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Adsorption of Hg(II) from Aqueous Solution Using Thiourea Functionalized Chelating Fiber*

XiaoxiaYao[1], Huicai Wang[1,2**], Zhenhua Ma[1], Mingqiang Liu[1], Xiuqing Zhao[1], Dai Jia[1]

[1] School of Environmental and Chemical Engineering, Tianjin Polytechnic University, Tianjin, China

[2] State Key Laboratory of Separation Membranes and Membrane Processes, Tianjin Polytechnic University, Tianjin 300387, China

Abstract A fast and selective adsorbent for Hg(II) from aqueous solutions using thiourea (TU) functionalized polypropylene fiber grafted acrylic acid (PP-g-AA), PP-g-AA-TU fibers, were characterized by Fourier transform infrared spectroscopy and X-ray photoelectron spectroscopy. The adsorption behavior of the functionalized chelating fibers for Hg(II) was investigated by static adsorption experiments, and the effects of some essential factors on adsorption of Hg(II) were examined, such as pH, initial concentration, adsorption time, coexisting cations, and temperature. The results showed that the adsorptive equilibrium could be achieved in 10 min, and the equilibrium adsorption quantity of PP-g-AA-TU fibers was 20 times that of PP-g-AA fibers. The PP-g-AA-TU fibers showed a very high adsorption rate and a good selectivity for Hg(II) over a wide range of pH. The adsorption isotherm can be well described with Langmuir model, with the maximum adsorption capacity for Hg(II) up to 52.04 $mg \cdot g^{-1}$ and the removal of Hg(II) more than 97%. The kinetic data indicate that the adsorption process is best-fitted into the pseudo-second-order model.

Keywords thiourea, chelating fiber, adsorption, mercury ions, aqueous solution

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** Corresponding author.
E-mail: wanghuicai@tjpu.edu.cn (H. Wang)