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Title:

Development of medium-pore zeolites with high catalytic performance by modification of synthesis method

Outline:

Chapter 1 Introduction

A comprehensive review of zeolites and the two medium-pore **MFI** and **TUN** structures was shown. Important features of zeolites including the topology, the framework compositions and the resulting acidic properties were discussed. Recent development of the typical TS-1 and ZSM-5 with **MFI** structure and TNU-9 zeolite with **TUN** structure were included in terms of synthesis and the applications in cracking and epoxidation reaction.

Chapter 2 Synthesis of TS-1 zeolite with improved catalytic oxidation performance by controlling hydrolysis process and gel composition

The hydrolysis time and temperature and gel composition for TS-1 synthesis and the effects on epoxidation reaction were investigated. Firstly, based on a three-steps crystallization process, the different hydrolysis time and temperature were studied. And later, based on a two-steps hydrolysis process, the different gel compositions were studied. The effects on structure, morphology, Ti content, coordination states and 1-hexene epoxidation were studied.

Chapter 3 A novel boron and aluminum containing TUN-type zeolite synthesis, acidic properties, and n-hexane cracking behaviors

The novel [Al, B]-TUN zeolites were synthesized and the application in n-hexane cracking was investigated. The influence of different gel compositions on the phase selectivity during the [Al, B]-TUN synthesis was examined. The effects on structure, morphology, textural properties, Al and B content, coordination states, acidic properties and the n-hexane cracking behaviors were intensively studied. And the cracking results were also compared with the popular ZSM-5 and Beta zeolites. The possible acid sites distribution in channels or in intersections was discussed.

Chapter 4 Post-treatment of [B, Al]-TUN zeolite and applied in n-hexane cracking reactions

The post-treatment of [Al, B]-TUN zeolites and the application in *n*-hexane cracking

were investigated. Three different kinds of post-treatment methods were applied to modify the acidic properties of [Al, B]-TUN zeolites. The effects on structure, morphology, textural properties, Al and B content, acidic properties and the *n*-hexane cracking behaviors were intensively studied.

Chapter 5 Summary

Conclusions based on the thesis were summarized.