

Ethanol dehydration on γ -Al₂O₃: effects of partial pressure and temperature

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In this study, ethanol dehydration was carried out on platelet γ -Al₂O₃ as catalyst over a wide range of reaction temperature (180 - 300 °C) and ethanol partial pressure (0.5-2 kPa). Ethanol dehydration reaction measurements and TPD demonstrate that the ethoxide is a key intermediate for ethylene formation by ethanol dehydration on Al₂O₃, possibly suggesting an E1 mechanism for ethylene formation. The reaction order for both ethylene and ether formation increased with increasing reaction temperature. The apparent activation energies also changed with the reaction temperature and ethanol partial pressure. These results demonstrate the change of surface coverage in the catalytic active sites for alcohol dehydration as reaction temperature varies.