ONLINE ISSN : 1349-273X
PRINT ISSN : 1346-8804

Journal of the Japan Petroleum Institute
Vol. 46 (2003) , No. 1 pp.45-52

[PDF (661K)] [References]

Estimation of Coke and Metal Deposition Distribution within Hydrodesulfurization Catalyst Pore at the Last Stage of Operation

Kazuo IDEI[1)], Takeshige TAKAHASHI[2)] and Takami KAI[2)]

1) Research & Development Center, Cosmo Oil Co., Ltd.
2) Dept. of Applied Chemistry and Chemical Engineering, Faculty of Engineering, Kagoshima University

(Received: July 12, 2002)

Hydrodesulfurization (HDS) of atmospheric residue (AR) carried out over Ni-Mo or Co-Mo catalyst requires a sudden increase in the reaction temperature for the desired desulfurization at the end of operation (EOR). This phenomenon is mainly caused by reduced diffusion rate due to metal deposition in the pore mouth. The present study performed HDS over catalysts with different pore size to separately examine the effects of metal and coke deposition on catalyst deactivation. HDS catalysts used in a commercial process for 1 year were analyzed by EPMA to determine the coke and metal distribution along the catalyst radius. A model equation was developed to quantitatively estimate the coke and metal distribution. The model equation could estimate parameters such as Thiele modulus and catalyst properties coefficient. Furthermore, the equation was applicable to used catalyst obtained from commercial equipment and to used catalysts with different pore radii after HDS of Boscan crude containing large amounts of metals and asphaltenes. The distributions of coke and metals could be simulated with the model equation, giving 0.01 and 4 for the Thiele moduli for coke and metal, respectively. The model equation developed in this study is useful to estimate the service life of HDS catalyst.

Keywords: Hydrodesulfurization, Model equation, Thiele modulus, Metal distribution estimation, Coke distribution estimation

To cite this article:
Kazuo IDEI, Takeshige TAKAHASHI and Takami KAI, *Journal of the Japan Petroleum Institute*, Vol. **46**, No. 1, p.45 (2003) .

doi:10.1627/jpi.46.45
JOI JST.JSTAGE/jpi/46.45