

Pore mouth shape selectivity: the origin of remarkable catalytic performance of aged H-ferrierite for the skeletal isomerization of 1-butene to isobutene

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A series of 10-ring zeolites including clinoptilolite, ferrierite, ZSM-22, SUZ-4, ZSM-57, and ZSM-5, together with the dealuminated analogs of some of these materials prepared via oxalic acid treatments, has been tested as catalysts for the skeletal isomerization of 1-butene at 400°C and atmospheric pressure. A correlation of the catalytic results from these zeolites with variations in their 10-ring pore shape led us to speculate that the remarkable catalytic performance of aged H-ferrierite in the skeletal isomerization of 1-butene to isobutene may originate from the pore mouth shape selectivity of its 10-ring channels with a suitable degree of ellipticity which enables to effectively chemisorb *n*-butene molecules near the pore-mouth inlets compared to other medium-pore zeolites. Further evidence to support this speculation can be drawn by comparing the isomerization activities of two ferrierites having similar Si/Al ratios but different crystal sizes and thus different external surface areas.