

Ethylene trapping performance of Pd exchanged zeolites with respect to channel size

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The hydrocarbon(HC) trap can store the HC molecules at low temperature, subsequently converting stored HCs to CO₂ by active sites. Zeolites as the microporous material possesses a specific structure, large surface area and acid sites. These characteristics can be applied in trapping HCs selectively and strongly with the channel size and exchanged cations. In this study, we compared the trapping performances of ethylene as a function of the channel size of zeolites. The Pd exchanged zeolites have been prepared to identify the role of active sites in the adsorption and their oxidation activities. The H-form zeolites were not effective in the C₂H₄ trapping performance. However, Pd/zeolites improved the adsorption capacity. Particularly, Pd/ZSM-5 showed a performance of the C₂H₄ trapping and oxidation, compared to Pd/BEA and Pd/SSZ-13. An oligomerization reaction occurs over the Pd/BEA and Pd/SSZ-13, respectively, as confirmed by C-H-O spectra from the FTIR. The Pd species were identified from XPS and H₂-TPR characterizations. The present work will provide that the Pd/ZSM-5 can reduce cumulative emission of HC with transient tests, comparing the performance of Pd/Al₂O₃ catalyst.