

Adsorption of Aqueous Mercury(II) Species by Commercial Activated Carbon Fibres with and without Surface Modification†

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ABSTRACT: The adsorption of HgCl_2 , $[\text{HgCl}_4]^{2-}$ and Hg^{2+} onto a series of activated carbon fibres was studied. These included the as-received commercial activated carbon fibre (K), that obtained after modification via by sulphuric acid oxidation (K_{AC}) and that obtained after modification by reaction with pentaethylenhexamine (K_{BAS}). The effects of concentration (10–1500 mg/l), solution pH (1–10) and temperature (25°C, 35°C and 45°C) were studied. The mercury(II) adsorption isotherms followed the Langmuir model with maximum adsorption capacities of 361.0, 142.2 and 300.3 mg/g for HgCl_2 , $[\text{HgCl}_4]^{2-}$ and Hg^{2+} , respectively. Fibre K proved to have the highest adsorption capacity towards HgCl_2 but the best results for the adsorption of $[\text{HgCl}_4]^{2-}$ and Hg^{2+} were obtained with the fibre K_{AC} . The performance of fibre K_{BAS} was always worse than those of the other two fibres tested. The negative values obtained for ΔH_0 and ΔG_0 indicate that the adsorption was an exothermic and spontaneous process and also demonstrated that the adsorption of Hg(II) is a feasible process.