

IR study of active sites for n-heptane isomerization over MoO₃-ZrO₂

Abstract:

The property of acidic sites on MoO₃-ZrO₂ was studied for n-heptane isomerization. A 2,6-lutidine IR study showed that the introduction of MoO₃ on ZrO₂ partially eliminated the absorbance band at 1605 cm⁻¹ ascribed to Lewis acid sites corresponding to the presence of the monoclinic phase of ZrO₂ and developed several Brønsted and Lewis acid sites with different acidic strengths. MoO₃-ZrO₂ possesses a large number of relatively weak Lewis and Brønsted acid sites as well as strong acid sites. The active protonic acid sites in n-heptane isomerization were formed from molecular hydrogen through a spillover mechanism with the involvement of doublet bands at 1595 and 1580 cm⁻¹ ascribed to the Lewis acid sites corresponding to the presence of the tetragonal phase of ZrO₂. No catalytic activity of MoO₃-ZrO₂ for n-heptane isomerization was observed in the absence of the doublet bands at 1595 and 1580 cm⁻¹ and hydrogen in the gas phase.