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Effect of Halide Impregnation on Elemental Mercury Removal of Activated Carbons

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First published: 20 January 2017

<https://doi.org/10.1002/bkcs.11062>

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Abstract

Activated carbons (ACs) were impregnated with potassium halides (KX) to enhance the removal efficiency of elemental mercury (Hg^0). In this work, the impregnation effect of potassium bromide (KBr) and potassium iodine (KI) were investigated. The surface properties of KX-impregnated ACs were determined by scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS). The pore structures and total pore volumes of the KX-impregnated ACs were analyzed using the N_2

77% K adsorption isotherms. The Hg⁰ removal efficiency of KBr-ACs and KI-ACs was studied under simulated flue gas conditions. The effects of KI and KBr loading, adsorption temperature, and flue gas components on Hg⁰ removal efficiency were also investigated. The results showed that the Hg⁰ removal efficiency of the ACs was significantly enhanced by KI or KBr impregnation, and KI-ACs showed higher Hg⁰ removal efficiency than KBr-ACs under the same conditions. An increase in KI or KBr loading and higher adsorption temperatures improved the Hg⁰ removal efficiency, indicating that chemisorption occurred due to the reaction between X[•] and Hg⁰. The lower extent of Hg⁰ removal exhibited by the KBr-ACs than by the KI-ACs was due to the difficulty of Br₂ formation on the surfaces.

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- Peng Hu, Yufeng Duan, Weike Ding, Jun Zhang, Liyi Bai, Na Li and Hongqi Wei, Enhancement of Mercury Removal Efficiency by Activated Carbon Treated with Nonthermal Plasma in Different Atmospheres, *Energy & Fuels*, 10.1021/acs.energyfuels.7b01973, **31**, 12, (13852-13858), (2017).

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