

分离工程

超声波对活性炭吸附/脱附Cr(VI)的影响

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摘要

研究了超声波对活性炭吸附/脱附Cr(VI)的影响, 结果表明: 有无超声波作用下, 活性炭对Cr(VI)的吸附率均随pH值的升高而减小, 相对于无超声作用体系, 超声作用下的相平衡向吸附量减小的方向移动, 且pH值越大, 其减小的幅度越大; 当Cr(VI)初始浓度由 $20 \text{ mg} \cdot \text{L}^{-1}$ 增至 $110 \text{ mg} \cdot \text{L}^{-1}$ 时, 超声波作用下的Cr(VI)去除率由99.9%降至79.8%, 平衡吸附量则由 $3.3 \text{ mg} \cdot \text{g}^{-1}$ 增至 $15.0 \text{ mg} \cdot \text{g}^{-1}$, 与无超声波作用下的效果接近, 但无超声波作用时的吸附率持续上升至平衡, 而超声波作用下的吸附率先快速增加至近平衡, 再出现小幅下降后又缓慢增至平衡。脱附实验发现, 无论有无超声作用, 活性炭表面Cr(VI)在蒸馏水中的脱附率均很小; 添加NaOH可显著改善脱附效果, 脱附率随NaOH用量的增加而增加, 且超声场中NaOH对脱附的促进作用显著高于非超声场中的效果。

关键词

[活性炭](#) [六价铬](#) [超声波](#) [吸附](#) [脱附](#)

分类号

Effects of ultrasound on adsorption and desorption of chromium(VI) on activated carbon

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Abstract

Effects of ultrasound on the adsorption and desorption of chromium (VI) on activated carbon were studied. Results showed that within the range of experiment concerned, the adsorption ratio of chromium(VI) decreases with pH increasing regardless ultrasound application. However, with ultrasound, the equilibrium of the system moves to the direction in the decrease of adsorption, which becomes severe with the increase in pH. With ultrasound, as the initial Cr(VI) concentration increases from $20 \text{ mg} \cdot \text{L}^{-1}$ to $110 \text{ mg} \cdot \text{L}^{-1}$, the removal efficiency of Cr(VI) drops from 99.9% to 79.8%, while the equilibrium adsorption capacity increases from $3.3 \text{ mg} \cdot \text{g}^{-1}$ to $15.0 \text{ mg} \cdot \text{g}^{-1}$, which is similar to that without ultrasound. The adsorption ratio continuously increases until to an equilibrium without ultrasound, while, it appears a slight decrease after being quickly to the equilibrium, and then gradually increases to the equilibrium again in case with ultrasound. The desorption ratio of Cr(VI) is very small in distilled water regardless ultrasound application. While, the desorption can be greatly improved by the addition of NaOH, and this promotion effect is remarkable for the ultrasonic system.

Key words

[activated carbon](#) [chromium\(VI\)](#) [ultrasound](#) [adsorption](#) [desorption](#)

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