

Photocatalytic Reduction of NO in the Absence and Presence of Hydrocarbons over Ti-, V-, Mo-MCM-41

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The photocatalytic reduction of NO into N₂ in the absence and presence of hydrocarbons were investigated on Ti-, V-, and Mo-MCM-41 mesoporous molecular sieves. It was found that Ti-MCM-41 shows much higher photocatalytic reactivity for the direct decomposition of NO into N₂ and O₂ than V- and Mo-MCM-41. In contrast to Ti-MCM-41, the reactions of NO into N₂ on V- and Mo-MCM-41 were remarkably enhanced in the co-existence of propane. From photoluminescence, ESR, and photo-adsorption measurements, the origin of the sharp difference observed on Ti-MCM-41 as compared to V- and Mo-MCM-41 in this reaction could be attributed to the low reactivity of the charge transfer excited Ti-oxide species for the activation of propane as the first step of the reduction of NO with propane.