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研究论文

# 介孔碳CMK-3对苯酚的吸附动力学和热力学研究

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摘要 研究了介孔碳CMK-3对苯酚的吸附性能, 与传统商用活性碳(CAC)进行了比较, 结果表明, CMK-3比CAC的吸附量大、吸附速率快、达到平衡时间短, 是一种较好的吸附剂. 同时探讨了介孔碳CMK-3对苯酚的吸附热力学和动力学特征. CMK-3对苯酚的吸附行为可用Langmuir和Freundlich等温式进行描述, 相关性都较好, 但更符合Freundlich经验公式. 分别采用模拟一阶反应和二阶反应模型考察了吸附动力学, 并计算了这些动力学模型的速率常数. 模拟二级反应模型和实验数据之间有较好的相关性. 分别计算了热力学参数$\Delta G^0$, $\Delta S^0$和$\Delta H^0$, 结果表明, CMK-3对苯酚的吸附过程是吸热和自发的.

关键词 介孔碳 苯酚 吸附动力学 吸附热力学

分类号 0647.3



# Kinetics and Thermodynamics of Adsorption of Phenolonto Mesoporous Carbon CMK-3

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**Abstract** Mesoporous carbon CMK-3 was used to adsorb phenol from water by comparing its adsorption ability with commercial spherical activated carbon(CAC). CMK-3 had a higher adsorption capacity and faster adsorption rate than CAC. The adsorption property of phenol onto the mesoporous carbon CMK-3 was discussed from the thermodynamic and kinetic viewpoints. The adsorption parameters for Langmuir and Freundlich isotherm models were determined for CMK-3. Both isotherms were suitable models to analyze the equilibrium data for the phenol adsorption. However, the Freundlich model fitted better than the Langmuir model. The adsorption kinetics was tested with the pseudo-first-order and pseudo-second-order reaction mode1. The rate constants of adsorption for these kinetics models were calculated. The pseudo-second-order kinetic model provided the best correlation of the experimental data compared to the pseudo-first-order model. The thermodynamic constants of the adsorption process $\Delta G^0$, $\Delta S^0$ and $\Delta H^0$ were evaluated. These show that adsorption of phenol on CMK-3 was endothermic and spontaneous.

**Key words** CMK-3 Phenol Adsorption kinetics Adsorption thermodynamics

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