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改性木屑对水中刚果红的吸附性能研究

Adsorption properties of modified sawdust for conge red removal from wastewater

关键词: [木屑](#) [吸附](#) [刚果红](#) [表面活性剂](#)

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摘要: 对十六烷基三甲基溴化铵 (CTAB) 改性木屑用于水中刚果红 (CR) 的去除进行了研究. 用扫描电子显微镜 (SEM) 和傅里叶红外光谱分析仪 (FTIR) 对木屑和改性木屑的性能进行表征. 探讨了反应时间、pH、温度、剂量以及离子强度对改性木屑去除 CR 的影响. 实验结果表明, CTAB 改性后的木屑对刚果红的吸附量明显增大, 改性前后木屑的最大吸附量分别为 30.30 和 $111.36 \text{ mg} \cdot \text{g}^{-1}$. 反应过程在前 20 min 内反应速率很快, 并约在 120 min 内达到吸附平衡. 吸附动力学符合伪二级动力学模型. 最佳反应温度为 328 K , 吸附剂最适投加量为 0.09 g , 吸附量的大小与溶液的初始 pH 值有关, 且增加盐浓度, 改性木屑的吸附能力增加. 吸附等温线符合 Langmuir 方程, 且吸附过程为吸热反应.

Abstract: In this study, cetyltrimethylammonium bromide (CTAB)-modified sawdust was applied to remove conge red (CR) from aqueous solutions. The characteristics of sawdust and modified sawdust were characterized by Fourier transform infrared spectrum (FTIR) and scanning electron microscopy (SEM). The effect of factors, including pH, contact time, temperature, dosage, and salt concentration, on the adsorption properties of CR by modified sawdust were investigated. The results revealed that the addition of CTAB in preparation can significantly increase the adsorption capacity of CR. The maximum adsorption capacity of CR on sawdust and modified sawdust inferred from the Langmuir model was 30.30 and $111.36 \text{ mg} \cdot \text{g}^{-1}$ at 328 K , respectively. The adsorption processes were rapid within the first 20 min and reached equilibrium in about 120 min. The adsorption kinetics fitted well with pseudo-second-order model. The optimal reaction temperature was 328 K , the optimum adsorbent dosage was 0.09 g , the initial pH value of the solution had significant impact on the amount of adsorption, and the adsorption capacity of the modified sawdust increased with increasing salt concentration. Adsorption isotherm fitted better with the Langmuir model and the adsorption was an endothermic process.

Key words: [sawdust](#) [adsorption](#) [conge red](#) [surfactant](#)

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