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**Unconventional Sulfide Hydrotreating Catalysts Prepared by Deposition of MoO<sub>3</sub> and CoCO<sub>3</sub> with the Assistance of Nitrilotriacetic Acid on ZrO<sub>2</sub> Support**

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**UNCONVENTIONAL SULFIDE HYDROTREATING CATALYSTS  
PREPARED BY DEPOSITION OF MoO<sub>3</sub> AND CoCO<sub>3</sub> WITH THE  
ASSISTANCE OF NITRILOTRIACETIC ACID ON ZrO<sub>2</sub> SUPPORT**

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The sulfide hydrotreating Mo and CoMo catalysts of unconventional composition containing the monoclinic form of ZrO<sub>2</sub> as a support were prepared by unconventional preparation method based on impregnation of the support by the chelating agent nitrilotriacetic acid (NTA) assisted spreading of MoO<sub>3</sub> with CoCO<sub>3</sub>·xH<sub>2</sub>O and they were compared with samples prepared conventionally and reference gamma-Al<sub>2</sub>O<sub>3</sub> supported catalysts. The catalysts were characterized by X-ray diffraction, N<sub>2</sub> physisorption, O<sub>2</sub> chemisorption and activity in 1-benzothiophene hydrodesulfurization (HDS) reaction at 1.6 MPa and 360 °C. It was found that conventional subsequent deposition of Mo and Co from (NH<sub>4</sub>)<sub>6</sub>Mo<sub>7</sub>O<sub>24</sub>·4H<sub>2</sub>O and Co(NO<sub>3</sub>)<sub>2</sub> and the deposition of the metals from MoO<sub>3</sub> and CoCO<sub>3</sub>·xH<sub>2</sub>O without the use on NTA onto the ZrO<sub>2</sub> as well as drying or sulfidation of the samples did not significantly influenced the support specific surface area. In contrast, the presence of NTA decreased the surface areas in the samples dried at 110 °C. After sulfidation at 400 °C, however, the high surface areas (99–119 m<sup>2</sup>/g) were recovered. X-ray diffraction did not detect presence of crystalline phase of NTA, Mo or Co species in the catalysts after drying or sulfidation. Only the monoclinic phase of ZrO<sub>2</sub> (baddeleyite) was found. It was ascertained that the ZrO<sub>2</sub> support increased the amount of chemisorbed O<sub>2</sub> over the deposited metal sulfides more than two times in comparison to gamma-Al<sub>2</sub>O<sub>3</sub> support in industrial reference catalysts. The approximate linear correlation between HDS activity and amount of chemisorbed O<sub>2</sub> was observed for the prepared CoMo/ZrO<sub>2</sub> catalysts. It was concluded<sup>1</sup> that the use of chelating agent NTA during preparation of CoMo catalysts supported on the monoclinic ZrO<sub>2</sub> increased the HDS activity within the range 22–69 %. The molar ratio NTA/(Co+Mo) to achieve high HDS activities was 1/1. The most active CoMo/ZrO<sub>2</sub> catalyst was prepared by the impregnation of the support from the solution made by dissolution of MoO<sub>3</sub>, CoCO<sub>3</sub> and NTA in water followed by sulfidation without previous calcination.

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**References:**

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