



národní  
úložiště  
šedé  
literatury

## **High-Temperature Desulfurization of a Producer Gas by La- and Ce-based Oxides.**

Brynda, Jiří  
2017

Dostupný z <http://www.nusl.cz/ntk/nusl-354694>

Dílo je chráněno podle autorského zákona č. 121/2000 Sb.

Tento dokument byl stažen z Národního úložiště šedé literatury (NUŠL).

Datum stažení: 10.04.2024

Další dokumenty můžete najít prostřednictvím vyhledávacího rozhraní [nusl.cz](http://nusl.cz).

# High-Temperature Desulfurization of a Producer Gas by La- and Ce-based Oxides

*Student: Ing. Jiří Brynda*

*Supervisor: Ing. Siarhei Skoblja, Ph. D.*

*Supervising Expert: Doc. Ing. Karel Svoboda, CSc.*

The deep high-temperature desulfurization of a producer gas is a necessary step to efficient power production by solid oxide fuel cells. The sorbents currently used for such desulfurization are mostly based on ZnO and CuO, which deteriorate above 773 K.<sup>1</sup> Based on thermodynamic calculations,<sup>2</sup> we decided to test the possibility of using sorbents containing La and Ce oxides. The prepared sorbents contained either La<sub>2</sub>O<sub>3</sub> or nonstoichiometric cerium oxide CeO<sub>x</sub> (x=1.5–2) on an alumina support. The sulphur capacity and desulfurization efficiency of both sorbents were tested at 773 K in various gas mixtures containing reducing gases (e.g. H<sub>2</sub>, CO) and H<sub>2</sub>S as the model sulfur compound. These preliminary laboratory tests implied that each sorbent was capable of high desulfurization efficiency. Next, experiments performed in artificial producer gases (CO, H<sub>2</sub>, CO<sub>2</sub>, H<sub>2</sub>O, N<sub>2</sub> and H<sub>2</sub>S) of varying compositions showed the negative influence of increasing amounts of CO<sub>2</sub> and H<sub>2</sub>O, as well as the importance of pre-reduction in the case of the cerium-based sorbent. Thus, the application of La- and Ce-based sorbents for deep high-temperature desulfurization seems to be feasible for producer gases with low concentrations of CO<sub>2</sub> and H<sub>2</sub>O.

## *References*

1. Sasaoka, E.; Hirano, S.; Kasaoka, S.; Sakata, Y. Stability of Zinc-Oxide High-Temperature Desulfurization Sorbents for Reduction. *Energy & Fuels* **1994**, 8 (3), 763–769.
2. Svoboda, K.; Leitner, J.; Havlica, J.; Hartman, M.; Pohořelý, M.; Brynda, J.; Šyc, M.; Chyou, Y.-P.; Chen, P.-C. Thermodynamic aspects of gasification derived syngas desulfurization, removal of hydrogen halides and regeneration of spent sorbents based on La<sub>2</sub>O<sub>3</sub>/La<sub>2</sub>O<sub>2</sub>CO<sub>3</sub> and cerium oxides. *Fuel* **2017**, 197, 277–289.