AN FTIR STUDY OF THE INFLUENCE OF ENVIRONMENT CONDITIONS ON THE SUCCESSIVE HYDROGENATIONS OF CO

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In a preliminary study, the reaction of CO successive hydrogenation has been performed at 3 and 10 K using a co-injection technique. A H/H_2 mixture and CO molecules are codeposited on a cold mirror and hydrogen atoms are reacting step by step with CO as follows :
$CO \rightarrow HCO \rightarrow H_2CO \rightarrow H_3CO \rightarrow CH_3OH$
At 3 K, CO hydrogenation is limited to the first step of the reaction. However, when the reaction is performed at 10 K, CO hydrogenation is total and all intermediates are observed in the IR spectra.
The aim of this present work is to understand the influence of the environment in wich the reaction takes place, in order to determine the best conditions promoting CO hydrogenation. Indeed, the catalytic potential of water molecules on CO hydrogenation has been more specifically studied. In this experiment, mixtures of (CO,H_2O) and H/H_2 are co-injected at various concentrations and in a temperature range between 3 and 20 K. It is clear that water environnements induce noticeable changes by increasing the chemical reaction rate and promoting HCO conversion into H_2CO.