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巯基改性玉米秸秆吸附Hg(II)的热力学特征研究

Thermodynamics of mercury ions adsorption by thiol-modified corn stalk

关键词: [玉米秸秆](#) [改性](#) [吸附](#) [Hg\(II\)](#) [热力学](#)

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摘要: 采用化学反应的合成方法向玉米秸秆中引入巯基官能团,并进行电镜扫描、红外光谱和X射线电子能谱分析.在此基础上,以巯基改性玉米秸秆为吸附剂,通过批处理试验讨论了吸附时间、体系pH和温度等因素对水体中Hg(II)吸附的影响.结果表明,采用该合成方法可以成功地向玉米秸秆中引入0.98%的巯基官能团.巯基改性玉米秸秆对水体Hg(II)的吸附最佳pH为6,吸附能在120min内达到平衡,在285K时对Hg(II)的最大吸附量可达 $80.04\text{mg} \cdot \text{g}^{-1}$.吸附过程是自发的放热过程,可用Langmuir模型描述,其吸附机理可能为络合反应控制的化学吸附.研究表明,巯基改性玉米秸秆是一种对水体Hg(II)具有良好吸附能力的生物吸附剂.

Abstract. In order to investigate the Hg(II) ions adsorption thermodynamics in aqueous solution, the thiol-modified corn stalk prepared by chemical reaction was used as adsorbents in experiments, and the surface of thiol-modified corn stalk was further characterized by SEM, FTIR and XPS. The experimental parameters, such as pH, contact time and temperature were examined through batch experiments and the adsorption mechanism was elucidated. The results showed that about 0.98% of thiol was grafted onto corn. The optimal pH for Hg(II) adsorption was 6, and the Hg(II) ions adsorption reached balance in 120 min. The maximum adsorption capacity was $80.04\text{mg} \cdot \text{g}^{-1}$ at 285 K. The adsorption process was spontaneous and exothermic in nature which could be described by Langmuir isotherm model, and the adsorption mechanism might be a complexation reaction process. It was indicated that thiol-modified corn stalk was a good adsorbent for Hg(II) removal from contaminated water.

Key words: [corn stalk powder](#) [modification](#) [adsorption](#) [Hg\(II\)](#) [thermodynamics](#)

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