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Effect of HumicAcid on Sorption and Desorption of Zinc

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Abstract

Humic substances are the most important organic fractions in soils and have affinity towards trace metals. In order to evaluate the effect of humic acid on zinc (Zn) sorption and desorption by soil, a batch experiment was conducted with two soil samples which were different in clay and calcium carbonate contents. Three levels of humic acid (0, 200, 500 mg/L) and various Zn concentrations (0 to 450 mg/L) were applied at constant ionic strength (0.05 M NaCl). Adsorption data were fitted to Langmuir, Freundlich and Temkin equations. Freundlich equation fitted relatively better (R^2= 0.86-0.98). Results showed that the application ofhumic acid increased both sorption and desorption of Zn in the two sample soils. Increasing of humic acid concentration increased maximum adsorption of Langmuir (q_{max}) up to 8-21% and Freundlich sorption capacity (K_f) up to 73-95%. All sorption parameters including Langmuir binding energy (K_L), Freundlich intensity factor (n) and coefficients of Temkin equation (A, K_T) were increased by adding humic acid, so that the above mentioned sorption parameters of S1 (with low clay and calcium carbonate) were lower than those of S2 (with high clay and calcium carbonate). Application of humic acid (500 mg/L) increased desorption of Zn (DTPA-Zn) from 511 to 711 mg/kg for S1 and 499 to 609 for S2.

Keywords: Zinc, humic acid, sorption isotherm, desorption.

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