

ABSTRACT

In the present doctoral thesis has been studied aspects related to the hybrid catalysts based on the bifunctional system $\text{CuZnOAl}_2\text{O}_3$ /zeolite employed in the direct synthesis of DME from syngas, which exhibit controversy in the literature.

First of all, the preparation methodology of the hybrids was assessed. Thereby, the use of different characterization techniques showed for the first time the occurrence of detrimental interactions between components. Such interactions affect in a different extent the catalytic behavior depending on the preparation method employed.

The study focused on the influence of the zeolite acidity using ZSM-5 zeolite revealed what type of acid sites rules the dehydration of methanol to DME and its influence in the catalytic behavior of the hybrids used in the direct DME synthesis.

On the other hand, the use of different zeolite structures and their surface modification by different treatments allowed us to conclude that the extraframework Al species located on the external surface of the zeolite in contact with the $\text{CuZnOAl}_2\text{O}_3$ catalyst are responsible of the deactivation observed for the hybrid catalysts.

Finally, on the basis of the gained knowledge, a new catalytic system based on the confinement of the CuZnO in the SBA-15 matrix was developed. The novel system showed an improvement in the activity and stability respect to the conventional hybrid catalysts.