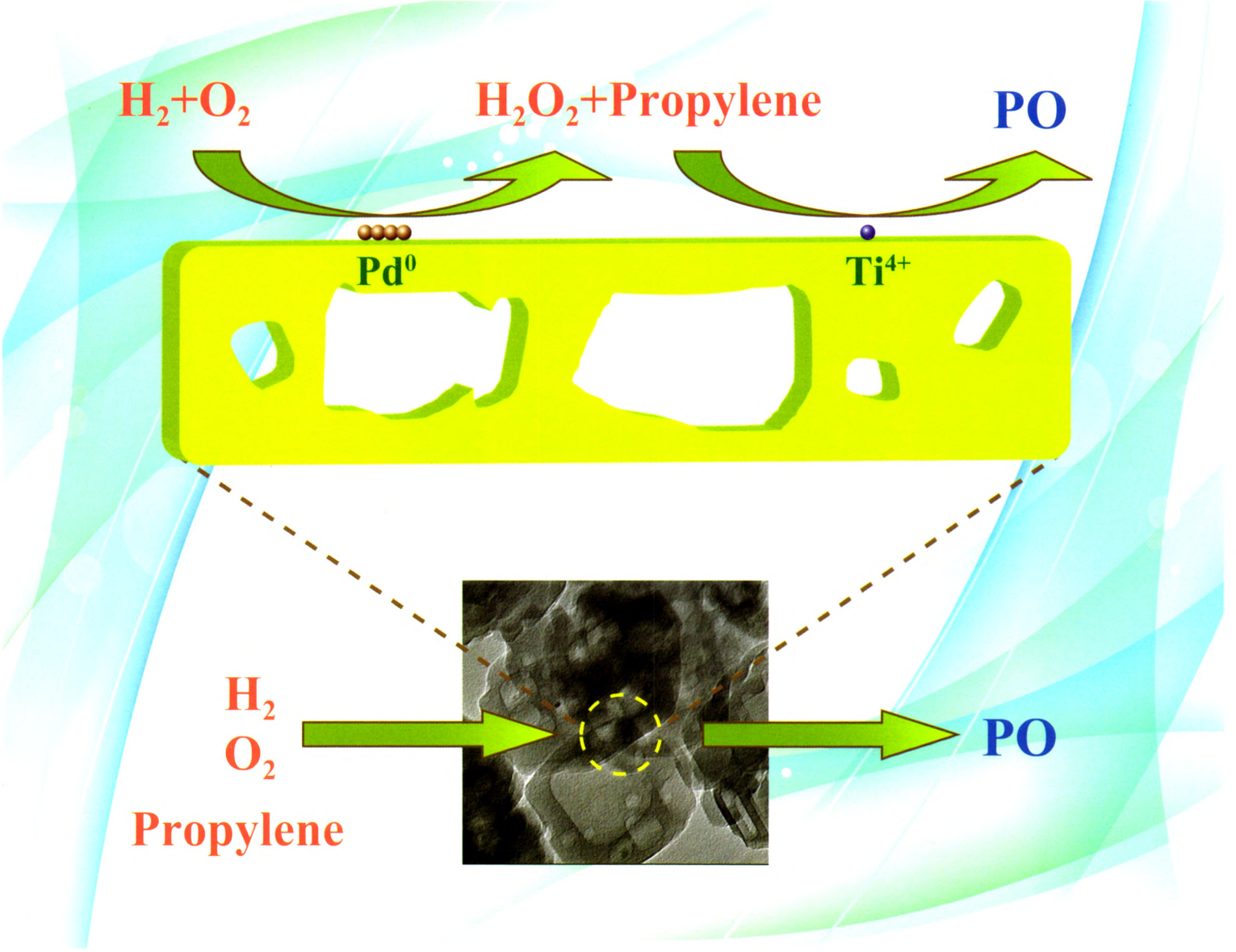
ACTA PETROLEI SINICA
(PETROLEUM PROCESSING SECTION)



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（石油加工）

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目 次

* 封面文章

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ACTA PETROLEI SINICA

(PETROLEUM PROCESSING SECTION)

Vol. 30 No. 2 Apr. 2014

CONTENTS

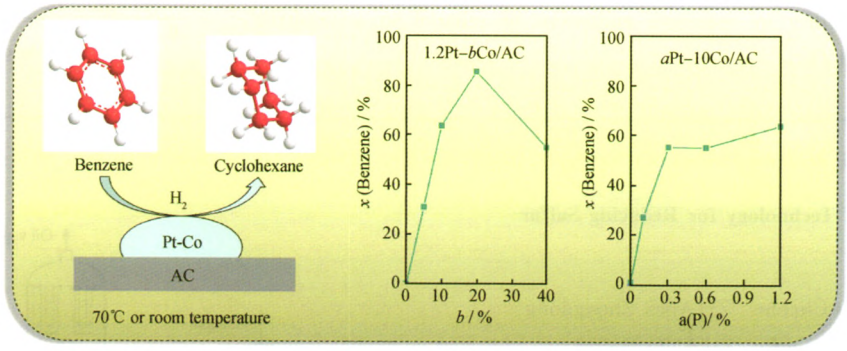
Research Articles

Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 211-217 **doi**: 10.3969/j.issn.1001-8719.2014.02.004

Effect of Metal Loadings on Pt-Co/AC Catalyst for Low Temperature Hydrogenation of Benzene

ZHENG Renyang LU Shuliang ZHU Yuexiang

Activated carbon supported Pt-Co bimetallic catalysts(Pt-Co/AC) were synthesized. The optimized metal contents on the catalytic activity of Pt-Co/AC for benzene hydrogenation were evaluated. The Pt-Co/AC catalyst with Pt content of 0.3% showed the excellent performance for benzene hydrogenation at atmospheric pressure and both 70℃ and room temperature.

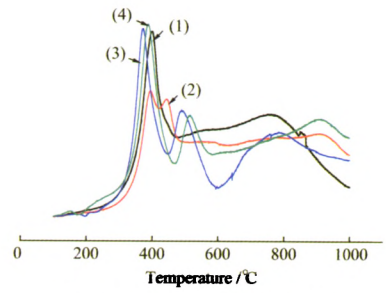


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 218-223 **doi**: 10.3969/j.issn.1001-8719.2014.02.005

Effect of the Modification by Citric Acid Cooperating With Phosphorus on the Hydrodenitrogenation Performance of Ni-Mo/Al_2O_3 for Coking Gas Oil

LÜ Weichao ZHOU Yasong LI Ruifeng WEI Qiang LUO Yi LIU Tingting

The hydrotreating catalyst Ni-Mo/γ-Al_2O_3 was modified by phosphorus cooperating with citric acid to improve its reduction performance and acid content. On the surface of the modified catalyst both the amount of acid increased and HDN activity was remarkably promoted, because more Mo species of high activity were formed, the dispersion of active components was increased and most of MoS_2 nanoparticles were dilayered and trilayered.



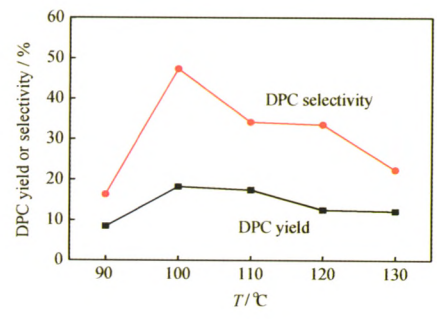
(1) Ni-Mo/Al_2O_3; (2)Ni-Mo-P/Al_2O_3; (3) Ni-Mo-CA/Al_2O_3; (4)Ni-Mo-P-CA/Al_2O_3

Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 224-230 **doi**: 10.3969/j.issn.1001-8719.2014.02.006

Preparation of Novel Amino Acid Heterodinuclear Schiff Base Complex Catalyst Supported on ZSM-5 and Its Catalytic Performance in Oxidative Carbonylation of Phenol

CHENG Qingyan ZHOU Jie WANG Yanji ZHAO Xinqiang

A novel catalyst of ZSM-5 supported heterodinuclear Pd(Ⅱ)-Cu(Ⅱ) complex with Schiff base of salicylaldehyde-*L*-leucine (CuPdTS/ZSM-5) was prepared by microwave-assisted solvothermal method of fractional steps. The catalytic performance of CuPdTS/ZSM-5 in oxidative carbonylation of phenol to diphenyl carbonate (DPC) was investigated. The DPC yield was 18.3% under the reaction temperature 100℃, reaction time 8 h and $Cu(OAc)_2$ 0.03 g.

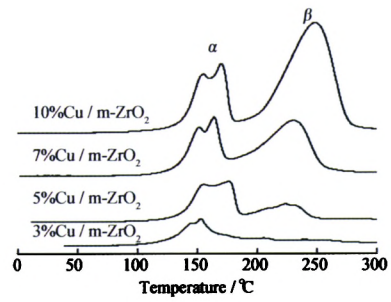


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 231-238 **doi**: 10.3969/j.issn.1001-8719.2014.02.007

Comparison of Catalytic Performances of Cu/m-ZrO_2 and Cu/γ-Al_2O_3 for Reductive Amination of Ethanol to Acetonitrile

HU Yunfeng LI Junfei DENG Jun JIANG Guangshen ZHANG Hongsheng

In the H_2-TPR profiles of Cu/m-ZrO_2 catalysts, all the samples exhibited two reduction peaks (α, β) in the temperature range of 130 — 270℃ except for the sample containing Cu loading of 3%. It was suggested that the peak β was due to bulk CuO and the peak α to highly dispersed CuO. Satisfactory catalytic results were closely related with CuO, so Cu/m-ZrO_2 with low Cu loading (e.g. 5%) had better activity and stability in reductive amination of ethanol to acetonitrile, compared with Cu/γ-Al_2O_3.

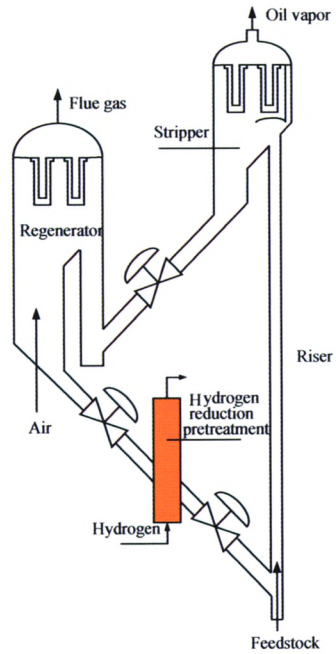


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 239-244 **doi**: 10.3969/j.issn.1001-8719.2014.02.008

Research on Novel FCC Technology for Reducing Sulfur Content in Gasoline

LIU Zhaoyong YANG Chaohe ZHANG Zhongdong
WANG Zhifeng GAO Yongfu ZHANG Haitao
GAO Xionghou

The evaluation results of pilot riser with H_2 reduction pretreatment showed that sulfur mass concentration of gasoline decreased from 880 μg/mL to 515 μg/mL, when the H_2 reduction pretreatment temperature was 650℃, H_2 reduction time was 20 min, catalyst was c, and H_2 flow rate was 40 L/h.

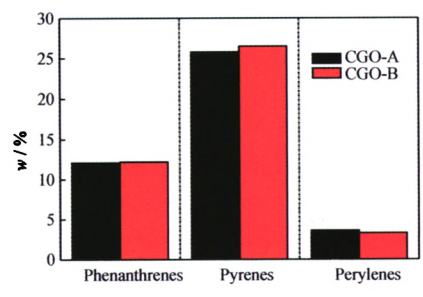


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 245-255 **doi**: 10.3969/j.issn.1001-8719.2014.02.009

Composition and Structure Characterization of Coker Gas Oils Derived From FCC Decant Oil Before and After Hydrotreating

CAI Xinheng LIU Yingrong LIU Zelong FAN Qiming TIAN Songbai

GC-FID/MS and NMR data showed that coker gas oils derived from FCC decant oils with and without hydrotreating had different compound compositions, though their hydrocarbon group compositions were quite similar. The gas oil from hydrotreated FCC decant oil had less unsubstituted polycyclic aromatic and hetero-aromatic hydrocarbons, while more alkyl substituted aromatics and naphthenic-aromatics than from the unhydrotreated one.



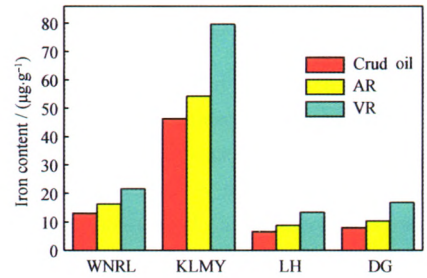
Results of aromatic types analysis

Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 256-261 **doi**: 10.3969/j.issn.1001-8719.2014.02.010

Content Distribution and Existing Form of Fe in Crude and Residual Oil

GAO Xin CAI Tingting ZHU Lijun ZHOU Yulu XIANG Yuzhi XIA Daohong

The Fe contents in Venezuela, Karamay, Liaohe, Dagang crude oil and their corresponding atmospheric residue (AR), vacuum residue (VR) increased with the boiling range rising and the Fe was mainly oil-soluble Fe. The investigation of Fe contents in SARA components showed that the Fe was mainly concentrated in resin and asphaltene.

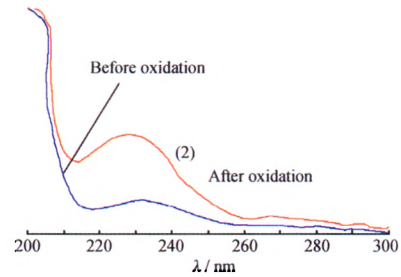


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 262-265 **doi**: 10.3969/j.issn.1001-8719.2014.02.011

FT-IR and UV Spectral Analysis of Biodiesel Before and After Oxidation

WU Jiang CHEN Boshui FANG Jianhua WANG Jiu

Cis-trans isomerization occurred of unsaturated FAME molecules and conjugated double-bond was produced in the oxidation process of biodiesel. The higher the mass fraction of unsaturated FAME with multi-double bonds in biodiesel and the more the conjugated double bonds, the poorer the oxidation resistance of biodiesel.

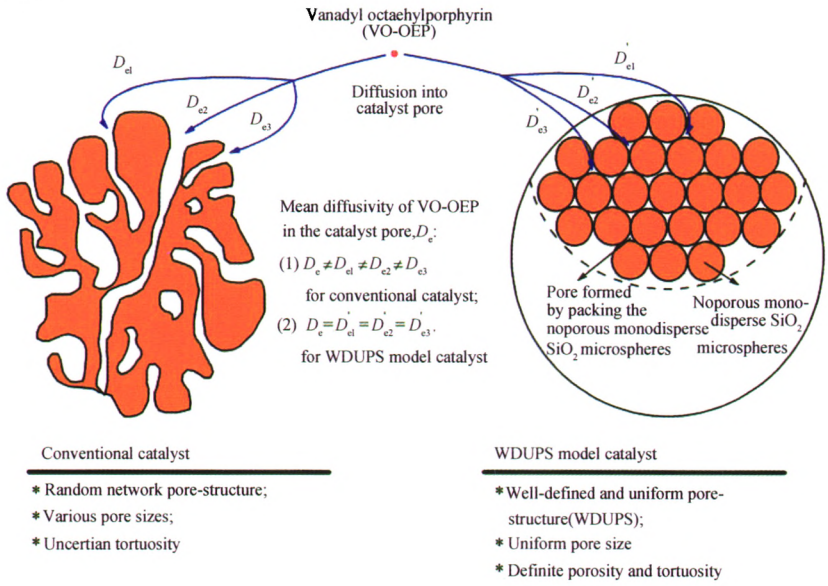


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 266-272 **doi**: 10.3969/j.issn.1001-8719.2014.02.012

Diffusion of Vanadyl Octaethylporphyrin in Well-Defined and Uniform Pore-Structure Model Catalyst

CHEN Aicheng CHEN Shengli LOU Yafeng CHEN Jing

Intraparticle diffusion of vanadyl 2,3,7,8,12,13,17,18-octaethylporphyrin (VO-OEP) was investigated over WDUPS (Well-Defined and Uniform Pore-Structure) $CoMo/Al_2O_3/SiO_2$ model catalysts under hydrodemetallization reaction of heavy oil. The intraparticle effective diffusivity and bulk diffusivity of VO-OEP obtained on the WDUPS model catalysts were more reliable than that on conventional catalysts.

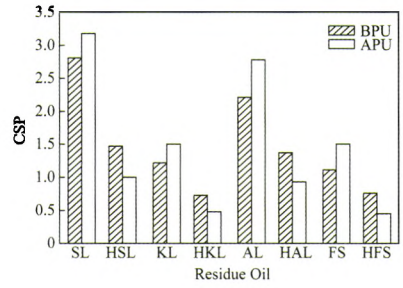


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 273-278 **doi**: 10.3969/j.issn.1001-8719.2014.02.013

Influence of Ultrasonic Treatment on Colloid Stability in Residue Hydrotreating

SUN Yudong ZHANG Qiang YANG Chaohe WANG Xue

The ultrasonic treatment has a strong influence on colloid stability of residue. The CSP of vacuum residue and the product distributions of residue hydrotreating were increased after ultrasonic treatment. But the CSP of hydrotreated residue from vacuum residue pretreated by ultrasonic was worse than that of untreated one. It was shown that the ultrasonic treatment could improve the properties and hydrotreating performance of vacuum residue.

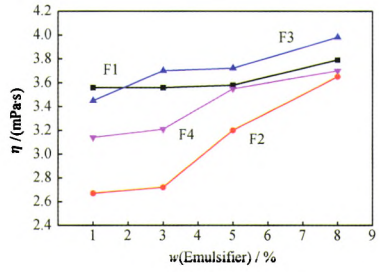


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 279-282 **doi**: 10.3969/j.issn.1001-8719.2014.02.014

Viscosity Characteristics of Methanol-Diesel Emulsions

JIAO Weizhou LI Jing LIU Youzhi LIU Wenli XU Chengcheng
GUO Liang JI Chunda REN Yuanyuan

For the methanol-diesel emulsions with the same composition, its viscosity increased with the increase of mass fraction and viscosity of emulsifier. The viscosity of the methanol-diesel emulsion enhanced with the increase of methanol mass fraction, when the contents of other components were constant.

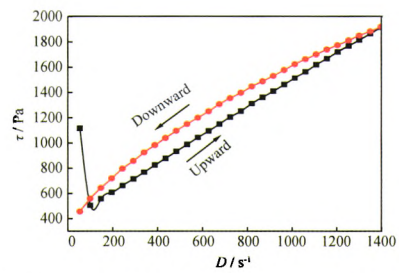


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 283-290 **doi**: 10.3969/j.issn.1001-8719.2014.02.015

Thixotropy Effects of Nano-SiO_2 Composite Grease Fluids

ZHANG Guoliang KE Yangchuan YANG Liyan ZHAO Yangyang DU Shouqin

The composite lubricating grease containing nano-SiO_2 with larger specific surface area could easily become a homogeneous non-thixotropic fluid, which significantly induced the negative thixotropic loop as the temperature rising. The negative thixotropy of the grease appeared when the shear stress of the uplink was less than that of the downlink. The negative thixotropy phenomenon would reduce the stability of lubricating greases.



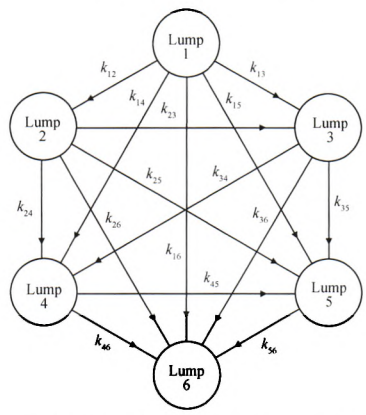
Shear rate: 4—1500 s^{-1}; Test temperature: 50 ℃

Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 291-297 **doi**: 10.3969/j.issn.1001-8719.2014.02.016

Study on Kinetics of Medium Temperature Coal Tar Hydrocracking

SUN Jinmeng LIU Xin LI Dong CUI Louwei LI Xuekun
SUN Zhihui LI Wenhong

A new six-lump kinetic was established according to four-component raw oil and the cut fraction of product oil. The model were solved with the fourth order variable step Runge-Kutta and optimized with variable metric method(BFGS) in Visual C++. The relative error of the model was within 3%, showing a good predictability.



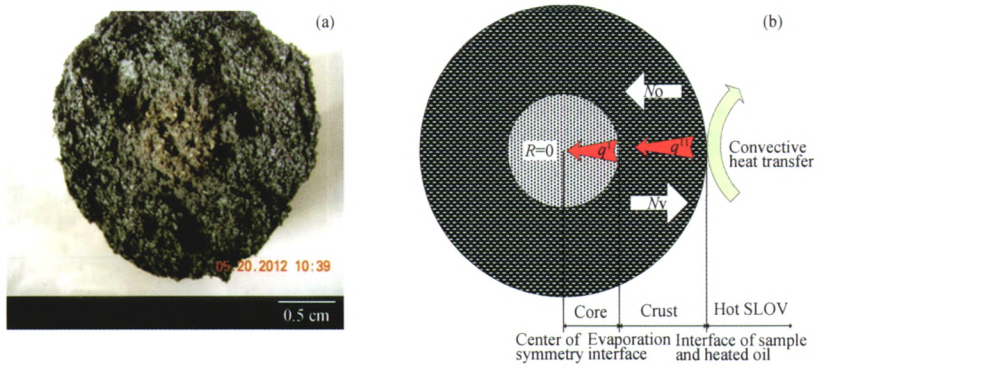
Lump 1——Asphaltene+Gelatine; Lump 2——Aromatics;
Lump 3——Saturates; Lump 4——Diesel;
Lump 5——Gasoline; Lump 6——Gas

Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 298-304 **doi**: 10.3969/j.issn.1001-8719.2014.02.017

Analysis of the Coupled Heat and Mass Transfer During Fry-Drying Process of Oily Sludge

ZHANG Ke ZHU Jianhua ZHOU Yong WU Bencheng

The frying process of oily sludge sample could be treated as Stephan type problem. During this procedure, there existed a moving interface which divided the sample into two regions, the crust and the core. With the frying time increasing, the thickness of crust increased and that of core decreased.



N_o—Diffusion of SLOV; N_v—Diffusion of vapor; q^I—Heat conduction of the core; q^{II}—Heat conduction of the crus

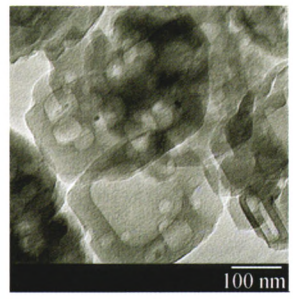
The 17th Chinese Zeolite Conference

Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 305-310 **doi**: 10.3969/j.issn.1001-8719.2014.02.018

Synthesis and Characterization of Hierarchical Porous Dual-Functional Titanosilicate

SHI Chunfeng ZHU Bin LIN Min LONG Jun

The characterization and catalytic performance results showed that RN-1 particle possessed hierarchical pores, which were micropores, mesopores and even macropores, and certain amount of high dispersed metal Pd. The Ti element in RN-1 was mainly in framework. RN-1 is an excellent catalyst in the direct production of propylene oxide (PO).

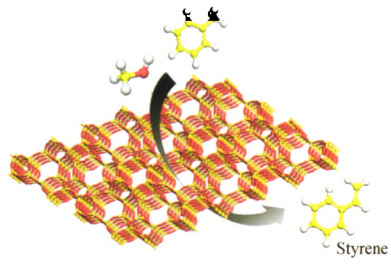


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 311-319 **doi**: 10.3969/j.issn.1001-8719.2014.02.019

A Review About Side-Chain Alkylation of Toluene With Methanol to Produce Styrene

XU Feng QIN Lihong LIU Yalu YU Chunmei YUAN Zhongyong

Catalyst systems and reaction mechanism of the side-chain alkylation of toluene with methanol to produce styrene were systematically reviewed, and the existing problems and corresponding suggestions were summarized in detail.

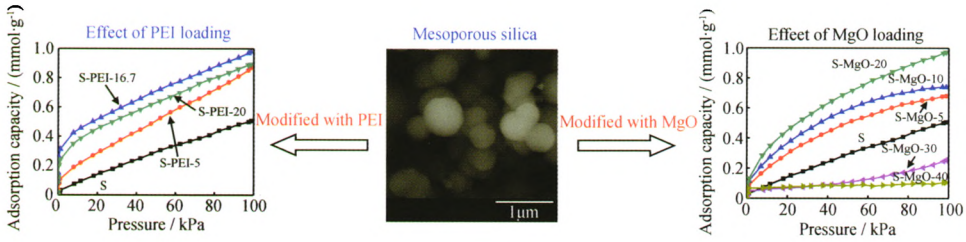


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 320-327 **doi**: 10.3969/j.issn.1001-8719.2014.02.020

Synthesis of Functionalized Mesoporous Silica and Its Performance for CO_2 Adsorption

ZHANG Lina WANG Hao QIN Zhangfeng FAN Weibin WANG Jianguo

Novel CO_2 adsorbents were prepared by modification of the mesoporous silica with PEI and MgO. Highest CO_2 adsorption capacity of PEI-loaded mesoporous silica was achieved at a PEI loading amount of 16.7%, while an MgO loading amount of 20% gave the adsorbent the highest CO_2 adsorption capacity.

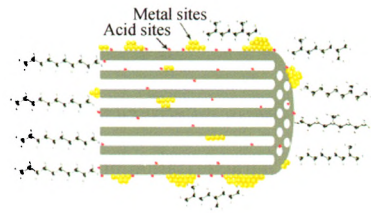


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 328-335 **doi**: 10.3969/j.issn.1001-8719.2014.02.021

The Influence of Silicon and Aluminum Species on Physicochemical Properties and Catalytic Performance of SAPO-31 Molecular Sieve

WU Huimin XIAO Linfei BAI Xuefeng WU Wei ZHAO Aijuan
QI Weixin ZHANG Rui

Silicoaluminophosphate SAPO-31 molecular sieves were synthesized with different silicon and aluminum species. The effects of silicon and aluminum species on the characteristics of synthesized SAPO-31 and the catalytic performance in *n*-decane hydroisomerization were investigated. The Pd/SAPO-31 in which SAPO-31 was synthesized with silica sol and pseudoboehmite demonstrated the excellent catalytic performance in *n*-decane hydroisomerization.

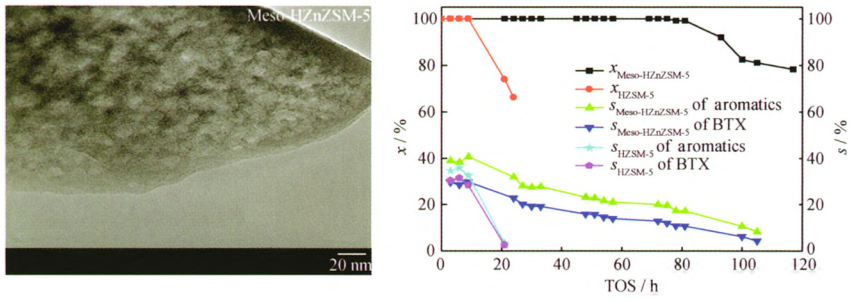


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 336-342 **doi**: 10.3969/j.issn.1001-8719.2014.02.022

Synthesis of Mesoporous HZnZSM-5 Zeolite and Its Catalytic Performance in Methanol Aromatization

WANG Xiaoxing ZHANG Tao ZHANG Junfeng XIE Hongjuan HAN Yizhuo TAN Yisheng

Meso-HZnZSM-5 showed an evidently improved catalytic stability in comparison to HZSM-5 due to the presence of mesoporous channels and reduced strong acid sites. Moreover, the decreased rates of aromatics and BTX selectivity of methanol aromatization over Meso-HZnZSM-5 were much slower than those over HZSM-5.

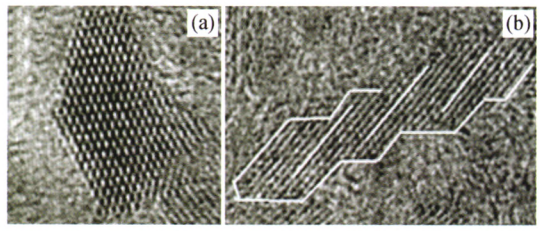


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 343-347 **doi**: 10.3969/j.issn.1001-8719.2014.02.023

Synthesis of TiO_2 Nanocrystallites With High Photocatalytic Performance in the Presence of Lauric Acid

WANG Juan ZHAO Huali WANG Shuyu GUO Yanxia ZHOU Huijing LIU Yuping

By using tetrabutyl titanate as Ti source, TiO_2 nanocrystallites were successfully synthesized through a solvothermal route in the presence of lauric acid. The growth of TiO_2 nanocrystallites prepared with lauric acid followed OA growing mechanism.



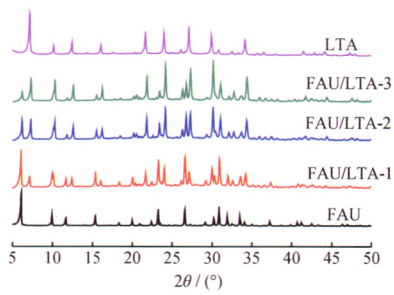
$n(LD)/n(TBT)=5$; $T=200℃$

Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 348-352 **doi**: 10.3969/j.issn.1001-8719.2014.02.024

Characterization and Performance of FAU/LTA Co-Crystalline Zeolite Synthesized by Lithium Slag

ZHUANG Qiang LIN Guo CUI Qun WANG Haiyan

Three FAU/LTA co-crystaline zeolites (FAU/LTA-1, FAU/LTA-2, FAU/LTA-3) with different mass proportions of FAU to LTA were synthesized by hydrothermal method with lithium slag as Si and Al sources. The cation (Ca^{2+} and Mg^{2+}) exchange capacities of FAU/LTA co-crystaline zeolite were outstanding, so there will be an excellent application prospect for replacing 4A as detergent builder.

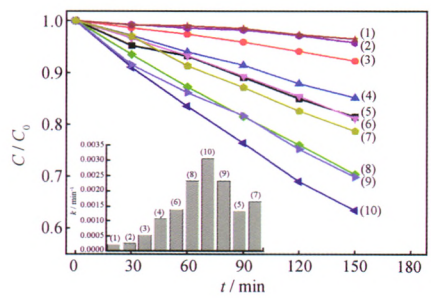


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 353-358 **doi**: 10.3969/j.issn.1001-8719.2014.02.025

Preparation and Photocatalytic Activity of ZnO/mpg-C_3N_4 Composite Photocatalyst

WANG Kewei CHANG Jianli REN Tiezhen CHEN Daimei

ZnO/mpg-C_3N_4 composite photocatalyst with high visible light activity was successfully synthesized by solvothermal method. The ZnO/mpg-C_3N_4 (80%) composite sample possessed the highest visible light photocatalytic activity, which was almost 2.3 times as high as that of pure mpg-C_3N_4.

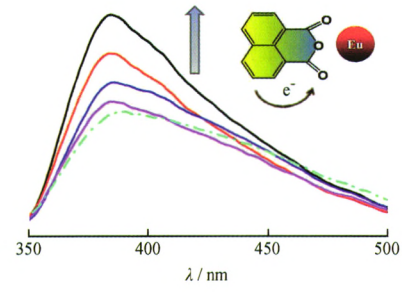


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 359-364 **doi**: 10.3969/j.issn.1001-8719.2014.02.026

Characterization and Luminescent Performance of Hybrid Bimodal Mesoporous Silicas Loading Europium Chloride Modified 1,8-Naphthalic Anhydride

WANG Feng BAI Shiyang WU Xia WANG Jinpeng SUN Jihong

The modification of Eu^{3+} for 1,8-naphthalic anhydride loaded on bimodal mesoporous silicas (BMMs) enhanced the luminescence performances of LHMS.

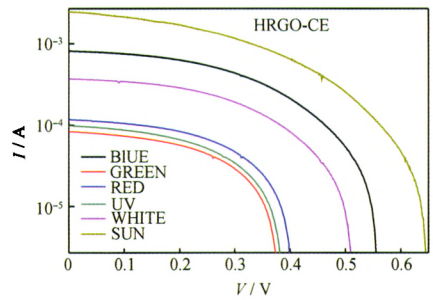


Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 365-370 **doi**: 10.3969/j.issn.1001-8719.2014.02.027

Application of Titanium Dioxide Parceled With Graphene in Counter Electrodes of Dye-Sensitized Solar Cells

CHANG Jianli WANG Kewei XU Qianqian GAO Sumei REN Tiezhen

By using the graphene parceled with commercial titanium dioxide (P25) as counter electrodes, the DSSC batteries were assembled. The electrochemical properties of the batteries were tested under different lights. Experimental results showed that the graphene prepared by hydrozine hydrate reducing method possessed good photo-electrochemical performance.



Review

Acta Petrolei Sinica (*Petroleum Processing Section*), 2014, 30(2): 371-378 **doi**: 10.3969/j.issn.1001-8719.2014.02.028

Current Status in Reducing Acid Value of Biodiesel Raw Materials and Products

CHEN Yanfeng DU Zexue ZHANG Wei

Reducing the acid value of biodiesel raw material and the product is a hot research topic in preparation of biodiesel. The development of deacidification techniques was reviewed including acid-base catalytic method, supercritical method, enzyme catalysis and adsorption methods. And the future trend of deacidification technique was proposed.

$$RCOOH+CH_3OH \overset{Cat}{\rightleftharpoons} RCOOCH_3+H_2O$$

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