燃料化学学报
JOURNAL OF FUEL CHEMISTRY AND TECHNOLOGY
ISSN 0253-2409
CN 14-1140/TQ

燃料化学学报 » 2014, Vol. 42 » Issue (02): 252-256 DOI:

[BMIM]Cl离子液体改性埃洛石为基质制备大孔RFCC助剂

薛青松, 王一萌

华东师范大学化学系 上海市绿色化学与化工过程绿色化重点实验室, 上海 200062

Ionic liquid of [BMIM]Cl modified halloysite as matrix for preparation of macroporous RFCC additives

XUE Qing-song, WANG Yi-meng

Shanghai Key Laboratory of Green Chemistry and Chemical Process, Chemistry of Department, East China Normal University, Shanghai 200062, China

全文: PDF (2943 KB) HTML (1 KB) 输出: BibTeX | EndNote (RIS) 背景资料

摘要 以氯化1-丁基-3-甲基咪唑（[BMIM]Cl）离子液体改性埃洛石为基质，以USY为主剂制备了大孔渣油催化裂化（RFCC）助剂，采用XRD、N_2吸附、SEM等手段对制备的助剂进行了表征，以济南FCC原料油为原料，以济南平衡剂为主剂在固定流化床（ACE-MODEL R+ MM）上测定了助剂的反应性能。结果表明，在助剂的制备过程中，将离子液体先嫁接到具有开放大孔管状结构的埃洛石上，有效阻止了分子筛碎屑、黏结剂等占据埃洛石的管道及其活性位，高温焙烧去除离子液体后，保留了埃洛石的大孔结构，使制得的助剂具有高的催化裂化活性和良好的汽油选择性。

关键词： 离子液体 催化裂化 埃洛石 大孔 助剂

Abstract: The residue fluid catalytic cracking (RFCC) additives containing macropores were prepared with 1-butyl-3-methylimidazolium chloride ([BMIM]Cl) of room temperature ionic liquid modified halloysite as matrix and the USY zeolite as base. X-ray powder diffraction and N_2 adsorption-desorption were employed for characterization of the crystallinity and macroporous structure of RFCC additives. The performance of RFCC additives were carried out over a confined fluidized bed fluidized bed (ACE-MODEL R+ MM) with Jinan FCC feedstock and Jinan FCC balance catalyst. It was found that the ionic liquid strongly interacted with the surface hydroxyl of halloysite firstly during the preparation of RFCC additives, and then the strong interaction between ionic liquid and halloysite effectively prevented the binder and USY zeolite to enter the inner of nano-tube of halloysite. At last, the macropores in RFCC additives were produced when the additives were calcinated and the ionic liquid was removed at higher temperature. The resulting macroporous additive exhibited good catalytic cracking activity and high yield of gasoline.

Key words: ionic liquid catalytic cracking halloysite macropores additive

收稿日期: 2013-06-24;

基金资助:

国家科技支撑计划（2012BAE05B02）。

作者简介: 薛青松（1978- ），男，四川阆中人，博士，高级工程师，主要从事催化裂化助剂的研究，Tel：021-62232753，E-mail：qsxie@chem.ecnu.edu.cn。

服务
- 把本文推荐给朋友
- 加入我的书架
- 加入引用管理器
- E-mail Alert
- RSS

作者相关文章
- 薛青松
- 王一萌

引用本文:

薛青松,王一萌. [BMIM]Cl离子液体改性埃洛石为基质制备大孔RFCC助剂[J]. 燃料化学学报, 2014, 42(02): 252-256.

XUE Qing-song,WANG Yi-meng. Ionic liquid of [BMIM]Cl modified halloysite as matrix for preparation of macroporous RFCC additives[J]. J Fuel Chem Technol, 2014, 42(02): 252-256.

链接本文:

http://rlhxxb.sxicc.ac.cn/CN/ 或 http://rlhxxb.sxicc.ac.cn/CN/Y2014/V42/I02/252

[1] 朱华元, 何鸣元, 宋家庆, 张信. 催化剂的大分子裂化性能与渣油裂化[J]. 炼油设计, 2000, 30(8): 49-53. (ZHU Hua-yuan, HE Ming-yuan, SONG Jia-qing, ZHANG Xin. Reside cracking and bulk molecule cracking abilities of RFCC catalysts[J]. Petroleum Refinery Engineering, 2000, 30(8): 49-53.)

[2] 薛青松, 王一萌, 何鸣元. 一种大孔流化催化裂化催化剂及其制备方法: CN, 201210568840.9[P]. 2013-04-24. (XUE Qing-song, WANG Yi-meng, HE Ming-yuan. A method for preparation of macropore FCC catalysts: CN, 201210568840.9[P]. 2013-04-24.)

[3] 祁彦平, 陈胜利, 董鹏, 徐克琪, 申宝剑. 新型孔结构渣油催化裂化催化剂[J]. 燃料化学学报, 2006, 34(6): 685-689. (QI Yan-ping, CHENG Sheng-li, DONG Peng, XU Ke-qi, SHEN Bao-jian. Novel macroporous residua FCC catalysts[J]. Journal of Fuel Chemistry and Technology, 2006, 34(6): 685-689.)

[4] LUSSIER J, SURLAND J. Catalytic cracking process exploying a zeolite as catalysts and catalyst supports: US, 4836913[P]. 1989-06-06.

[5] LUSSIER J. Acid-reacted metakaolin catalyst and catalyst support compositions: US, 4843052[P]. 1989-06-27.

[6] 刘从华, 潘仲良, 唐荣华, 张永明, 原所良. 含有改性高岭土的烃类裂化催化剂: CN, 1186105[P]. 1998-07-01. (LIU Cong-hua, PAN Zhong-liang, TANG Rong-hua, ZHANG Yong-ming, YUAN Suo-liang. A catalyst containing modified kaolin clay for hydrocarbon cracking: CN, 1186105[P]. 1998-07-01.)

[7] 杨建, 许明德, 范中碧. 高岭土的改性方法: CN, 1195014[P]. 1998-10-07. (YANG Jian, XU Ming-de, FAN Zhong-bi. A technique for the modification of kaolin clay: CN, 1195014[P]. 1998-10-07.)

[8] LAU L Y, SANTOS A D S, RONCOLATTO R E, TOREM M A, MORGADO E, O'CONNOR P. Cracking catalyst composition: US, 165083[P]. 2002-06-29.

[9] 陈胜利, 董鹏, 祁彦平, 徐克琪. 颗粒模板法合成大孔催化裂化催化剂: CN, 200510082624.3[P]. 2006-09-13. (CHEN Sheng-li, DONG Peng, QI Yan-ping, XU Ke-qi. Macropore FCC catalysts prepared through particl templates: CN, 200510082624.3[P]. 2006-09-13.)

[10] MARSH K N, BOXALL J A, LICHTENTHALER R. Room temperature ionic liquids and their mixtures-A review[J]. Fluid Phase Equilibr, 2004, 219(1): 93-98.

[11] SELVAM T, MACHOKE A, SCHWIEGER W. Supported ionic liquids on non-porous and porous inorganic materials-A topical review[J]. Appl Catal A: Gen, 2012, 445-446: 92-101.

[12] PINO V, AFONSO A M. Surface-bonded ionic liquid stationary phases in high-performance liquid chromatography-A review[J]. Anal Chim Acta, 2012, 714: 20-37.

[13] RONG T J, XIAO J K. The catalytic cracking activity of the kaolin-group minerals[J]. Mater Lett, 2002, 57(2): 297-301.

[1] 窦喆, 张海杰, 潘燕飞, 徐秀峰. N_2O在钾改性Cu-Co尖晶石型复合氧化物上的催化分解[J]. 燃料化学学报, 2014, 42(02): 238-245.

[2] 左同梅, 李为民, 赵强, 徐庆瑞, 陈诚, 陈龙. 新型碱性离子液体催化酯交换合成生物柴油[J]. 燃料化学学报, 2014, 42(02): 200-206.

[3] 王辉, 解从霞, 于世涛, 刘福胜. 功能化酸性离子液体脱除模拟油品中的非碱性氮[J]. 燃料化学学报, 2014, 42(01): 55-60.

[4] 陈嘉宁, 刘永梅. K、Mn助剂协同效应对Fe基催化剂上CO加氢制低碳烯烃反应性能的影响[J]. 燃料化学学报, 2013, 41(12): 1488-1494.

[5] 王远洋, 闫瑞锋. 咪唑类离子液体用作电解质对燃料电池性能的影响[J]. 燃料化学学报, 2013, 41(12): 1520-1524.

[6] 赵晓波, 王文举, 郭新闻, 王祥生. Al_2O_3孔结构对纳米HZSM-5基催化剂改质FCC汽油性能的影响[J]. 燃料化学学报, 2013, 41(11): 1343-1348.

[7] 孔晓, 侯博, 贾丽涛, 黄巍, 孙志强, 李德宝, 李晋平. Al_2O_3助剂对Co/SiC催化剂F-T反应性能的影响[J]. 燃料化学学报, 2013, 41(10): 1217-1222.

[8] 海航, 闫常峰, 胡蓉蓉, 郭常青, 李文博. 助剂对泡沫金属微反应器内二甲醚水蒸气重整制氢的影响[J]. 燃料化学学报, 2013, 41(10): 1210-1216.

[9] 王永钊, 李凤梅, 程慧敏, 范莉渊, 赵永祥. 高镍负载量Ni/SiO_2和低镍负载量$Ni-Ce/SiO_2$催化CO甲烷化的比较研究[J]. 燃料化学学报, 2013, 41(08): 972-977.

[10] 雷智平, 张素芳, 伍练, 水恒福, 王知彩, 任世彪. 先锋褐煤在离子液体中温和加氢转化研究[J]. 燃料化学学报, 2013, 41(08): 922-927.

[11] 陈宗定, 公旭中, 王志, 王永刚, 张书, 许德平. KNO_3体系中离子液体辅助水煤浆电解脱硫[J]. 燃料化学学报, 2013, 41(08): 928-936.

[12] 秦玉才, 高雄厚, 裴婷婷, 郑兰歌, 王琳, 莫周胜, 宋丽娟. 噻吩在稀土离子改性Y型分子筛上吸附与催化转化研究[J]. 燃料化学学报, 2013, 41(07): 889-896.

[13] 雷智平, 张素芳, 张艳秋, 水恒福, 王知彩, 任世彪. 褐煤在离子液体1-丁基-3-甲基咪唑氯盐中热溶及热溶产物的分离与分析[J]. 燃料化学学报, 2013, 41(07): 814-818.

[14] 赵强, 李为民, 陈清林. Brønsted酸性离子液体催化合成聚甲醛二甲醚的研究[J]. 燃料化学学报, 2013, 41(04): 463-468.

[15] 赵坤, 何方, 黄振, 魏国强, 李海滨, 赵增立. 三维有序大孔Fe_2O_3为载氧体的生物质热解气化实验研究[J]. 燃料化学学报, 2013, 41(03): 277-284.