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1 **Sorption–desorption of Sb(III) in different soils: kinetics and effects**
2 **of the selective removal of hydroxides, organic matter, and humic**
3 **substances**

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12 **Abstract**

13 To examine the Sb(III) retention by three soils with different properties (Ferrosol,
14 Primosol and Isohumosol), kinetic batch experiments were carried out for Sb(III)
15 adsorption–desorption, followed by Sb release using a sequential extraction procedure.
16 In addition, hydroxides, organic matter, and humic substances were selectively
17 removed by washing the soil with oxalate, sodium dithionate–citrate–bicarbonate,
18 H₂O₂, and NaOH. The effects of removing these substances on Sb(III) retention were
19 investigated by comparing the Sb distribution coefficients and desorption rates. The
20 results indicated that exogenous Sb(III) was adsorbed onto all three soils rapidly at
21 first and then more slowly. After 168 h of adsorption, most of the adsorbed Sb(III)
22 was irreversibly retained in stable fractions by the Ferrosol. Oxidation reactions
23 negatively affected Sb(III) retention by the Primosol and Isohumosol, and a large
24 proportion of the Sb adsorbed remained mobilizable. The oxalate washing markedly
25 enhanced Sb retention but the sodium dithionate–citrate–bicarbonate washing
26 decreased Sb retention in all three soils. The H₂O₂ and NaOH washings affected Sb
27 retention by the Ferrosol more than Sb retention by the Primosol and Isohumosol.
28 Changes in the pH and hydroxides caused by the washing strongly affected Sb

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