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**NIOBIA SUPPORTED MOLYBDENUM SULFIDE  
HYDRODESULFURIZATION CATALYSTS PREPARED  
USING NITRILOTRIACETIC ACID**

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The effect of addition of chelating agent nitrilotriacetic acid, NTA, to the impregnation solution of ammonium heptamolybdate, AHM, for preparation of Mo/Nb<sub>2</sub>O<sub>5</sub> hydrodesulfurization, HDS, catalysts was studied. The Nb<sub>2</sub>O<sub>5</sub> support was obtained by calcination of commercial Nb<sub>2</sub>O<sub>5</sub>·xH<sub>2</sub>O at 400 °C and its surface area, S<sub>BET</sub>, was 93 m<sup>2</sup> g<sup>-1</sup>. In contrast to previous papers dealing with NTA Co(Ni)Mo/Al<sub>2</sub>O<sub>3</sub> HDS catalysts (references are given in <sup>1</sup>), NH<sub>4</sub>OH was not used in the preparation of AHM-NTA impregnation solution in the present paper. The natural pH of this solution was about 2. The catalysts were tested in HDS of thiophene at total pressure 1 MPa. The NTA Mo/Nb<sub>2</sub>O<sub>5</sub> samples were not calcined before sulfidation. The dependence of weight activity on MoO<sub>3</sub> loading was compared for Mo/Nb<sub>2</sub>O<sub>5</sub>, NTA Mo/Nb<sub>2</sub>O<sub>5</sub> and conventional Mo/Al<sub>2</sub>O<sub>3</sub> catalysts. The activity of Mo/Nb<sub>2</sub>O<sub>5</sub> samples was low, irrespectively of loading. The activity of Mo/Al<sub>2</sub>O<sub>3</sub> catalysts increased up to the monolayer loading of about 22 wt.% MoO<sub>3</sub> (S<sub>BET</sub> of Al<sub>2</sub>O<sub>3</sub> was 262 m<sup>2</sup> g<sup>-1</sup>) and was much higher than that of Mo/Nb<sub>2</sub>O<sub>5</sub> samples. However, the use of NTA improved HDS activity of Mo/Nb<sub>2</sub>O<sub>5</sub> catalysts; the effect increased with MoO<sub>3</sub> loading and it was one order of magnitude at high loadings of 20-25 wt.% MoO<sub>3</sub>. Surface area of sulfided NTA Mo/Nb<sub>2</sub>O<sub>5</sub> catalysts was only 35-40 m<sup>2</sup> g<sup>-1</sup>, while that of conventional Mo/Al<sub>2</sub>O<sub>3</sub> was about 210 m<sup>2</sup> g<sup>-1</sup>. However, surface area activity per 1 m<sup>2</sup> of NTA Mo/Nb<sub>2</sub>O<sub>5</sub> samples was much higher than that of conventional Mo/Al<sub>2</sub>O<sub>3</sub> catalysts. At the loading of 22 wt.% MoO<sub>3</sub>, the ratio of these activities was 5.1, which is higher than that achieved in previous papers in the literature. In spite of low surface area of sulfided NTA Mo/Nb<sub>2</sub>O<sub>5</sub> catalysts, their weight activity per 1 g was higher than that of conventional Mo/Al<sub>2</sub>O<sub>3</sub> samples in the broad loading range of 10-25 wt.% MoO<sub>3</sub>. Mo/Nb<sub>2</sub>O<sub>5</sub> catalysts with such high relative weight normalized activity were not reported in the literature up to now. The high activity was not achieved by increasing the extensive factor i.e. surface area of Nb<sub>2</sub>O<sub>5</sub> support. S<sub>BET</sub> of the starting Nb<sub>2</sub>O<sub>5</sub> was not radically higher than it was reported in previous papers in the literature. Unprecedentedly high weight normalized activity of Mo/Nb<sub>2</sub>O<sub>5</sub> catalysts was achieved by addition of NTA to the impregnation solution without use of NH<sub>4</sub>OH to dissolve it.

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**Reference:**

- <sup>1</sup> Kaluža, L.; Zdražil, M. *Current Topics in Catalysis* **2014**, *11*, 65-74.