

Low-Temperature Ethanol Dehydration over Cage-Based, Small-Pore Zeolites with Different Framework Topologies

이정환, 이수진, 홍석봉[†]

포항공과대학교

(sbhong@postech.ac.kr[†])

The low-temperature dehydration of ethanol to ethene in the presence of water vapor ($H_2O/EtOH = 0.2$) is investigated over five cage-based, small-pore zeolites with different framework structures (LEV, CHA, AEI, RTH, and LTA). At 200 °C, H-SSZ-13, H-SSZ-39, and H-RTH exhibit higher initial ethene yields (by 15 - 30%) than H-mordenite, known as the best low-temperature ethanol dehydration catalyst. H-SAPO-34 with the same framework topology (CHA) as that of H-SSZ-13, but with fairly weaker acidity, is characterized by a much lower initial ethene yield, suggesting an important role of strong acid sites in ethanol dehydration. This may also account for the poor catalytic performance of the other two cage-based, small-pore zeolites (i.e., H-levyite and H-LTA). Given their structural features, the selective ethene formation over H-SSZ-39, H-SSZ-13, and H-RTH can be rationalized by product shape selectivity.