

Catalytic activation of hydrocarbons in confined spaces

Johannes A. Lercher

TU München, Department of Chemistry, Lichtenbergstr. 4, 85748 Garching

The lecture addresses the elementary steps involved in the conversion of hydrocarbons at acid sites in well-defined environments. These steps include, transport to and sorption on sites in and outside the pores, the addition of protons and the abstraction of hydrogen as initiating steps, the surface reaction and finally the desorption of the products. Especially, the coupling of hydrogen abstraction with acid catalysis in the first step and the hydride transfer to facilitate desorption and to propagate the catalytic cycle, will be shown to be crucial. Only the subtle control of these processes leads to active and stable catalysts. Surface carbenium ions are the critical intermediates/transition states along the catalytic cycles. The role of the steric control of the acid/active site will be especially discussed in the light of potential variations of the transition entropies. Examples will include alkane cracking, isomerization, and the disproportionation/isomerization of substituted aromatic molecules.