

Development of CoMoS catalysts supported on mesoporous silica by impregnation assisted with organic oligomers: Effect of molecular weight

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In recent years, several changes in the impregnation techniques of the active phase on mesoporous supports have been developed to improve results. One option reported the synthesis of catalysts by incipient impregnation assisted by organic chelating agent derived from carboxylic acids such as citric acid, nitrilotriacetic, EDTA, among others [1, 2]. Based on those studies, this research work presents the evaluation of a series of CoMoS catalysts supported on three-dimensional mesoporous silica, which were prepared by incipient impregnation assisted by soluble polyacrylic acid oligomers with different molecular weights (1,000 and 5,000 UMA, approximately). Polyacrylic acid oligomers were prepared by radical polymerization in aqueous solution. The control variables during the impregnation process were solution pH and the level of humidification of the CoMo precursor phase.

The textural properties analysis of the synthesized catalysts was made by N₂ physisorption using BET method, the morphology analysis was carried out by HR-TEM, while the composition of catalysts was determined using energy dispersive spectroscopy (EDS) and thermogravimetric (TGA) analysis. Finally, evaluation of catalytic activity during the HDS of DBT was carried out in a high-pressure batch reactor [3]. Figure 1 shows the morphology of the dispersed active phase and the catalytic performance of supported catalysts. As can be seen, the chelating agent proposed in this paper allow to obtain highly dispersed catalysts and 1.7 times more active than the commercial catalyst. The low activity shown by catalyst prepared with wet CoMo precursor is probably due to loss of active phase during humidification process, or change of its structure to a less active phase. The role of chelating agent to obtain a highly disperse active phase could be due to the reduction of CoMo precursor migration from porous structure to external surface during drying process. Therefore, a higher quantity of precursor is fixed into the porous network. Also, the chelating agent generates an amorphous phase of CoMo oxide and aids to reduce the crystallinity of active phase during activation process.

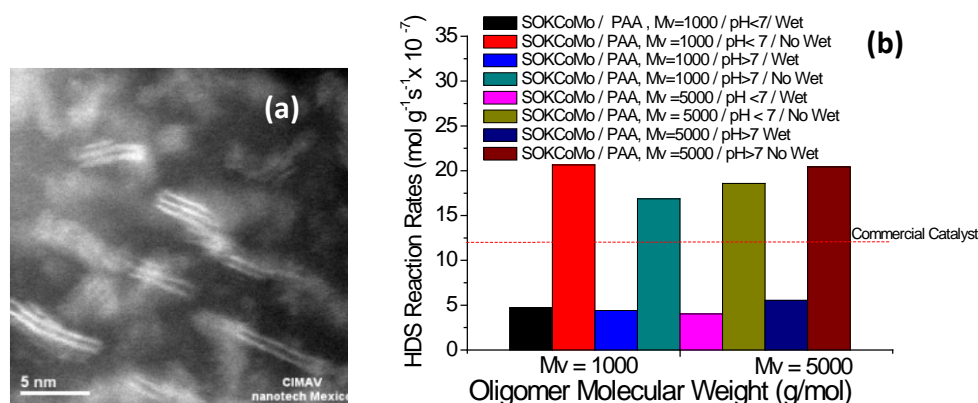


Figure 1. TEM micrograph of the active phase on the support (a) and catalysts performance (b).

References

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