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MERCURY AND PCBs ADSORPTION ON ACTIVATED CARBONS: EXPERIMENTATION AND MODELLING

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EXTENDED ABSTRACT

In this work, two commercial activated carbons (RWE Rheinbraun active coke, Calgon Filtrasorb 400) and activated carbons prepared from Greek lignite (Ptolemais lignite) were tested for their Hg° and PCBs removal capacity from the gas phase. The samples have been characterised for their structural properties. Adsorption experiments were realized in a laboratory-scale fixed bed unit, and the effect of sorption temperature, carbon dosage, and particle size, and carbon pore structure, was examined. The effect of sulphur addition on Hg° adsorption was also studied. A mathematical model was developed in order to simulate the adsorption of mercury by activated carbons in a fixed bed. The obtained results showed that activated carbons are suitable for the removal of toxic compounds (i.e. Hg° and PCBs) from gas phase by elaborating either continuous (activated carbon injection) or batch (packed column) processes. Results obtained, revealed decrease in Hg° adsorptive capacity with temperature increase, as expected in physisorption processes, and mercury removal efficiency increased by sulphur addition due to the chemisorption mechanism. The developed model was proven successful in predicting the experimental results, thus, it could be employed in designing and predicting the performance of mercury adsorption equipment.

Key words: activated carbon, mercury adsorption, modelling