

Studies in Surface Science and Catalysis

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Probing the Elementary Steps of the Water-Gas Shift Reaction over Cu/ZnO/Al₂O₃ with Transient Experiments

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The elementary steps involved in the water-gas shift reaction have been investigated by temperature- and concentration-programmed experiments over a conventional Cu/ZnO/Al₂O₃ catalyst. It has been found that under the reaction conditions studied the interaction of H₂ with the reduced adsorbate-free and the N₂O oxidized surface, the reaction of CO with preadsorbed atomic oxygen and the dissociation of CO₂ and H₂O occurred on metallic Cu surface sites. By means of microkinetic analysis it was possible to bridge the pressure and material gaps between results collected on well-defined single crystals under ultrahigh vacuum conditions and on metal-supported commercial catalysts under industrial conditions.