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ONLINE ISSN : 1349-273X

PRINT ISSN : 1346-8804

Journal of the Japan Petroleum Institute

Vol. 47 (2004) , No. 3 pp.214-217

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Deactivation of Pt/SO₄²⁻/ZrO₂ Catalyst with Sulfur Compounds and Preventive Measures

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(Received: November 26, 2003)

Hydrodesulfurization of feed oil stocks is essential for the industrial isomerization process of light naphtha, because the isomerization catalysts are deactivated by small amounts of sulfur compounds. In this study, the deactivation of Pt/SO₄²⁻/ZrO₂ catalyst by various sulfur compounds was examined, and reactions to suppress the deactivation were proposed. Various sulfur compounds caused rapid deactivation of Pt/SO₄²⁻/ZrO₂ catalyst, in the order of (*n*-C₃)₂S₂ >> Et-S-Me >> *i*-C₃SH > H₂S. The order of deactivation seems to depend on the adsorption of the sulfur compound on the active site. In order to suppress deactivation of the isomerization catalyst, a two reactor process combining hydrodesulfurization (HDS) and isomerization was examined. HDS followed by Pt/SO₄²⁻/ZrO₂ catalyst isomerization showed stable activity for light naphtha with relatively high sulfur content.

Keywords: [Platinum catalyst](#), [Sulfated zirconia catalyst](#), [Isomerization](#), [Light naphtha](#), [Sulfur compound](#), [Sulfur poisoning](#)

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To cite this article:

Takao Kimura, Nobuyasu Ohshio, Takahito Kawakami and Katsuya Watanabe, *Journal of the Japan Petroleum Institute*, Vol. **47**, No. 3, p.214 (2004) .

doi:10.1627/jpi.47.214

JOI JST.JSTAGE/jpi/47.214

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