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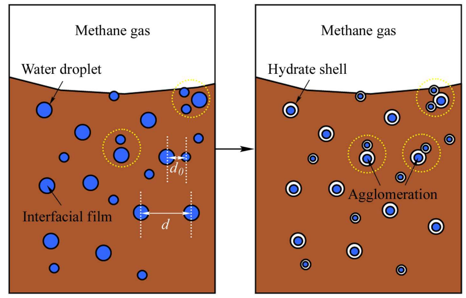
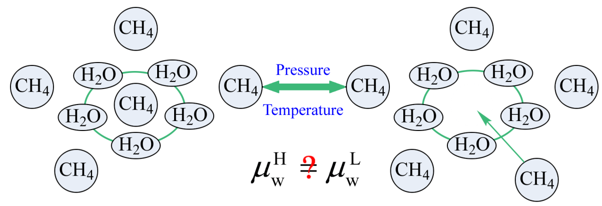
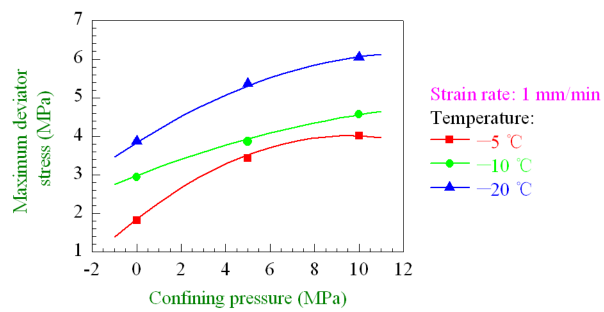
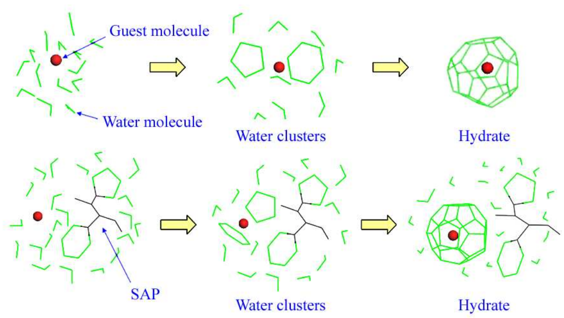
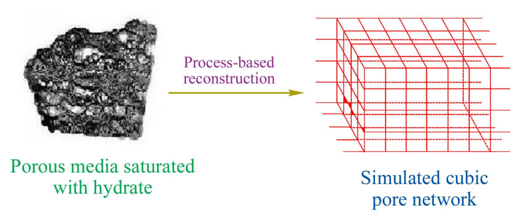
Special Column: Gas Hydrates


Methane gas
Water droplet
Interfacial film
d_0
d
Methane gas
Hydrate shell
Agglomeration


CH_4
H_2O
Pressure
Temperature
$\mu_w^H \stackrel{?}{=} \mu_w^L$


Maximum deviator stress (MPa)
Confining pressure (MPa)
Strain rate: 1 mm/min
Temperature:
−5 ℃
−10 ℃
−20 ℃


Guest molecule
Water molecule
Water clusters
Hydrate
SAP
Water clusters
Hydrate

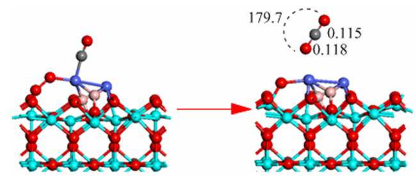

Process-based reconstruction
Porous media saturated with hydrate
Simulated cubic pore network

Regular papers

300

Density functional theory study of CO catalytic oxidation on Co_2B_2/TiO_2 (110) surface (Article)

Qingsong Zeng, Wenkai Chen, Yongfan Zhang, Wenxin Dai, Xin Guo

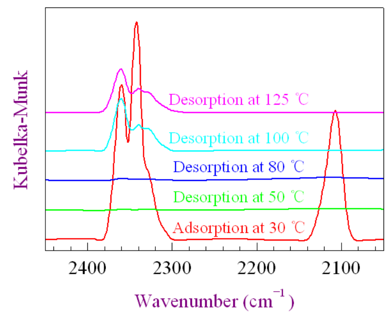


The transition state search starting from the reactant has been investigated by DFT method. The reaction barrier is 12.1 kJ/mol, suggesting that the reaction easily carry through, and can react at room temperature. All calculations indicate that Co_2B_2/TiO_2 exhibit higher catalytic activity.

307

Study on Au/Al_2O_3 catalysts for low-temperature CO oxidation in situ FT-IR (Article)

Xuhua Zou, Shixue Qi, Jinguang Xu, Zhanghuai Suo, Lidun An, Feng Li

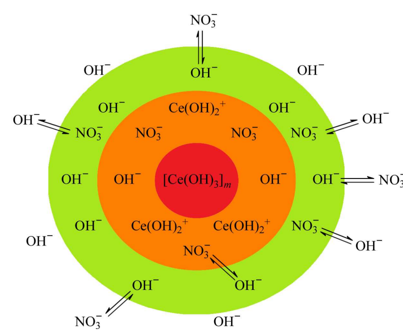


FT-IR spectra of Au/Al_2O_3 obtained during desorption in Ar at 50, 80, 100, and 125 ℃ separately after adsorption in 1%CO + 10%O_2 + Ar (balance) at 30 ℃.

313

Influence of pH values in the preparation of CuO-CeO_2 on its catalytic performance for the preferential oxidation of CO in excess hydrogen (Article)

Zhigang Liu, Shuren Yang, Renxian Zhou, Xiaoming Zheng



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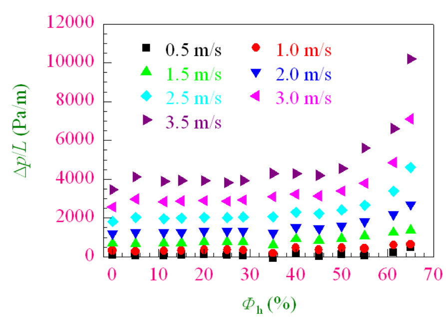
Experimental study on flow characteristics of tetrahydrofuran hydrate slurry in pipelines (Article)

Wuchang Wang, Shuanshi Fan, Deqing Liang, Yuxing Li

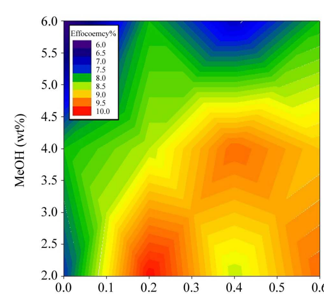


Pressure drops as a function of volume concentration of THF hydrate slurry.

323

A new high performance gas hydrate inhibitor (Article)

Ehsan Heidaryan, Amir Salarabadi, Jamshid Moghadasi, Alireza Dourbash



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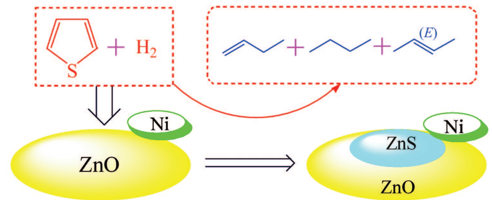
Reactive adsorption of thiophene on Ni/ZnO adsorbent: Effect of ZnO textural structure on the desulfurization activity (Article)



Jingcheng Zhang, Yunqi Liu, Shuang Tian, Yongming Chai, Chenguang Liu

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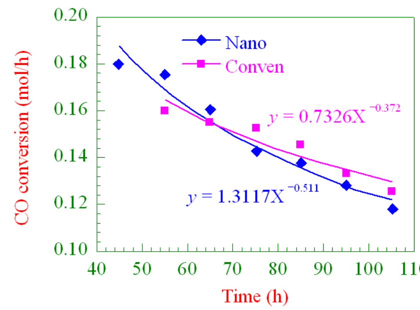
Deactivation studies of nano-structured iron catalyst in Fischer-Tropsch synthesis (Article)



Ali Nakhaei Pour, Mohammad Reza Housaindokht, Sayyed Faramarz Tayyari, Jamshid Zarkesh

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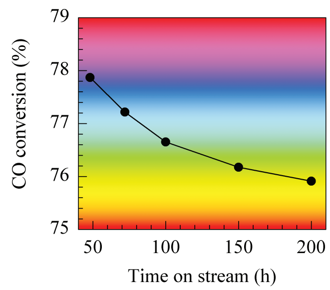
Effects of preparation and operation conditions on precipitated iron nickel catalysts for Fischer-Tropsch synthesis (Article)



The catalytic performance of 40%Fe/60%Ni/40wt.%Al_2O_3 catalyst in different operation conditions has been studied. The results show that during the FTS a stable trend for this catalyst was observed.

Mostafa Feyzi, Ali Akbar Mirzaei, Hamid Reza Bozorgzadeh

Preface for the Special Column of Gas Hydrates

Gas hydrate (or Hydrate), is also known as cage-shaped inclusion (Clathrate). It is ice-like, non-chemical cage-shaped crystal compound, composed of the gas and small water molecules on certain conditions (appropriate temperature, pressure, gas saturation, water salinity, pH, etc.). It can be represented with $M \cdot nH_2O$, in which M stands for gas molecules of hydrate, and n is the number of water molecules. Small-molecule gases CH_4, C_2H_6, C_3H_8, C_4H_{10} equivalent homologue, as well as CO_2, N_2, H_2S, etc., can form a single hydrate or multi-component of gas hydrate. Perhaps the most important gas hydrate is natural gas hydrate, which contains more than 99% methane molecules. So the natural gas hydrate is usually called methane hydrate.

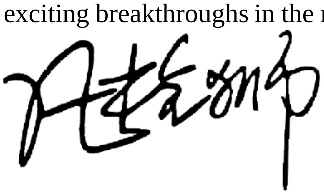
Gas hydrates are widely distributed in the mainland and the island's slope areas, active and passive continental margin of the uplift at the polar continental shelf and oceans and deep-water environment of inland lakes. In standard conditions, per unit volume of gas hydrate decomposition can yield 180 unit volume of methane gas, so it is an important potential carbon-containing resource for the future. According to the property and character of hydrate, hydrate technology can be applied to petrochemical industry, energy and environmental engineering, such as natural gas hydrate exploration and development for the potential energy recovery, production and transportation of gas and oil in subsea flowlines (flow assurance), gas storage and transport, gas separation, seawater desalination, cool storage etc.

I think that this is also one of the most important themes of the *Journal of Natural Gas Chemistry*.

This special column of gas hydrates has collected eleven papers concentrated on either academic research or industrial application, which are distributed over the following eight topics:

- Gas hydrate in permafrost or oceans.
- Mechanical properties and thermal properties of gas hydrate.
- Energy recovery from gas hydrate.
- Kinetic and thermodynamic characteristic of gas hydrate formation and dissociation.
- Development of gas storage and transport for the energy storage.
- Hydrate inhibition in oil and gas production, processing and drilling.
- Development of hydrate separation technology for carbon capture and storage (CCS).
- Characterization technique of gas hydrate

Special thanks to Prof. Xinhe Bao, the Editor-in-Chief, who invited me to organize this Special Column. I would also like to thank the authors, the referees and the staffs at the Journal office for their nice contributions to this Special Column. It is our hope that this Special Column will encourage and stimulate more creative studies in this challenging research field and lead to exciting breakthroughs in the near future.



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Brief Introduction of Professor Shuanshi Fan

Professor Shuanshi Fan received his B.S. in chemical engineering from Nanjing University of Technology in 1988 and his Ph.D. from Dalian University of Technology in 1996. He worked at Dalian University of Technology and China University of Petroleum in 1993–1998. In 1999 he joined the Chinese Academy of Sciences and was promoted to Professor in 2000. Since the December of 2006, he has been working as a full Professor at South China University of Technology. He has been working on the field of gas hydrate since 1996 and now his main research interests are gas hydrate, energy conversion and storage. He has published more than 200 journal papers and two books till now.