

## Contents

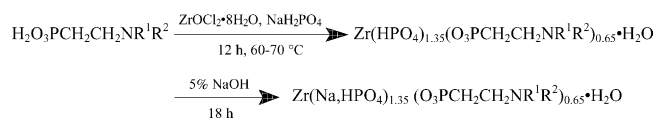
### Articles

**RenQuan Zeng, XiangKai Fu, ChengBin Gong,  
Yan Sui, XueBing Ma, XinBin Yang**

A new type of the mixed zirconium phosphate phosphonate support and the solid base are prepared. The compounds are characterized by elemental analysis, IR, XRPD, <sup>31</sup>P MAS NMR, TG, DTG and DSC.

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 1

Preparation and catalytic property of the solid base supported on the mixed zirconium phosphate phosphonate for Knoevenagel condensation

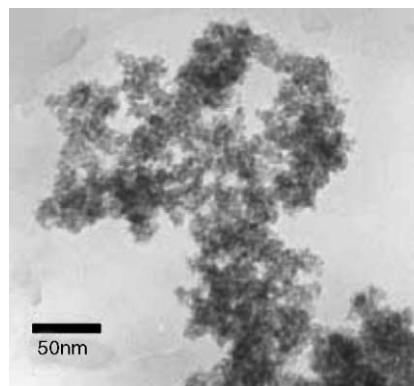


**Chengcai Luo, Yuhong Zhang, Yanguang Wang**

Palladium nanoparticles were prepared by applying poly(ethyleneglycol) (PEG) and Pd(OAc)<sub>2</sub> in the absence of other chemical agents. The as-prepared palladium nanoparticles were found to be a highly stable and reusable catalyst for Heck reaction.

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Palladium nanoparticles in poly(ethyleneglycol): the efficient and recyclable catalyst for Heck reaction

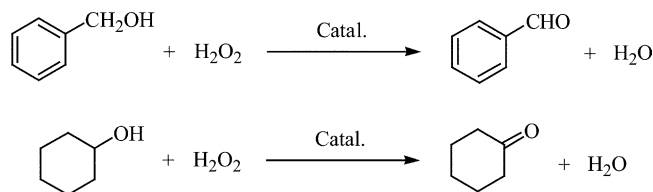


**Xian-ying Shi, Jun-fa Wei**

Several novel kinds of bis-quaternary phosphonium salts of peroxotungstate and peroxomolybdate, such as Ph<sub>3</sub>P(CH<sub>2</sub>)<sub>2</sub>PPh<sub>3</sub>[W(O<sub>2</sub>)<sub>4</sub>]·2H<sub>2</sub>O, Ph<sub>3</sub>P(CH<sub>2</sub>)<sub>2</sub>PPh<sub>3</sub>[WO(O<sub>2</sub>)<sub>2</sub>(C<sub>2</sub>O<sub>4</sub>)]·2H<sub>2</sub>O, Ph<sub>3</sub>P(CH<sub>2</sub>)<sub>3</sub>PPh<sub>3</sub>[W(O<sub>2</sub>)<sub>4</sub>]·2H<sub>2</sub>O, and Ph<sub>3</sub>P(CH<sub>2</sub>)<sub>2</sub>PPh<sub>3</sub>[Mo(O<sub>2</sub>)<sub>2</sub>(C<sub>2</sub>O<sub>4</sub>)]·2H<sub>2</sub>O, have been synthesized and characterized by elemental analysis, IR and Raman spectroscopy. Their catalytic properties in oxidation of cyclohexanol and benzyl alcohol to cyclohexanone, benzaldehyde or benzoic acid were investigated with aqueous 30% hydrogen peroxide under halide- and organic solvent-free conditions

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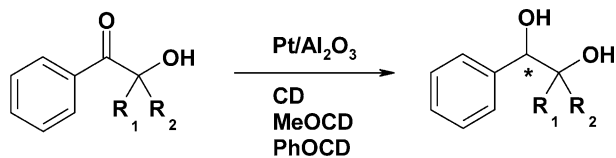
Oxidation of alcohols with H<sub>2</sub>O<sub>2</sub> catalyzed by bis-quaternary phosphonium peroxotungstates (or peroxomolybdates) under halide- and organic solvent-free condition



Otmar J. Sonderegger, Gabriel M.-W. Ho, Thomas Bürgi, Alfons Baiker

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 19

Enantioselective hydrogenation of  $\alpha$ -hydroxyketones over cinchona-modified Pt: influence of reactant and modifier structure



R <sub>1</sub>	H	CH <sub>3</sub>	C <sub>5</sub> H <sub>10</sub>
R <sub>2</sub>	H	CH <sub>3</sub>	

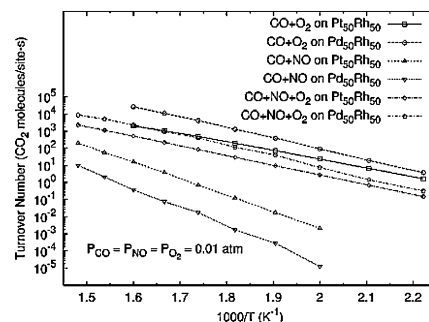
Different  $\alpha$ -hydroxyketones have been hydrogenated on Pt/Al<sub>2</sub>O<sub>3</sub> modified with CD, MeOCD and PhOCD, with CD showing best catalytic performance affording 60–80% ee depending on the substrate.

Abir De Sarkar, Badal C. Khanra

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 25

CO oxidation and NO reduction over supported Pt-Rh and Pd-Rh nanocatalysts: a comparative study

Microkinetic model has been used to demonstrate that Pd-Rh is a better CO oxidation catalyst, while Pt-Rh is a better NO reduction catalyst. Sulphur deactivates the Pd-Rh catalyst more than the Pt-Rh catalyst.

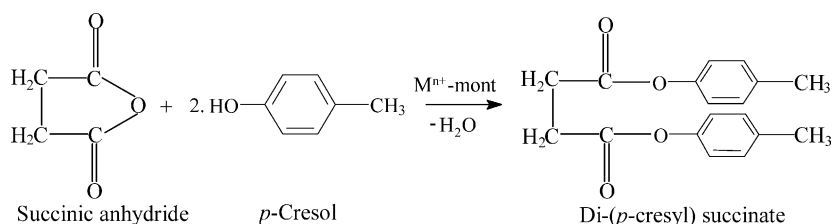


C.R. Reddy, Pushpa Iyengar, Gopalpur Nagen-drappa, B.S. Jai Prakash

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 31

Esterification of succinic anhydride to di-(*p*-cresyl) succinate over M<sup>n+</sup>-montmorillonite clay catalysts

Esterification of succinic anhydride to di-(*p*-cresyl) succinate over montmorillonite clay exchanged with different cations (M<sup>n+</sup>-mont; M<sup>n+</sup>=Al<sup>3+</sup>, Cr<sup>3+</sup>, Fe<sup>3+</sup>, Cu<sup>2+</sup>, Zn<sup>2+</sup>, Ni<sup>2+</sup>, Mn<sup>2+</sup> and H<sup>+</sup>) is demonstrated. Among the clay catalysts studied, Al<sup>3+</sup> and H<sup>+</sup>-mont are found to be more active for the esterification of succinic anhydride with *p*-cresol. The activity of M<sup>n+</sup>-mont was found to be correlated with the charge to radius ratio of M<sup>n+</sup>-ions exchanged in the clay layer. The influence of molar ratio of reactants, reaction time, and catalyst amount on the esterification reaction have been investigated. Regeneration and reusability of the clay catalyst have also been examined.

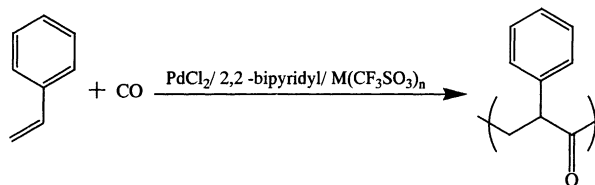


Li Lin, Huang Xiang-Liang, Li Guang-Xing

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 39

A new catalytic system for copolymerization of styrene with CO: PdCl<sub>2</sub>/bipy/M(CF<sub>3</sub>SO<sub>3</sub>)<sub>n</sub>

A new three-component catalytic system, PdCl<sub>2</sub>/bipy/M(CF<sub>3</sub>SO<sub>3</sub>)<sub>n</sub>, was studied for copolymerization of styrene with CO to prepare alternating polyketone. The copolymer was characterized by elemental analysis, FTIR, <sup>1</sup>H NMR, DSC and TGA. The effects of M(CF<sub>3</sub>SO<sub>3</sub>)<sub>n</sub>, ligands, *p*-benzoquinone/PdCl<sub>2</sub> ratio, solvents, and reaction temperatures on the reaction have been discussed in detail.

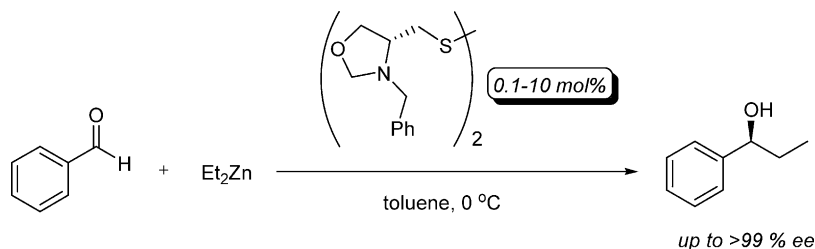


**Antonio L. Braga, Diogo S. Lüttke, Ludger A. Wessjohann, Márcio W. Paixão, Paulo H. Schneider**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 47

A chiral disulfide derived from (*R*)-cysteine in the enantioselective addition of diethylzinc to aldehydes: loading effect and asymmetric amplification

A chiral disulfide is described to catalyze the enantioselective addition of diethylzinc to benzaldehyde with high enantioselectivities. Nonlinear effects have also been evaluated and it has been found to be strictly linear.

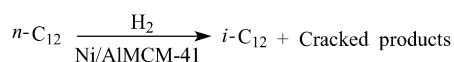


**Kegong Fang, Jie Ren, Yuhan Sun**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 51

Effect of nickel precursors on the performance of Ni/AlMCM-41 catalysts for *n*-dodecane hydroconversion

The effect of different nickel precursors on the performance of Ni/AlMCM-41 catalysts for *n*-dodecane hydroconversion was studied. The catalyst prepared with nickel citrate as the precursor possessed stronger metal-support interaction, higher metal dispersion and slightly lower acidity than those prepared with nickel nitrate and alkaline tetraamine nickel nitrate. In the test of *n*-dodecane hydroconversion, this catalyst exhibited better activity and isomerization selectivity due to the intimate interaction between metal and acid functions and the improved (de)hydrogenation capability of the metallic nickel active sites.

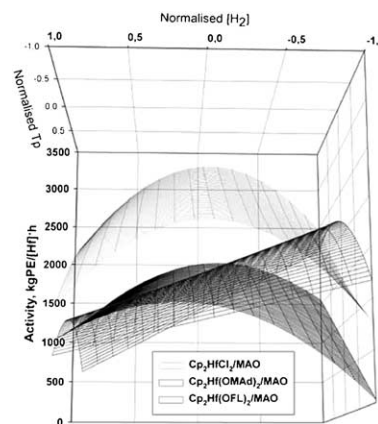


**Andrei V. Grafov, Daniela E.B. Lopes, Iryna A. Grafova, Marcos L. Dias, Maria F.V. Marques**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 59

Ethylene polymerisation with hafnocene difenolate/MAO system: a comparison with other hafnocenes

Catalytic behaviour of  $\text{Cp}_2\text{Hf}(\text{OC}_{10}\text{H}_{17})_2$  in homogeneous ethylene polymerisation activated by MAO is discussed in comparison with  $\text{Cp}_2\text{HfCl}_2/\text{MAO}$  and  $\text{Cp}_2\text{Hf}(\text{OC}_{11}\text{H}_{17})_2/\text{MAO}$  systems. The influence of  $\sigma$ -bonded bridged alicyclic alcoholato-ligand on polymerisation process and polymer properties is shown. Dependence of the catalytic activity and the  $M_w$  of the polyethylene obtained on independent and dependent variables of the process are compared and discussed.

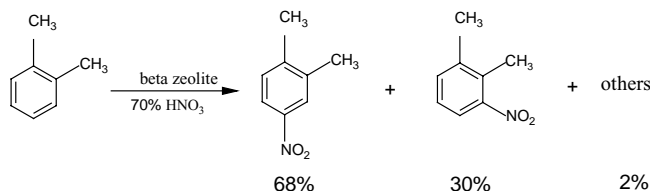


**Mannepalli L. Kantam, Boyapati M. Choudary, Nadakuditi S. Kumar, Kompella V. Ramprasad**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 67

Beta zeolite: an efficient and eco-friendly catalyst for the nitration of *o*-xylene with high regio-selectivity in liquid phase

*o*-Xylene was nitrated with high regio-selectivity by using beta zeolite as a catalyst and with a stoichiometric amount of nitric acid.

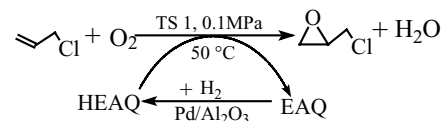


**Qingfa Wang, Zhentao Mi, Yaquan Wang, Li Wang**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 71

Epoxidation of allyl chloride with molecular oxygen and 2-ethyl-anthrahydroquinone catalyzed by TS-1

Epichlorohydrin was prepared by direct epoxidation of allyl chloride with O<sub>2</sub> in the presence of 2-ethyl anthrahydroquinone and TS-1 under mild conditions. TS-1 shows high selectivity. Separated by distillation, the working solution is recycled

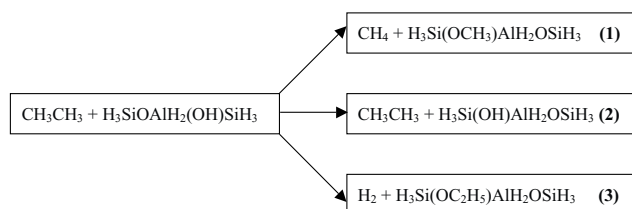


**Xiaobo Zheng, Paul Blowers**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 77

An ab initio study of ethane conversion reactions on zeolites using the complete basis set composite energy method

Zeolite catalyzed ethane reactions are investigated using ab initio methods. Applying a cluster method, the activation energies for each reaction are calculated as functions of cluster size and zeolite acidity.

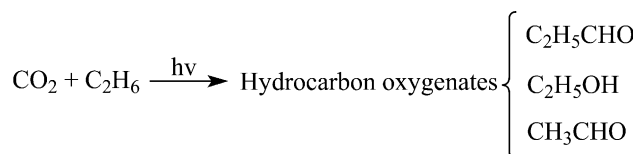


**Xi-Tao Wang, Shun-He Zhong, Xiu-Fen Xiao**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 87

Photo-catalysis of ethane and carbon dioxide to produce hydrocarbon oxygenates over ZnO-TiO<sub>2</sub>/SiO<sub>2</sub> catalyst

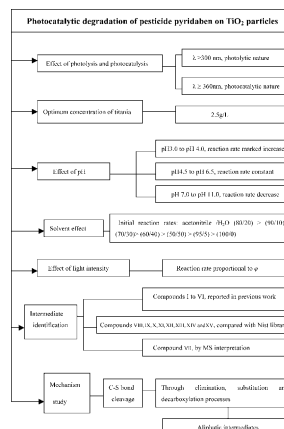
The surface structure, photoabsorbing behaviors, chemisorbing properties and photo-oxidation performances of ethane with CO<sub>2</sub> over the supported ZnO-TiO<sub>2</sub>/SiO<sub>2</sub> catalyst were thoroughly investigated.



**Xinle Zhu, Chunwei Yuan, Yanchu Bao, Jihong Yang, Yizu Wu**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 95

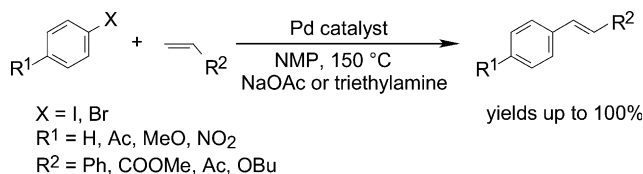
Photocatalytic degradation of pesticide pyridaben on TiO<sub>2</sub> particles



**Attila Papp, Krisztina Miklós, Péter Forgo, Árpád Molnár**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 107

Heck coupling by Pd deposited onto organic–inorganic hybrid supports

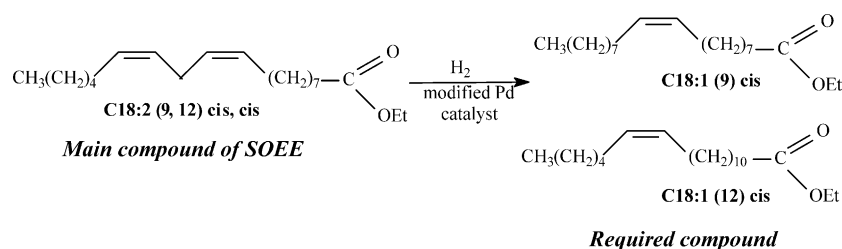


**Bendaoud Nohair, Catherine Especel, Gwendoline Lafaye, Patrice Marécot, Lê Chiên Hoang, Jacques Barbier**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 117

Palladium supported catalysts for the selective hydrogenation of sunflower oil

The aim of the study is to hydrogenate selectively the ethyl esters of traditional sunflower oil (SOEE) toward the *cis* C18:1 isomers, at 40°C in ethanol. The highest selectivity is obtained over Pd/SiO<sub>2</sub> catalysts modified by lead or by addition of amines in the reaction medium.

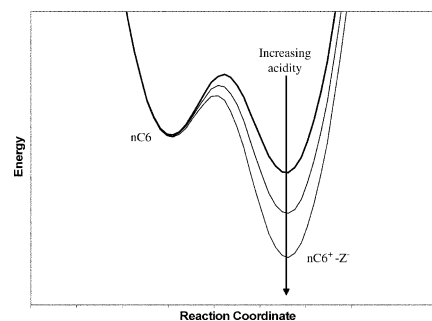


**P. Borges, R. Ramos Pinto, M.A.N.D.A. Lemos, F. Lemos, J.C. Védrine, E.G. Derouane, F. Ramôa Ribeiro**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 127

Activity–acidity relationship for alkane cracking over zeolites: *n*-hexane cracking over HZSM-5

The acidity and the catalytic activity for *n*-hexane cracking of three related HZSM-5 catalysts have been determined. A method is described for obtaining the distribution of acid strength by deconvoluting ammonia TPD spectra and it is shown that a linear relationship exists between the enthalpy of the reaction and the activation energy for the desorption of ammonia.



**Maria C.A.F. Gotardo, André A. Guedes, Marco A. Schiavon, Nádia M. José, I. Valéria P. Yoshida, Marilda D. Assis**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 137

Polymeric membranes: the role this support plays in the reactivity of the different generations of metalloporphyrins

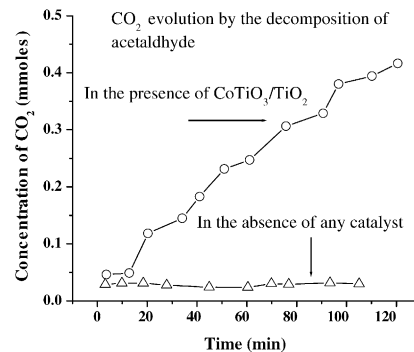
In this work we investigated the catalytic activity of representatives of the three generations of ironporphyrins occluded in a polymeric film based on poly(dimethylsiloxane) (PDMS), in the oxidation of cyclohexane by iodobenzene. The results show the influence of the polymeric support on the reactivity of the three generations of metalloporphyrins, its importance in concentrating the substrate close to the catalytic site, and the protection it renders the catalyst against auto-oxidative destruction.

**P.N. Kapoor, S. Uma, S. Rodriguez, K.J. Klambunde**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 145

Aerogel processing of  $\text{MTi}_2\text{O}_5$  ( $M=\text{Mg, Mn, Fe, Co, Zn, Sn}$ ) compositions using single source precursors: synthesis, characterization and photocatalytic behavior

$\text{MgTi}_2\text{O}_5$  and the composites  $\text{MTiO}_3/\text{TiO}_2$  ( $M=\text{Fe, Co and Zn}$ ) were obtained from a single source precursor,  $(\text{M}[\text{OTi}(\text{OPr}^i)_3]_2)$ , by a modified aerogel process. Of these,  $\text{CoTiO}_3/\text{TiO}_2$ , decomposed acetaldehyde in the dark, at room temperature, while the other oxides behaved as regular UV photocatalysts.

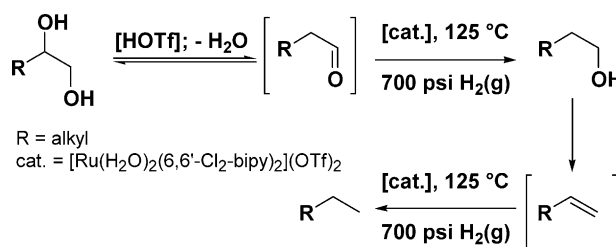


**Zhi Xie, Marcel Schlaf**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 151

Direct transformation of terminal vic-diols to primary alcohols and alkanes through hydrogenation catalyzed by  $[\text{cis-Ru}(6,6'\text{-Cl}_2\text{-bipy})_2(\text{OH}_2)_2](\text{CF}_3\text{SO}_3)_2$  in acidic medium

The catalyst system consisting of HOTf and  $[\text{cis-Ru}(6,6'\text{-Cl}_2\text{-bipy})_2(\text{OH}_2)_2](\text{CF}_3\text{SO}_3)_2$  effects a direct conversion of terminal diols to primary alcohols and/or alkanes in a single reactor.



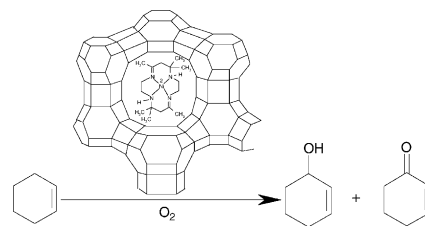
**Masoud Salavati-Niasari**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 159

Nanoscale microreactor-encapsulation 14-membered nickel(II) hexamethyl tetraaza: synthesis, characterization and catalytic activity

Nanoscale microreactor containing (5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane-4,11-diene)nickel(II) were successfully have been prepared by the template condensation of tris(ethylenediamine)nickel(II) complex with acetone within the nanodimensional pores of zeolite Y. This complex were entrapped in the supercage of zeolite Y by a two-step process in the liquid phase (i) inclusion of a nickel(II) precursor complex  $[\text{Ni}(\text{en})_3]^{2+}\text{-NaY}$  and (ii) in situ template reaction of the nickel(II) precursor complex with the acetone. The host-guest nanoscale tetraaza macrocycle was found catalytic activity. Cyclohexene was catalytically oxidized in the presence of molecular oxygen and  $[\text{Ni}(\text{Me}_6[14]\text{ane N}_4)]^{2+}\text{-NaY}$  in the

absence of solvent at 70 °C, affording 2-cyclohexene-1-ol and 2-cyclohexene-1-one.

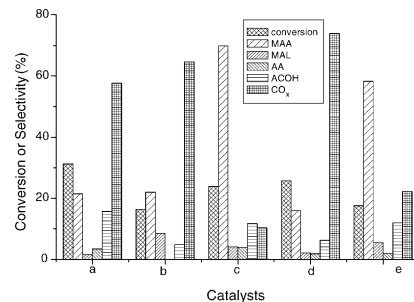


**Qian Deng, Shaoliang Jiang, Tiejun Cai, Zhen-shan Peng, Zhengjun Fang**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 165

Selective oxidation of isobutane over  $\text{H}_x\text{Fe}_{0.12}\text{Mo}_{11}\text{VPAs}_{0.3}\text{O}_y$  heteropoly compound catalyst

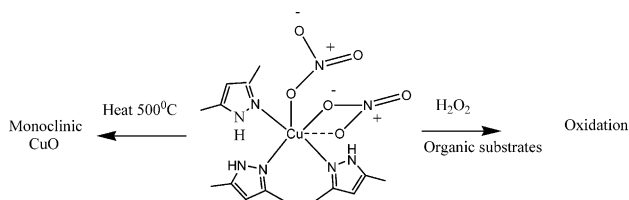
$\text{H}_4\text{PMo}_{11}\text{VO}_{40}$ -based heteropoly catalysts modified with transition metals were synthesized and applied in the selective oxidation of isobutane. A conversion of 23.9% and desirable selectivity to MAA of 69.9% can be obtained under optimal conditions over the catalyst  $\text{H}_x\text{Fe}_{0.12}\text{Mo}_{11}\text{VPAs}_{0.3}\text{O}_y$ . The Fe modification resulted in the improvements in both conversion and selectivity to MAA. In addition, the modification with As makes for the enhancement of selectivity to MAA, while the addition of K or Cs causes a negative effect on the catalytic property.



Sagar Sharma, Nilotpal Barooah, Jubaraj B. Baruah

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 171

Tris(3,5-dimethylpyrazole)copper(II) nitrate: as an oxidation catalyst

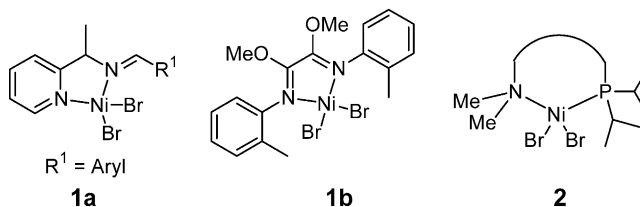


Martin E. Bluhm, Cristina Folli, Olaf Walter, Manfred Döring

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 177

Nitrogen- and phosphorus-coordinated nickel(II) complexes as catalysts for the oligomerization of ethylene

Nickel(II)-based Schiff base *N,N*-complexes **1a**, bis(imino)oxalate complexes **1b**, and *N,P*-coordinated complexes **2** are active precatalysts together with the cocatalyst MAO for the oligomerization of ethylene and the production of olefins with short chain lengths.

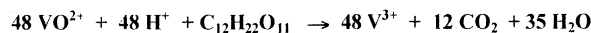


Ragnar Larsson, Börje Folkesson

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 183

A catalytic oxidation of sugar by vanadium(IV)

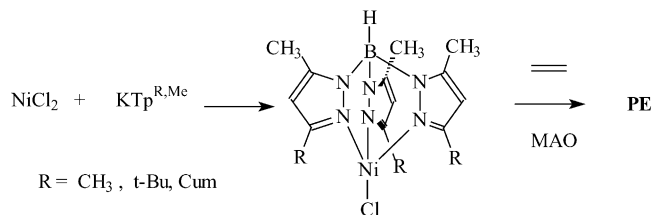
A complete oxidation of sucrose, glucose, xylose with vanadium(IV) as the oxidant can be achieved in acid solution with platinum as a catalyst. The resultant V(III) species can be part of a fuel cell concept. A tentative mechanism is proposed.



Roberto Santi, Anna Maria Romano, Anna Sommazzi, Manuela Grande, Claudio Bianchini, Giuseppe Mantovani

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 191

Catalytic polymerisation of ethylene with tris(pyrazolyl)borate complexes of late transition metals

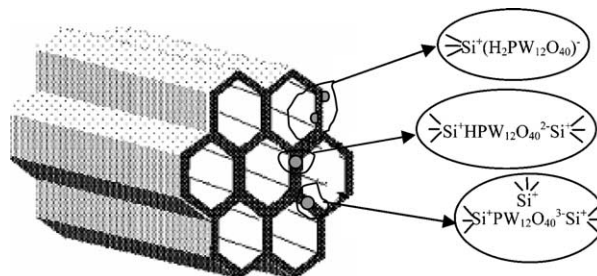


**Lina Yang, Yutai Qi, Xingdong Yuan, Jian Shen, Jiman Kim**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 199

Direct synthesis, characterization and catalytic application of SBA-15 containing heteropolyacid  $H_3PW_{12}O_{40}$

Mesoporous molecular sieve SBA-15 containing phosphotungstic acid  $H_3PW_{12}O_{40}$  was directly synthesized. Compared with the post synthesized sample, the catalysts stability was improved remarkably.

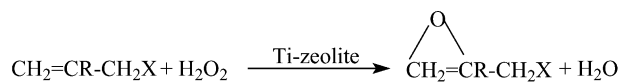


**Agnieszka Wróblewska**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 207

Liquid phase epoxidation of allylic compounds with hydrogen peroxide over titanium silicalite catalysts

The optimum parameters for the high selective epoxidation of allylic compounds to corresponding epoxides with using hydrogen peroxide as oxidant catalysed by titanium silicalite: TS-1, TS-2, Ti-beta and Ti-MCM-41 have been presented.



(R=H, CH<sub>3</sub>; X=OH, Cl; Ti-zeolite = TS-1, TS-2, Ti-Beta, Ti-MCM-41)

**Puttaswamy, R.V. Jagadeesh, Nirmala Vaz, A. Radhakrishna**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 211

Ru(III)-catalysed oxidation of some *N*-heterocycles by chloramine-T in hydrochloric acid medium: a kinetic and mechanistic study

The following general scheme is proposed for the Ru(III)-catalysed oxidation of *N*-heterocycles by chloramine-T in acid medium to explain the experimental results:

- (i)  $TsNHCl + H_3O^+ \xrightleftharpoons{K_1} TsNH_2 + H_2O^+Cl^-$  fast
- (ii)  $S + nH_2O^+Cl^- \xrightleftharpoons{K_2} X$  fast
- (iii)  $X + Ru(III) \xrightleftharpoons{K_3} X'$  fast
- (iv)  $X' \xrightarrow{k_4} \text{products}$  slow and r.d.s

Here  $n = 3$  for imidazole, 2 for benzimidazole and 1 for 2-hydroxybenzimidazole, 2-aminobenzimidazole and 2-phenylbenzimidazole. S, X and X' represents the substrate and complex intermediate species. The above scheme leads to the following rate law:

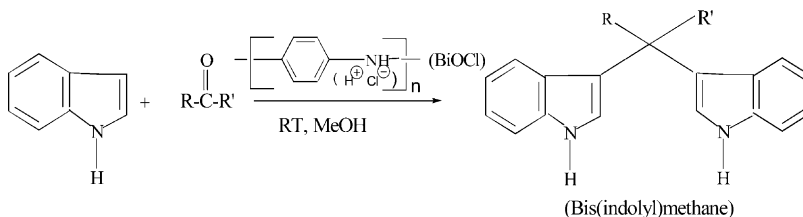
$$\text{rate} = \frac{K_1 K_2 K_3 k_4 [CAT]_T [S] [H_3O^+] [Ru(III)]}{[TsNH_2] + K_1 [H_3O^+] + K_1 K_2 [S] [H_3O^+] + K_1 K_2 K_3 [S] [H_3O^+] [Ru(III)]}$$

**Srinivasan Palaniappan, Chandrasekaran Saravanan, Vaidya Jayathirtha Rao**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 221

Synthesis of polyaniline-bismoclite composite and its function as recoverable and reusable catalyst

Polyaniline-bismoclite (PANI-BC) composite, which is effective in catalyzing the condensation of indole and carbonyl compounds, has been synthesized and characterized by spectral, physical and electrical methods.



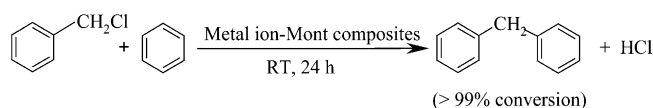


**Omar Saaduddin Ahmed, Dipak Kumar Dutta**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 227

Friedel-Crafts benzylation of benzene using Zn and Cd ions exchanged clay composites

Metal ion-exchanged clay composites such as  $M^{II}$ -Mont and  $M^{II}$ -Mont (AT) where  $M=Zn$  and  $Cd$ , Mont=montmorillonite clay of the types Mont<sub>1</sub> (SWy-2) and Mont<sub>2</sub> (Neelkanth), and AT=acid treated have been synthesized, characterized by X-ray diffraction analysis and evaluated as catalysts for Friedel-Crafts reaction particularly for benzylation of benzene.

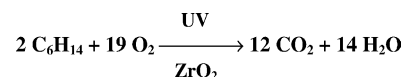


**Chunying Wu, Xiping Zhao, Yingjie Ren, Yinghong Yue, Weiming Hua, Yong Cao, Yi Tang, Zi Gao**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 233

Gas-phase photo-oxidations of organic compounds over different forms of zirconia

Nanosized zirconia powders with different phase structure and specific surface area were used as catalysts for gas-phase photocatalytic oxidations. The amorphous zirconia calcined at 110°C shows the highest photocatalytic activity.

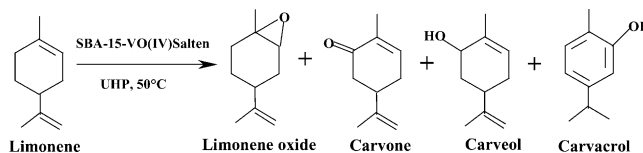


**Trissa Joseph, S.B. Halligudi**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 241

Oxyfunctionalization of limonene using vanadium complex anchored on functionalized SBA-15

VO(Salten) where, Salten=3-[*N,N'*-bis-3-(salicylidenamino)ethyl]tri-amine] was covalently anchored on functionalized SBA-15 and used for the oxyfunctionalization of limonene in presence of urea hydroperoxide (UHP) as the oxygen source. The oxyfunctionalization of limonene resulted in limonene oxide, carvone, carveol and carvacrol.

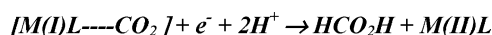
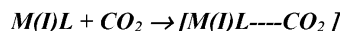
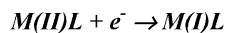


**M. Isaacs, F. Armijo, G. Ramírez, E. Trollund, S.R. Biaggio, J. Costamagna, M.J. Aguirre**

*Journal of Molecular Catalysis A: Chemical* 229 (2005) 249

Electrochemical reduction of  $\text{CO}_2$  mediated by poly-M-aminophthalocyanines ( $M=Co, Ni, Fe$ ): poly-Co-tetraaminophthalocyanine, a selective catalyst

The electrochemical reduction of  $\text{CO}_2$  on glassy carbon modified with poly-M-tetrakisaminophthalocyanines ( $M=Co, Ni, Fe$ ) shows that the cobalt complex is selective giving formic acid as the unique product.

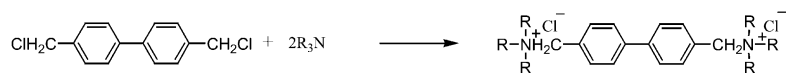


**Maw-Ling Wang, Ze-Fa Lee, Feng-Sheng Wang**

*Journal of Molecular Catalysis A: Chemical* 229  
(2005) 259

Synthesis of novel multi-site phase-transfer catalyst and its application in the reaction of 4,4'-bis(chloromethyl)-1,1'-biphenyl with 1-butanol

## Synthesis of multi-site phase transfer catalysts



Mult-site phase transfer catalyzed etherification of 4,4'-bis(chloromethyl)-1,1'-biphenyl in synthesizing 4,4'-bis(butoxymethyl)-1,1'-biphenyl

