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有机改性镁铝层状氢氧化物对酸性橙 II 的吸附研究



## Adsorption of the model anionic dye acid orange II by organic-modified magnesium aluminum-layered double hydroxides

关键词: [十二烷基硫酸钠](#) [镁铝层状氢氧化物](#) [酸性橙 II](#) [吸附](#)

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作者 单位

吴盼盼 山东大学环境科学与工程学院, 济南 250100

方婷婷 山东大学环境科学与工程学院, 济南 250100

于欢 山东大学环境科学与工程学院, 济南 250100

唐苗 山东大学环境科学与工程学院, 济南 250100

李玉江 山东大学环境科学与工程学院, 济南 250100

摘要: 采用共沉淀法合成以十二烷基硫酸根为层间阴离子的有机改性镁铝层状双金属氢氧化物(LDHs-SDS), 对其进行XRD、FT-IR表征, 并研究其对水中阴离子染料酸性橙 II 的吸附特性, 探讨了吸附剂投加量、初始pH值、染料浓度、温度、吸附时间等因素对酸性橙 II 吸附性能的影响. 结果表明, LDHs-SDS对酸性橙 II 染料废水具有明显的脱色效果, 25℃下,  $0.2 \text{ g} \cdot \text{L}^{-1}$  和  $0.4 \text{ g} \cdot \text{L}^{-1}$  的LDHs-SDS对浓度为  $100 \text{ mg} \cdot \text{L}^{-1}$  和  $200 \text{ mg} \cdot \text{L}^{-1}$  染料的脱色率可分别达到97.41%和97.13%. 在pH为3~11之间, 吸附效果良好; 吸附在2 h内完成; LDHs-SDS对酸性橙 II 的饱和吸附量为  $486.44 \text{ mg} \cdot \text{g}^{-1}$ . 吸附规律较好地符合Langmuir吸附等温方程, 吸附反应为吸热反应, 且吸附过程符合拟二级反应动力学方程. 在阴离子染料去除方面, LDHs-SDS显示出较好的应用前景.

**Abstract:** Dodecylsulfate-intercalated layered double hydroxide (LDHs-SDS) was prepared by co-precipitation, and was characterized by X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FT-IR). The use of LDHs-SDS as adsorbent to remove acid orange II, a model anionic dye, from aqueous solution was investigated in terms of adsorbent dosage, pH, dye concentration, temperature, and contact time. It was found that LDHs-SDS was particularly effective in removing acid orange II in a pH range between 3 and 11. When the dosages of LDHs-SDS were  $0.2 \text{ g} \cdot \text{L}^{-1}$  and  $0.4 \text{ g} \cdot \text{L}^{-1}$  at 25℃, the maximum removal efficiencies were 97.41% and 97.13% for the dye concentration of  $100 \text{ mg} \cdot \text{L}^{-1}$  and  $200 \text{ mg} \cdot \text{L}^{-1}$ , respectively. The adsorption of acid orange II on LDHs-SDS reached equilibrium within 2 hours. The adsorption isotherm can be well fitted by Langmuir equation. The saturated adsorption capacity of LDHs-SDS for acid orange II was  $486.44 \text{ mg} \cdot \text{g}^{-1}$  at 25℃. The adsorption process was endothermic. The adsorption kinetic of acid orange II onto LDHs-SDS can be best described by pseudo-second-order model. The results showed that LDHs-SDS can be used as a potential and effective adsorbent in treating dye effluent.

**Key words:** [sodium dodecyl sulfate](#) [magnesium aluminum layered double hydroxides](#) [acid orange II](#) [adsorption](#)

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服务热线：010-62941073 传真：010-62941073 Email: [hjkxxb@rcees.ac.cn](mailto:hjkxxb@rcees.ac.cn)

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