

## Thermal decomposition of thiomolybdate precursors for preparation of catalysts

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MoS<sub>2</sub>-based supported catalysts are widely used in industry to remove S and N from different refinery streams. Depending on the actual need the MoS<sub>2</sub> catalysts are promoted either with Co or Ni. The most established industrial procedure for the synthesis of the catalysts uses oxidic precursors like ammonium heptamolybdate (AHM). The support like  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> is first impregnated with a solution of AHM, dried and then calcined at elevated temperatures yielding MoO<sub>3</sub>. In the next step the promoter is added as a salt and the mixture is calcined again to give a mixture of oxides on the support material. The activation of the catalyst, i.e. the transformation of the oxides into the sulfides is done in two different ways: ex-situ by treatment in a H<sub>2</sub>S/H<sub>2</sub> atmosphere at high temperatures or in-situ by placing the oxidic catalyst in the refinery stream. The sulfidation occurs then by reaction between S-containing molecules like dibenzothiophene (DBT) and the oxidic material. The most critical step is the simultaneous sulfidation of both components Mo and Co/Ni. Moreover, it is widely accepted that the active catalyst contains some percent of Carbon.

A few years ago we started to develop an All-Sulfide-Route avoiding the usage of oxidic precursor materials [1, 2]. This new route bases on the thermal decomposition of suitable tetrathiomolybdate precursors allowing preparation of promoted catalysts containing Mo and the promotor atoms as well as a distinct carbon content. In addition, we used SBA-15 as support which has a much larger specific surface area than  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>. In the talk the synthesis methods are presented, the chemical as well as structural properties and the catalytic behavior in the hydrodesulfurization of DBT are discussed.

[1] Z.-D. Huang, W. Bensch, L. Kienle, G. Alonso, S. Fuentes, C. Ornelas, *Catal. Lett.*, **124**, (2008) 24-33.

[2] Z.-D. Huang, W. Bensch, L. Kienle, S. Fuentes, G. Alonso, C. Ornelas, *Catal. Lett.*, **127**, (2009) 132-142.