



**Journal of the Japan Petroleum Institute**  
The Japan Petroleum Institute

[Available Issues](#) | [Instructions to Authors](#) | [Japanese](#) >> [Publisher Site](#)

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. 50 (2007) , No. 3 pp.154-161



[\[PDF \(623K\)\]](#) [\[References\]](#)

## Comparison by $^{35}\text{S}$ Radiotracer Methods of Hydrodesulfurization Behavior for Molybdenum, Cobalt-Molybdenum and Nickel-Molybdenum Catalysts Supported on $\gamma$ -Alumina and High Specific Surface Area Titania

[Atsushi Ishihara](#)<sup>1)3)</sup>, [Franck Dumeignil](#)<sup>1)4)</sup>, [Kazuya Morimoto](#)<sup>1)</sup>, [Eika W. Qian](#)<sup>1)</sup>, [Toshiaki Kabe](#)<sup>1)</sup>, [Shinichi Inoue](#)<sup>2)</sup> and [Akihiro Muto](#)<sup>2)</sup>

1) Dept. of Chemical Engineering, Tokyo University of Agriculture and Technology

2) Chiyoda Corp.

3) (Present) Dept. of Chemistry for Materials, Graduate School of Engineering, Mie University

4) (Present) Unité de Catalyse et de Chimie du Solide UMR CNRS 8181, Université des Sciences et Technologies de Lille (USTL)

(Received: October 10, 2006)

The differences between  $\text{MoS}_2$ ,  $\text{CoMoS}$  and  $\text{NiMoS}$  HDS catalysts supported on  $\gamma$ -alumina and high SSA titania are investigated based on the results of [ $^{35}\text{S}$ ]DBT HDS experiments. Previous studies of  $\text{MoS}_2$  and  $\text{CoMoS}$  are reviewed, discussed and compared with new results for  $\text{NiMoS}$ . Introduction of Ni or Co to  $\text{MoS}_2/\text{Al}_2\text{O}_3$  catalysts classically yields a significant increase in HDS performance. Irrespective of the promoter, an increase in  $S_0$ , the number of labile sulfur atoms, is observed. In contrast,  $k_{\text{RE}}$ , the  $\text{H}_2\text{S}$  liberation rate constant, plotted as a function of the Ni/Mo ratio, presents a volcano profile on Ni-promoted catalysts, but  $k_{\text{RE}}$  reaches a plateau from low Co/Mo ratios on Co-promoted catalysts. The 'TiMoS' phase, which is formed *in-situ* during HDS on  $\text{Mo}/\text{TiO}_2$  catalysts, promotes sulfur mobility and makes  $\text{Mo}/\text{TiO}_2$  catalysts more active than

Mo/Al<sub>2</sub>O<sub>3</sub> catalysts. Nevertheless, CoMo/TiO<sub>2</sub> catalysts are less active than CoMo/Al<sub>2</sub>O<sub>3</sub> catalysts because further promotion of 'TiMoS' phase with Co might yield excessive weakening of the metal-sulfur bonds, and/or some Co atoms might be 'lost' in the TiO<sub>2</sub> matrix without interacting with MoS<sub>2</sub>. In contrast, introduction of Ni to Mo/TiO<sub>2</sub> catalysts yields significant increases in both  $k_{RE}$  and  $S_0$ . The NiMo/TiO<sub>2</sub> catalysts exhibit HDS performances close to those of Al<sub>2</sub>O<sub>3</sub>-supported catalysts. Clearly catalytic behavior over Co- and Ni-promoted catalysts is different.

**Keywords:** [Hydrodesulfurization](#), [Dibenzothiophene](#), [γ-Alumina](#), [High surface area titania](#), [Nickel molybdenum catalyst](#), [Radiotracer method](#)



[\[PDF \(623K\)\]](#) [\[References\]](#)

Download Meta of Article [\[Help\]](#)

[RIS](#)

[BibTeX](#)

To cite this article:

Atsushi Ishihara, Franck Dumeignil, Kazuya Morimoto, Eika W. Qian, Toshiaki Kabe, Shinichi Inoue and Akihiro Muto, *Journal of the Japan Petroleum Institute*, Vol. **50**, No. 3, p.154 (2007) .

---

doi:10.1627/jpi.50.154

JOI JST.JSTAGE/jpi/50.154

Copyright (c) 2007 by The Japan Petroleum Institute

---



---

[Japan Science and Technology Information Aggregator, Electronic](#)

