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污染土壤中重金属的超声波强化EDTA洗脱及形态变化

Washing of heavy metals from a contaminated soil and changes in species with ultrasound-enhanced EDTA solutions

关键词: [污染土壤](#) [重金属](#) [超声波](#) [EDTA](#) [形态分析](#)

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摘要: 以EDTA为洗脱剂,对重金属污染土壤进行超声波强化洗脱正交实验,并用Tessier连续提取法研究了洗脱前后Cd、Cu、Pb、Zn的形态变化.结果表明,在EDTA浓度 $20 \text{ mmol} \cdot \text{L}^{-1}$ 、固液比1:20、超声波作用时间16 min、超声波功率54%、洗脱次数4次的条件下,对4种重金属洗脱率最大,分别为: Cd 83.6%、Cu 58.8%、Pb 98.0%、Zn 43.0%.在实验所设浓度范围内,随着EDTA浓度的升高,重金属洗脱率均有降低.形态分析结果显示,超声波强化EDTA洗脱能显著降低土壤重金属的残渣态含量.除土壤中Zn残渣态去除率只有5.7%以外,超声波强化EDTA洗脱对土壤中Cd、Cu、Pb的残渣态去除率都很高,分别为81.6%、62.3%、93.8%.

Abstract: A washing orthogonal experiment of heavy metals from a contaminated soil was conducted with ultrasound-enhanced EDTA solutions, and changes in species of Cd, Cu, Pb and Zn in the soil were analyzed using the Tessier sequential extraction procedures before and after washing. Results showed that with 4 times of washing, the highest washing ratios for soil Cd, Cu, Pb, and Zn were 83.6%, 58.8%, 98.0%, and 43.0%, respectively, at EDTA concentration of $20 \text{ mmol} \cdot \text{L}^{-1}$, soil to liquid rate of 1:20, irradiation time of 16 min, and ultrasound power of 54%. Washing ratios of heavy metals decreased with increasing concentrations of EDTA solutions. The results of species analysis of heavy metals in the soil before and after washing indicated that residual fraction of heavy metals decreased significantly by using ultrasound-enhanced EDTA solutions. Except for Zn (only 5.7%), 81.6% of residual Cd, 62.3% of residual Cu, and 93.8% of residual Pb were removed from the tested soil in this experiment.

Key words: [contaminated soil](#) [heavy metal](#) [ultrasound](#) [EDTA](#) [species analysis](#)

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