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### 砒砂岩对Pb(II)的吸附特性研究 Pb(II) adsorption property of Pisha sandstone

关键词: [砒砂岩](#)|[吸附铅](#)

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**摘要:** 以红、白和灰3种不同颜色的砒砂岩作为吸附剂,通过研究不同吸附剂用量、pH和离子强度(IS)等外界条件对砒砂岩吸附Pb(II)的影响,以及吸附动力学和等温吸附特征,应用动力学与热力学吸附模型,结合红外光谱(FTIR)分析,探讨砒砂岩吸附Pb(II)的机理.结果表明,砒砂岩具有较强的吸附性,能够有效吸附Pb(II),其吸附效果受铅浓度、吸附剂用量及pH、离子强度(IS)的影响强烈,即:随pH的增大,吸附量提高,但随离子强度的增大,吸附量却降低.3种颜色的砒砂岩对Pb(II)的吸附均在30 min内达到平衡,吸附速率大小表现为灰色>白色>红色,其吸附过程符合准二级动力学模型.在试验浓度范围内,Freundlich和D-R模型能够较好地模拟砒砂岩对Pb(II)的等温吸附特性,3种砒砂岩均是以非均匀孔隙或表面为主要吸附位.结合吸附模型和FTIR表征,吸附机理以静电吸附、离子交换为主,辅以部分化学吸附和一部分化学沉淀综合作用.

**Abstract:** The adsorption characteristics for three types of Pisha sandstones with red, white and gray colors were studied. The adsorption capacity, dynamics and isothermal property of Pb(II) by the Pisha sandstones were analyzed under different adsorbent dosages, pH and ionic concentrations. The aim is to determine the mechanism of Pb(II) adsorption by the Pisha sandstones by model simulation and infrared spectroscopic (FTIR) analysis. Results showed that the Pisha sandstones had relatively large capacity to adsorb Pb(II). The adsorption efficiencies were significantly influenced by Pb(II) concentration, adsorbent dosage, pH and ionic concentration. The adsorption amount showed a positive relationship with pH and a negative relationship with the ionic concentration. The adsorptions of Pb(II) by the three types Pisha sandstones achieved equilibrium within 30 min and the adsorption rates presents an order of gray>white>red. The adsorption processes were consistent with the pseudo second-order dynamics equation. Within the studied ionic range, the models of Freundlich and D-R well simulated the isothermal adsorption properties of Pb(II) by the Pisha sandstones. These results indicated that the non-uniform porosities or non-uniform surfaces of the Pisha sandstones were the main adsorption sites of Pb(II). And, adsorption model simulation and FTIR analysis demonstrated that the Pisha sandstones adsorbing Pb(II) were mostly in the form of electrostatic adsorption and ion exchange, with chemical adsorption and chemical precipitation also participated in the processes.

**Key words:** [Pisha sandstone](#)|[adsorption characteristics](#)|[lead](#)

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