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Author: [ADVANCED](#) | Volume Page
Keyword:



[TOP](#) > [Available Issues](#) > [Table of Contents](#) > [Abstract](#)

ONLINE ISSN : 1349-273X

PRINT ISSN : 1346-8804

Journal of the Japan Petroleum Institute

Vol. 47 (2004) , No. 4 pp.249-257



[\[PDF \(590K\)\]](#) [\[References\]](#)

Activity and Surface Structure of Sulfided NiW/Al₂O₃ Catalyst: Effects of Chelating Agents on the Catalytic Activity for the Hydrogenation of Tetralin and *o*-Xylene

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(Received: August 18, 2003)

The present study investigated the effects of chelating agents on the aromatic hydrogenation activity and the surface fine structure of NiW/Al₂O₃ catalyst. NiW/Al₂O₃ catalyst was prepared from impregnating solution containing Ni, W and chelating agent (IDA, NTA, DTPA, EDTA, TTHA and/or CyDTA) and used for the hydrogenation of tetralin and *o*-xylene. NiW/Al₂O₃ prepared with chelating agents showed higher activities than NiW/Al₂O₃. CyDTA was the most effective additive for both reactions. NiW/Al₂O₃ prepared with CyDTA also showed higher activity than commercial NiW catalyst. NO pulse adsorption and XPS measurements indicated that the addition of chelating agents improved the dispersion of Ni species. W L_{III}-edge EXAFS measurements showed that the W-S coordination number of WS₂ was improved by the addition of CyDTA. These results suggest that the chelating agent enhances the formation of the Ni-W-S structure. Chelating agent forming a stable complex with Ni in the impregnating solution had a greater promoting effect on hydrogenation activity. Formation of the stable chelate-Ni complex affects the sulfidation process of Ni species during the sulfiding pretreatment, which enhances the formation of the active Ni-W-S structure.

Keywords: [Tetralin hydrogenation](#), [Xylene hydrogenation](#), [Nickel tungsten catalyst](#),



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Hideyuki Itou, Naoto Koizumi, Naoko Sakamoto, Takehide Honma, Masahiro Shingu and Muneyoshi Yamada, *Journal of the Japan Petroleum Institute*, Vol. **47**, No. 4, p.249 (2004) .

doi:10.1627/jpi.47.249

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