284b Comparison of the Performance of a Conventionally-Heated and a Microwave-Heated Fluidized Bed Mercury Desorber Employing a Mass Transfer-Based Kinetic Model

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Control of mercury emissions from various combustion sources has attracted great attention due to the toxic nature of mercury and the current and potential regulations. The most effective method for controlling trace elemental mercury emission is to employ activated carbon (AC) to adsorb mercury from the combustion flue gas. However, an environmental concern is the production of large quantity of spent activated carbon contaminated with various pollutants. A practical solution is to regenerate the AC for reuse in a conventionally- or microwave-heated fluidized bed mercury desorber. In this study, a mass transfer-based mercury desorption model was employed to simulate the performance of a conventionally-heated and a microwave-heated fluidized bed mercury desorber. The desorber had a 0.3 m ID and was filled with various types of activated carbon (AC) contaminated with various concentrations of mercury. Nitrogen was used as the desorption gas and the simulation parameters included temperature/microwave power level, fluidization velocity, AC type, AC size, AC amount, and concentration of mercury contamination. The objectives of the simulations were to compare the two operations and to identify optimal operating conditions resulting in the fastest desorption rate as well as the highest mercury concentration in the effluent gas. The latter is essential for effective mercury recovery from the effluent stream. The detailed results will be presented at the meeting.