

SELECTED PAPERS IN COMMEMORATE

磷改性ZSM-5分子筛物化性质和裂解制乙烯性能的研究

柯明^a, 汪燮卿^b, 张凤美^b

^a State Key Laboratory of Heavy Oil Processing, University of Petroleum, Beijing, 102249, China

^b Research Institute of Petroleum Processing SINOPEC, Beijing, 100083, China

收稿日期 修回日期 网络版发布日期 接受日期

摘要 The physicochemical features of phosphorus-modified ZSM-5 zeolites (SiO₂/Al₂O₃ molar ratio is 25) were characterized by XRD(X-ray diffraction), BET(Brunauer, Emmett and Teller specific surface area measurement), NH₃-TPD(ammonia temperature-programmed desorption) and MASNMR (magic angle spinning nuclear magnetic resonance), and the performance on catalytic pyrolysis to produce ethylene was investigated with a light hydrocarbon fixed bed micro-reactor with n-octane as feed. The results show that the acid site density, acid intensity and hydrothermal stability of ZSM-5 zeolite were improved by phosphorus modification. When P₂O₅ content in ZSM-5 zeolite is higher than 2.5%, phosphorus modification can prevent ZSM-5 zeolite crystal structure transformation from orthorhombic to monoclinic. In addition, the dealumination of ZSM-5 zeolite framework was moderated by phosphorus modification under high temperature hydrothermal treatment. The results of n-octane pyrolysis on phosphorus-modified ZSM-5 zeolites show that ethylene yields of zeolites with different phosphorus content are almost the same under the same n-octane conversion. However, the modified zeolites with higher pyrolysis activity give lower yield of propene, butene and total olefin than lower pyrolysis activity under the same n-octane conversion.

关键词 [phosphorus-modified ZSM-5 zeolite](#) [catalytic pyrolysis](#) [ethylene](#) [hydrothermal stability](#) [magic angle spinning nuclear magnetic resonance](#)

分类号

DOI:

Physicochemical Features of Phosphorus-Modified ZSM-5 Zeolite and Its Performance on Catalytic Pyrolysis to Produce Ethylene

KE Ming^a, WANG Xieqing^b, ZHANG Fengmei^b

^a State Key Laboratory of Heavy Oil Processing, University of Petroleum, Beijing, 102249, China

^b Research Institute of Petroleum Processing SINOPEC, Beijing, 100083, China

Received Revised Online Accepted

Abstract The physicochemical features of phosphorus-modified ZSM-5 zeolites (SiO₂/Al₂O₃ molar ratio is 25) were characterized by XRD(X-ray diffraction), BET(Brunauer, Emmett and Teller specific surface area measurement), NH₃-TPD(ammonia temperature-programmed desorption) and MASNMR (magic angle spinning nuclear magnetic resonance), and the performance on catalytic pyrolysis to produce ethylene was investigated with a light hydrocarbon fixed bed micro-reactor with n-octane as feed. The results show that the acid site density, acid intensity and hydrothermal stability of ZSM-5 zeolite were improved by phosphorus modification. When P₂O₅ content in ZSM-5 zeolite is higher than 2.5%, phosphorus modification can prevent ZSM-5 zeolite crystal structure transformation from orthorhombic to monoclinic. In addition, the dealumination of ZSM-5 zeolite framework was moderated by phosphorus modification under high temperature hydrothermal treatment. The results of n-octane pyrolysis on phosphorus-modified ZSM-5 zeolites show that ethylene yields of zeolites with different phosphorus content are almost the same under the same n-octane conversion. However, the modified zeolites with higher pyrolysis activity give lower yield of propene, butene and total olefin than lower pyrolysis activity under the same n-octane conversion.

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF](#) (1986KB)

▶ [\[HTML全文\]](#) (0KB)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [引用本文](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中包含“phosphorus-modified ZSM-5 zeolite”的相关文章](#)

▶ 本文作者相关文章

· [柯明^a](#)

· [汪燮卿^b](#)

· [张凤美^b](#)

Key words [phosphorus-modified ZSM-5 zeolite](#); [catalytic pyrolysis](#); [ethylene](#); [hydrothermal stability](#); [magic angle spinning nuclear magnetic resonance](#)

通讯作者:

柯明

作者个人主页: [柯明^a](#); [汪燮卿^b](#); [张凤美^b](#)