Adsorption and desorption characteristics and mechanism of Cd in reclaimed soil under the influence of dissolved organic carbon

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Abstract

Organic acids are widespread in the environment and play an important role in the adsorption, desorption, and migration of soil Cd. This study evaluated the characteristics and mechanism of Cd adsorption and desorption in reclaimed soil from Panyi Mine in the Huainan mining area under the influence of humic acid (HA) and citric acid (CA). The addition of HA and CA inhibited the adsorption and enhanced the desorption of Cd in reclaimed soil, with HA having a stronger effect than CA. As the concentration of added HA or CA increased, the adsorption capacity of Cd in the reclaimed soil gradually decreased, while the desorption capacity gradually increased. That is, the adsorption inhibition/desorption promotion effect was stronger for higher concentrations of organic acid. Cd adsorption and desorption could be described as a logarithmic function of organic acid concentration. The kinetic curves of Cd adsorption and desorption in reclaimed soil under the influence of organic acids show that both adsorption and desorption involved two stages: a fast reaction stage followed by a slow reaction stage.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the manuscript can be downloaded and accessed as a PDF.

Figures

Figure 1

Cd adsorption capacity vs. Cd concentration in solution in the presence and absence of HA and CA (60 mg/L)

Figure 2

Cd desorption capacity vs. Cd concentration in solution in the presence and absence of HA and CA (60 mg/L)

Figure 3

Cd desorption rate vs. Cd adsorption capacity for reclaimed soil in the presence and absence of HA and CA

Figure 4

Kinetic curves of Cd adsorption in reclaimed soil in the absence and presence of CA and HA

Figure 5

Kinetic curves of Cd desorption from reclaimed soil in the presence and absence of CA and HA

Figure 6

Plots of Cd adsorption capacity (left) and desorption capacity (right) vs. HA and CA concentration