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Bromination of petroleum coke for elemental mercury capture

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JHM HIGHLIGHTS:

- Chemical-mechanical bromination of petroleum coke
- Effective capture of elemental mercury in flue gas by brominated petroleum coke
- Synergy of bromine and sulfur inherent in petroleum coke in mercury capture

ABSTRACT: Activated carbon injection has been proven to be an effective control technology of mercury emission from coal-fired power plants. Petroleum coke is a waste by-product of petroleum refining with large quantities readily available around the world. Due to its high inherent sulfur content, petroleum coke is an attractive raw material for developing mercury capture sorbent, converting a waste material to a value-added product of important environmental applications. In this study, petroleum coke was brominated by chemical-mechanical bromination. The brominated petroleum coke was characterized for thermal stability, mercury capture capacity, and potential mercury and bromine leaching hazards. Bromine loaded on the petroleum coke was found to be stable up to 200^{o}C. Even after treating the treated petroleum coke for 30 minutes at 600^{o}C, 1/3 bromine remained on the solid. The sorbent from bromination of sulfur-containing petroleum coke was shown to be a promising alternative to commercial brominated activated carbon for capture of elemental mercury from coal combustion flue gases.

Keywords: Petroleum coke; mercury emission control; bromine; sulfur; power plant

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