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## 砒砂岩修复晋陕蒙能源区铅污染土壤的研究

## Remediation of lead contaminated soil by adding Pisha sandstone in resource-rich region of Shanxi, Shaanxi and Inner Mongolia

关键词: [砒砂岩](#) [铅污染土壤](#) [铅形态](#) [TCLP](#)基金项目: [中国科学院西部行动计划项目\(No.KZCX2-XB3-13\)](#)

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摘要: 寻找合适的材料来修复晋陕蒙地区因煤炭、石油和天然气开发导致的土壤重金属污染是该区域环境治理的重要措施。砒砂岩具有较强的吸附性,是可以用于土壤重金属污染修复的潜在材料。本研究通过室内模拟实验来研究土壤中添加砒砂岩对铅形态分布、毒性溶出量(TCLP)的影响及其对土壤孔隙度、pH、田间持水量、土壤酶活性的影响。结果表明,砒砂岩可显著降低土壤弱酸提取态铅含量,增加可还原态与残渣态铅含量;随土壤中砒砂岩添加量的增加,高活性态铅的降幅越大低活性态铅的增幅越大。砒砂岩显著降低了土壤铅毒性溶出量,降低程度与砒砂岩添加量成正比。砒砂岩的较强吸附特性及可以提高土壤pH是固化土壤重金属铅的重要因素。此外,砒砂岩对土壤理化性质的改善一定程度上对污染土壤起着改良作用。

**Abstract:** As one of the important aspects in regional environment management in Shanxi, Shaanxi and Inner Mongolia region, heavy metal-contaminated soil caused by coal, oil and natural gas exploitations need to be remediated by proper materials. With high adsorption, Pisha sandstone is a good candidate for remediation. This study carried out laboratory simulation experiments to determine the effects of the Pisha sandstone on the distributions of Pb forms and Pb TCLP (Toxicity Characteristic Leaching Procedure) and to determine its effects on soil bulk density, soil pH, field capacity and soil enzyme activity. The results showed that the Pisha sandstone reduced the contents of acid extractable lead in soil and increased the contents of reducible lead and residual lead. The reduction rate of high activity Pb and the increase rate of low activity Pb increased with the dosage of the Pisha sandstone in soil. The Pisha sandstone significantly reduced the contents of Pb TCLP and the reduction degree was proportional to the dosage of the Pisha sandstone. The solidification of Pb could be attributed to high absorption and the enhancement of soil pH by the Pisha sandstone. The Pisha sandstone improved soil physical and chemical properties, which to some extent remediated Pb contaminated soil.

**Key words:** [Pisha sandstone](#) [lead contaminated soil](#) [lead forms](#) [TCLP](#)

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