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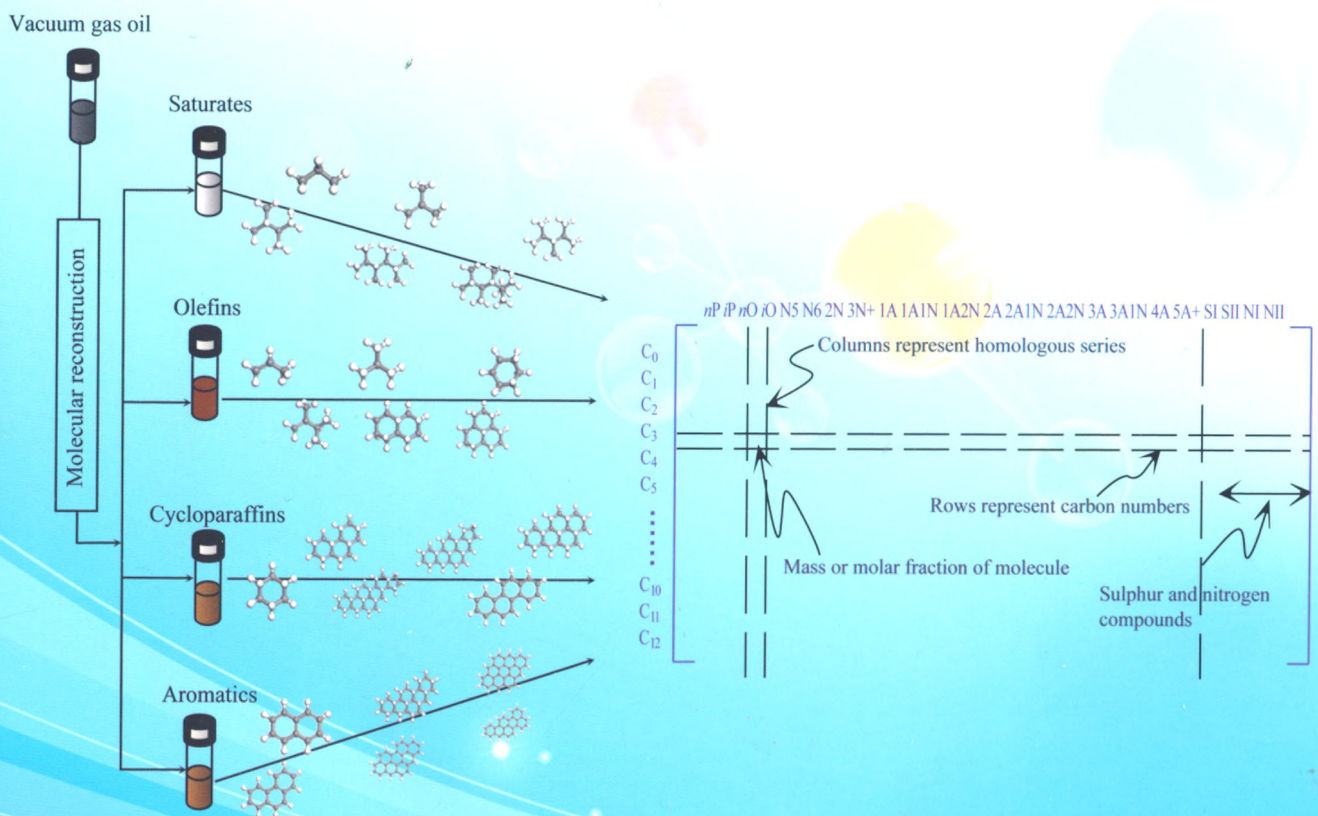
ACTA PETROLEI SINICA
(PETROLEUM PROCESSING SECTION)



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（石油加工）

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ACTA PETROLEI SINICA

(PETROLEUM PROCESSING SECTION)

Vol. 28 No. 6 Dec. 2012

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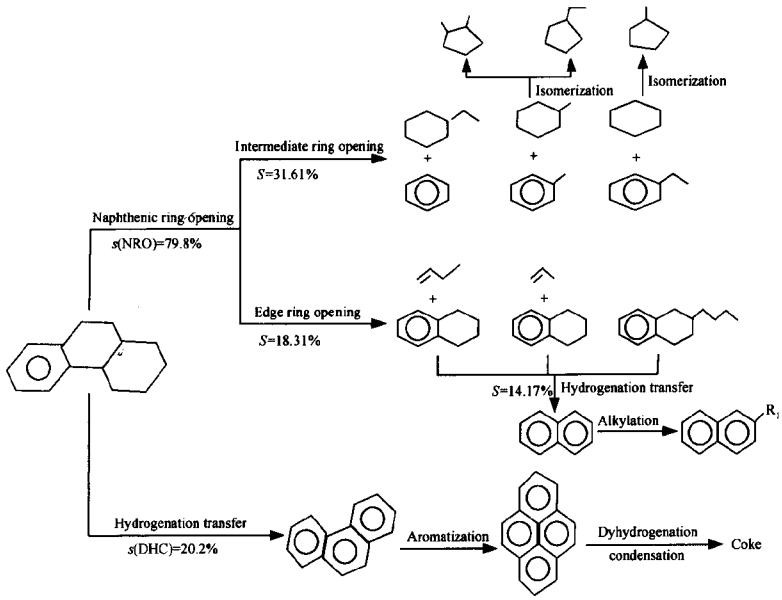
Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 900-906 **doi**: 10.3969/j.issn.1001-8719.2012.06.003

Naphthenic Ring Opening of Octohydrophenanthrene Over Zeolite Catalysts

TANG Jinlian XU Youhao WANG Xieqing

Experiments data from fixed fluidised bed unit showed that naphthenic ring opening reactions of octohydrophenanthrene over zeolite catalysts occurred easily with the mass selectivity of 79.8% over Y catalyst at 500℃, catalyst/oil mass ratio of 6 and MHSV of 10 h^{-1}. Mole selectivities of intermediate naphthenic ring and edge naphthenic ring being opened were 31.61%, 18.31%, respectively.

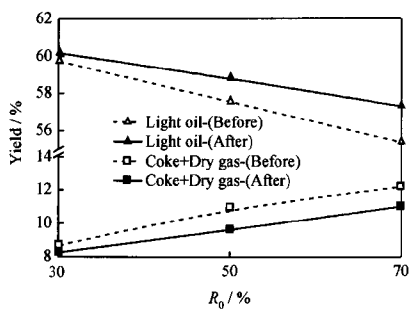


Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 907-912 **doi**: 10.3969/j.issn.1001-8719.2012.06.004

Catalytic Cracking Performance of Heavy Oil After Fractionation

GAO Haohua WANG Gang ZHANG Zhaoqian
BAI Yuehua GAO Jinsen

Compared with heavy oil before being cut, the product distribution of heavy oil after being cut was improved, resulting in the light oil increased and the coke plus dry gas decreased. With the increase of blending ratio of VR in heavy oil, the advantage after being cut was more obvious.

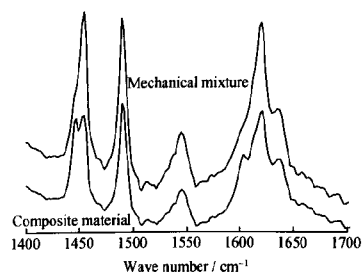


Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 913-919 **doi**: 10.3969/j.issn.1001-8719.2012.06.005

Synthesis of β-MCM-41 and Its Application in Gasoline Isomerization/Hydrodesulfurization

XU Nan LIANG Naisen ZHANG Shunguang DUAN Yan HOU Kaihu

The β-MCM-41 meso-microporous molecular sieve composite was synthesized by hydrothermal method with β zeolite as silica source. Compared with the catalyst supported on the support obtained by the mechanical kneading method, the activities of isomerization and HDS of the catalyst Co-Mo/β-MCM-41 were higher.

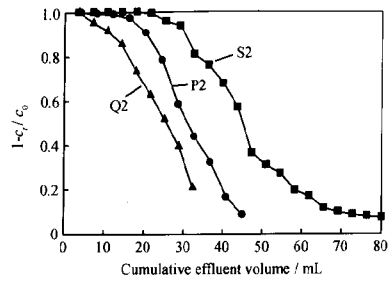


Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 920-926 **doi**: 10.3969/j.issn.1001-8719.2012.06.006

Effects of Toluene and Pyridine on the Desulfurization Properties of Ag/TiO_2-NaY

SONG Hua WANG Deng MU Jincheng

The TiO_2-NaY complex support was prepared by the sol-gel method and the Ag/TiO_2-NaY sorbent was prepared by the impregnation method. The anatase TiO_2 is the main phase in AgTY and the Y-zeolite framework of TY was unchanged compared with NaY.

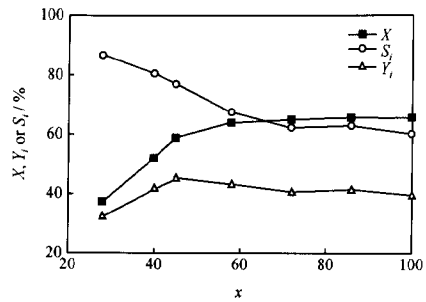


Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 927-932 **doi**: 10.3969/j.issn.1001-8719.2012.06.007

Effect of Partial NH_4^+ Exchange on *n*-Butene Skeletal Isomerization Catalytic Performance of FER Zeolites

ZHOU Feng CHEN Ming ZHANG Shumei QIAO Kai

A series of ferricrite zeolites with different NH_4^+ exchange levels were prepared by partial NH_4^+ exchange method. With the NH_4^+ exchange level of HF-x increasing, the initial *n*-butene conversion of *n*-butene skeletal isomerization over HF-x increased, while the isobutene selectivity decreased. The initial isobutene yield of *n*-butene skeletal isomerization reached its maximum value over HF-45(The NH_4^+ exchange level of 45).



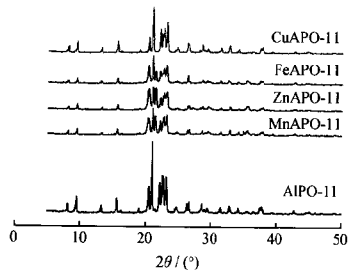
θ=350℃; Atmospheric pressure; MHSV= 4 h^{-1}; t=10 min

Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 933-939 **doi**: 10.3969/j.issn.1001-8719.2012.06.008

Synthesis and Catalytic Properties of MeAPO-11 Molecular Sieves for Phenol Hydroxylation

SHAO Hui CHEN Xia WANG Binbin ZHONG Jing YANG Chao

Me-substituted aluminophosphate molecular sieves with AEL framework MeAPO-11(Me is Cu、Fe、Zn、Mn)were synthesized and characterized, and used as the catalyst in phenol hydroxylation. The investigation revealed that it was possible to incorporate transition metal atom into the AEL framework. Such incorporation could increase the catalytic performance of the aluminophosphate molecular sieves in phenol hydroxylation.

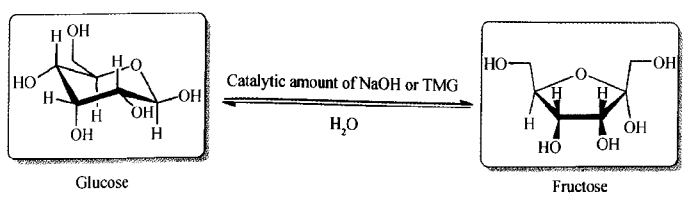


Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 940-949 **doi**: 10.3969/j.issn.1001-8719.2012.06.009

Isomerization of Glucose to Fructose in Aqueous Solution With a Catalytic Amount of Inorganic or Organic Base

JIA Songyan LIU Min GONG Yanyan FENG Jianping GUO Xinwen

Glucose could be isomerized to fructose in aqueous solution with only a catalytic amount of NaOH or TMG. When excess bases were added, the isomerization of glucose proceeded drastically with a maximum 40% yield of fructose, while glucose and fructose would be degraded intensively after longer reaction time.



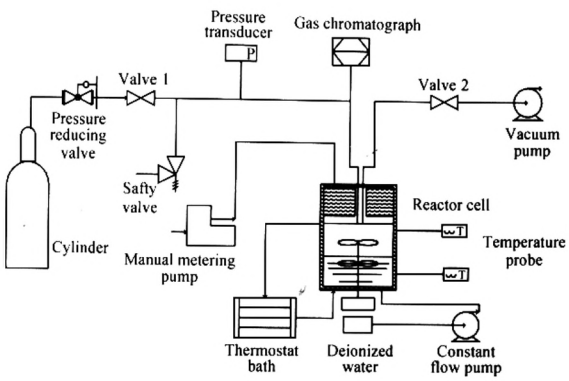
Glucose Fructose

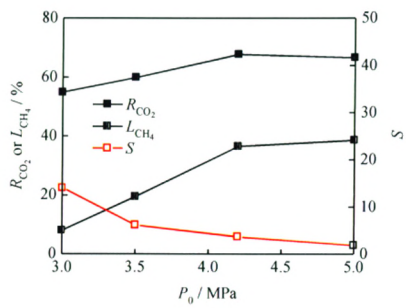
Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 950-956 **doi**: 10.3969/j.issn.1001-8719.2012.06.010

Influence Factors of Hydrate-Based Separation for Natural Gas Deacidification

TANG Jianfeng ZENG Dalong WANG Chuanlei CHEN Yuliang HE Limin FU Hao

The effects of initial system pressure, temperature, tetrahydrofuran (THF) concentration and water volume on hydrate-based natural gas deacidification efficiency were studied through experiments. It is concluded that the natural gas hydrate-based deacidification could be improved under the conditions of higher initial pressure, lower temperature, 1.0% mole fraction of THF added and adequate water volume.



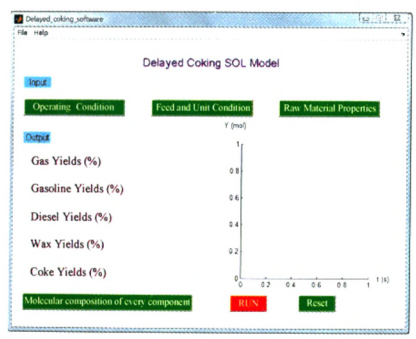


Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 957-966 **doi**: 10.3969/j.issn.1001-8719.2012.06.011

Building a Kinetic Model of Delayed Coking With Structure Oriented Lumping

TIAN Lida SHEN Benxian LIU Jichang

With the help of the concept of structure oriented lumping, a molecular kinetic model of delayed coking has been built. The proposed model achieved the prediction of the products distribution from delayed coking with enough precision.

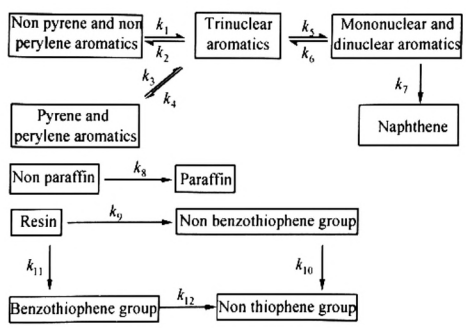


Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 967-972 **doi**: 10.3969/j.issn.1001-8719.2012.06.012

The Eleven Lumped Macrokinetics Model for Hydrotreating Reactions of FCC Recycle Oil

ZHANG Kui DAI Lishun LIU Tao NIE Hong

Hydrogenation reaction kinetics network of the FCC recycle oil was studied through the lump division method, and the eleven lumped macrokinetics model for hydrotreating reactions of FCC recycle oil had application value for hydrotreating process development and hydrotreating reactor optimization of FCC recycle oil.

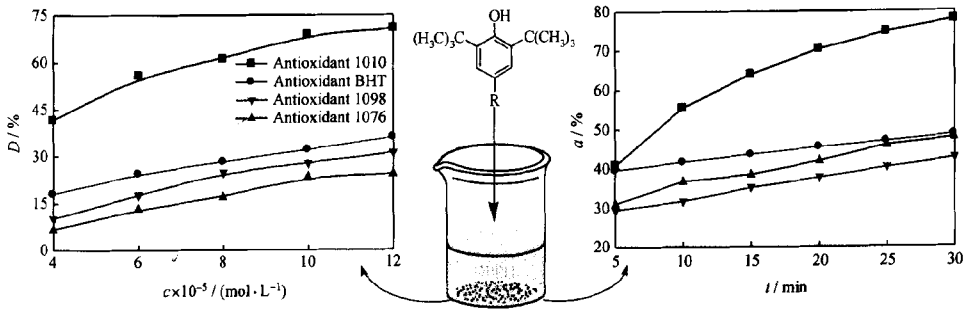


Acta Petrolei Sinica (Petroleum Processing Section), 2012, 28(6): 973-977 **doi**: 10.3969/j.issn.1001-8719.2012.06.013

Study on the Antioxidant Capacity and Kinetics of Polyolefin Antioxidant by Using DPPH Method

WANG Jun SHI Chunxia LI Cuiqin WEI Yujia

Free radical scavenging abilities of polyolefin antioxidants were evaluated by DPPH · assay, and antioxidants reaction kinetics were studied. Four antioxidants had good DPPH · scavenging abilities and the DPPH · scavenging rates gradually increased with the increase of the antioxidants concentration, and increased first and then became steady along with the scavenging time. The antioxidation efficiency of the four polyolefin antioxidants from high to low was in order of antioxidant 1010, antioxidant 1098, antioxidant BHT, antioxidant 1076.

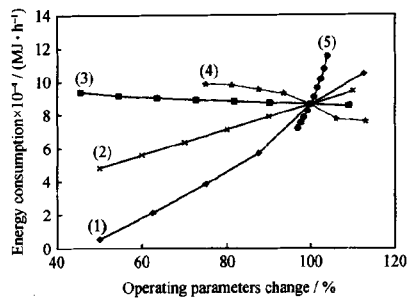


Acta Petrolei Sinica (Petroleum Processing Section), 2012, 28(6): 978-985 **doi**: 10.3969/j.issn.1001-8719.2012.06.014

Simulation Study on the Impact of Operating Conditions on Energy Consumption in High-Sulfur Natural Gas Desulfurization

QIU Kui AN Pengfei YANG Funing ZHU Lin
KIM Sungyoung BAGAJEWICZ Miguel

The impacts of operating conditions, such as feed gas processing capacity, absorber temperature, absorber pressure, number of absorber trays, stripper temperature, on energy consumption in high-sulfur natural gas desulfurization were different. The primary factor affecting the energy consumption was the stripper temperature, the second factor was absorber temperature. The number of absorber trays was the weakest factor affecting the energy consumption.



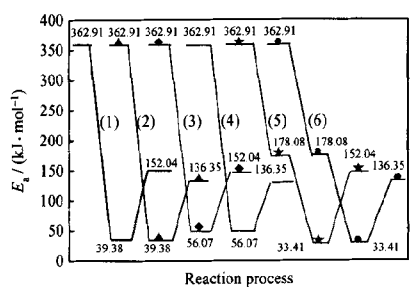
(1) Absorber temperature; (2) Feed gas load; (3) Number of absorber plates; (4) Absorber pressure; (5) Stripper temperature

Acta Petrolei Sinica (Petroleum Processing Section), 2012, 28(6): 986-990 **doi**: 10.3969/j.issn.1001-8719.2012.06.015

Molecular Simulation of Propane Pyrolysis Reaction

ZHANG Hongmei GU Pingping ZHANG Hanwei
ZHAO Liang

By taking propane for a target, analyzing molecular simulation calculation on the reaction kinetics, a new technique was established for a kinetic model of steam hydrocarbon pyrolysis reaction.

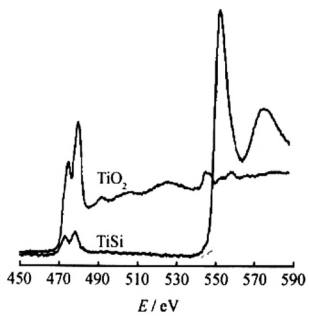


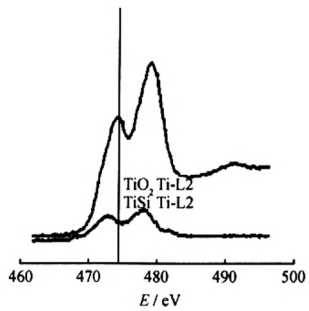
Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 991-994 **doi**: 10.3969/j.issn.1001-8719.2012.06.016

Basic Research for TS-1 Zeolite With Electron Energy Loss Spectroscopy

ZHENG Aiguo XIANG Yanjuan ZHU Bin ZHANG Jin LIN Min XU Guangtong

The analysis electron microscopy was used to analyze the EELS spectra of Ti in TS-1 zeolite. The difference of Ti-L_2 and Ti-L_3 in TiO_2 and TS particles was 1 eV, which could be a proof for Ti atoms engaging into the framework of TS-1.



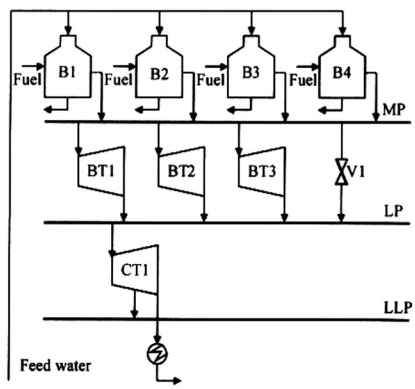


Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 995-1000 **doi**: 10.3969/j.issn.1001-8719.2012.06.017

Optimal Multi-Period Operational Planning for Steam Power System Under Low-Carbon Economy

DAI Wenzhi YU Jingmei YANG Xinle

An operational planning model for steam power system was proposed, which was of two levels for the least CO_2 emission and lowest operation cost, and the strategy of distribution solving was put forward. The strategy of distribution solving reduced the computational complexity. Optimized by the model, the cost for reducing CO_2 emission was about 11 Yuan RMB/t.



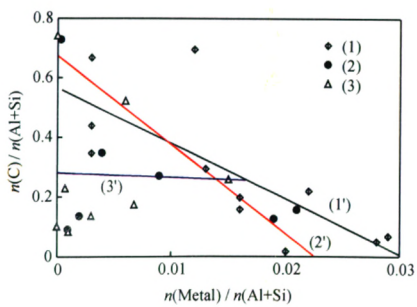
Research Notes

Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 1001-1005 **doi**: 10.3969/j.issn.1001-8719.2012.06.018

Gasification Reactivity of Coke on Contact Materials

MEN Xiujie ZHANG Shuhong ZHANG Meiju LI Yanjun
WANG Zijun WANG Xieqing

There was a co-relationship between the lower carbon content and the higher one of elemental metals such as Fe, Ca in a tiny area of contact material, which inferred the catalytic effects of metal. However, it was an evidence of mainly non-catalysis process for coke gasification as the reaction began with higher carbon content on catalyst.



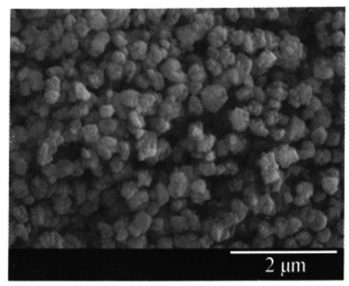
Correlated line (1'), (2') and (3') relevant to total carbon mass fraction on contact materials (1) 0.45%, (2) 0.88%, (3) 1.26%, respectively

Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 1006-1011 **doi**: 10.3969/j.issn.1001-8719.2012.06.019

Rapid Synthesis of Small Zeolite Y Crystals in the Absence of Seed Gel

YUAN Hao LI Gang

Zeolite Y crystals of *ca.* 0.3 μm in size were obtained after being crystallized for 3 h at 100℃ of a synthesis mixture without containing organic templates and seed gel.

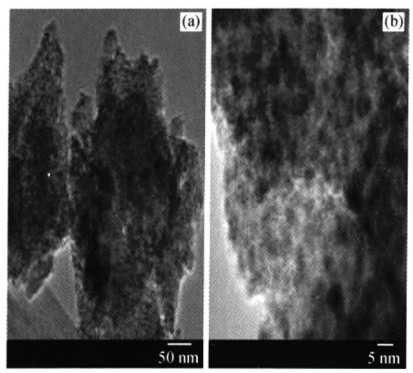


Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 1012-1017 **doi**: 10.3969/j.issn.1001-8719.2012.06.020

Effects of BRIJ30 Template on the Catalytic Hydrodearomatization Performance of Super Fine Ni-Mo Catalysts

YIN Hongsen LI Weimin QIN Qing

The experimental results proved that with BRIJ30 as template the specific surface area of NiO-MoO_3/TiO_2-SiO_2 catalyst was obviously expanded and its pore structure was improved, so that its catalytic activity increased. By the HRTEM images, the active component distribution on the carrier can be clearly seen in the microscopic view.



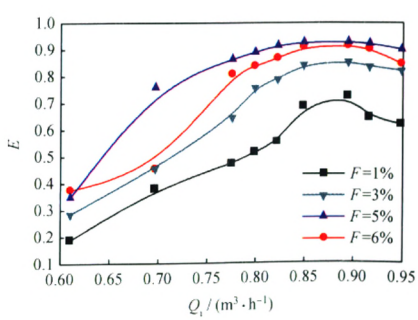
(a) 50 nm; (b) 5nm

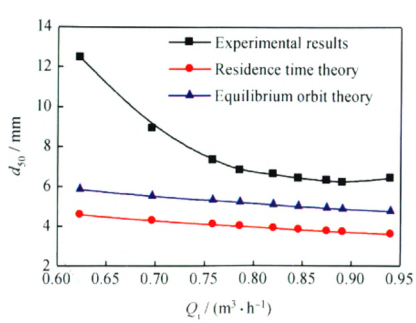
Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 1018-1024 **doi**: 10.3969/j.issn.1001-8719.2012.06.021

Experimental Research on Coke Powder Removal From Coker Oils by Mini-Hydrocyclone

LI Zhiming YANG Qiang SHEN Qisong WANG Jiangang YAN Chao ZUO Peng WANG Hualin

A mini-hydrocyclone with 25 mm diameter was designed to remove coke powder below 20 μm from coker oils. Under optimal conditions, cut size reached 6 μm, total separation efficiency was over 92%. The values of cut size predicted by both equilibrium orbit model and residence time model were comparatively close to the experimental value.



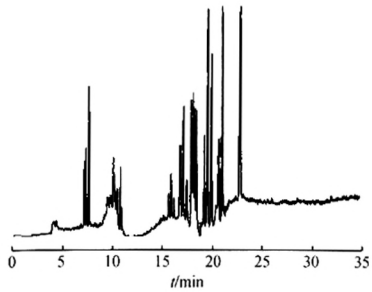


Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 1025-1030 **doi**: 10.3969/j.issn.1001-8719.2012.06.022

Synthesis of High Performance Lubricating Oil With Alkylation of Decene-1 and Benzene Catalyzed by Ionic Liquid

LÜ Chunsheng YAN Zilong XU Yunfei CHEN Yi WENG Hanbo

Alkylation of benzene with decene-1 catalyzed by ionic liquid was studied. Under the conditions of the experiment, the results showed that two kind products were of wanted components for lubricant base oil with high viscosity index and low pour point. The alkylation product was mainly composed of dialkylbenzene and pentamer, tetramer of decene-1, which possessed high viscosity index(114－164), low pour point(－48℃ － －62℃), and moderate relative molecular mass(425－620). The oligomerization product(PAO) with the ranges of 100℃ viscosity 19.4－29.6 mm^2/s, viscosity index 138－164, pour point －48℃ － －60℃, relative molecular mass 460－620 could be also obtained.

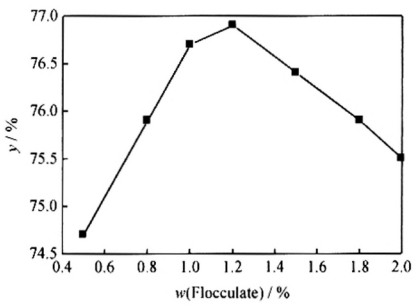


Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 1031-1036 **doi**: 10.3969/j.issn.1001-8719.2012.06.023

Regeneration of Waste Lubricating Oil Based on Three Carbon Alcohols Solvent Refining

YANG Xin CHEN Ligong ZHU Liye LIU Xianjie CAO Shuhan

Three carbon alcohols polar solvents (*n*-propanol、*i*-propanol) were chosen as extraction solvents and 1, 2-ethanediamine was used as flocculant to regenerate waste lubricating oil. The optimal conditions were obtained by one-factor experiments, under which the recovered oil yield reached 76.8%, meanwhile, the recovered oil could meet the HVI150 standard of base oil.

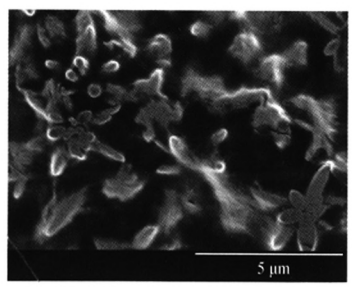


Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 1037-1042 **doi**: 10.3969/j.issn.1001-8719.2012.06.024

Thickening Mechanism of Hydrophobically Associating Polyacrylamide and Polyacrylamide

LI Meirong LIU Zhi CAO Xulong ZHANG Benyan ZHANG Jichao SUN Fanglong

The figure directly explain the high viscosity: the chains crosslinking part is intermolecular association under the power of electrostatic force, hydrogen bond and van der Waals force, to form a big space volume; the unfold part is hydrophilic groups which could form the hydration membrane.

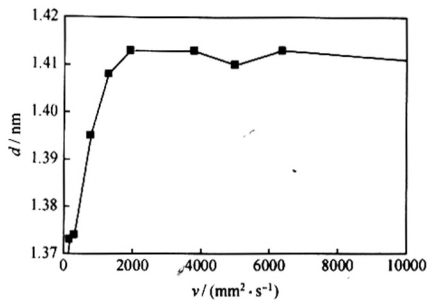


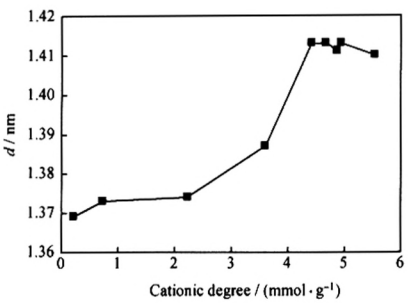
Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 1043-1047 **doi**: 10.3969/j.issn.1001-8719.2012.06.025

Relationship of Polyamine Viscosity and Cationic Degree to Relative Inhibitory Rate of Shale

LU Jiao FANG Xiangchen WANG Anjie ZHANG Xiwen LI Yuansheng

Polyamine shale inhibitor was prepared by ring-opening polymerization. Shale inhibitor performance and clay lattice spacing before and after polyamine treatment were investigated respectively, which further identified the physiochemical index of polyamine for practice application. Results showed the ranges of physiochemical index for polyamine application were obtained with kinetic viscosity of 304—1940 mm^2/s and cationic degree of 0.750—3.603 mmol/g.



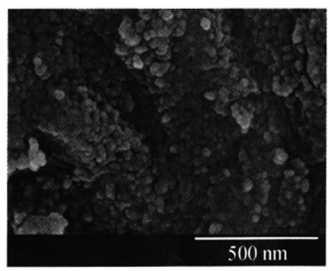


Acta Petrolei Sinica (*Petroleum Processing Section*), 2012, 28(6): 1048-1052 **doi**: 10.3969/j.issn.1001-8719.2012.06.026

Preparation of Fe_x^{3+}-TiO_2/Shell and Photocatalytic Degradation of Oil Pollutant Suspension on the Ocean

LI Xiuqin LI Zizhen LI Chunhu WANG Liang XING Ningning GAO Jian FENG Lijuan GAO Xueli

The Fe_x^{3+}-TiO_2/Shell photocatalyst was used in the degradation of oil suspension on the seawater. The results showed that the $Fe_{0.7}^{3+}$-TiO_2/shell with four coated times of $Fe_{0.7}^{3+}$-TiO_2 possessed the highest photocatalytic activity for oil degradation. After 16 h illumination with 300W iodine-tungsten lamp, the oil degradation rate on the seawater reached 76%.



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The Effect of HRT on UASB-SMBR (PTFE) Process in Treating Oily Wastewater of One Oil Field

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The proposed process combining UASB reactor and submerged MBR with PTFE membrane performed very well for the treatment of synthetic oily wastewater in different HRTs. The correlation between removal efficiency with HRT was not observed obviously, but membrane fouling rate increased significantly with the membrane flux increasing.