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The binding of cadmium, copper and iron by fractions of dissolved organic matter and humic substances originating from compost

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Complexation by soluble organic ligands originating from composted municipal solid waste (MSW) and biosolids (BS) amended to the soil, were studied. Dissolved organic matter (DOM) from these composts was separated into six fractions and their complexation constants for Cd, Cu and Fe were quantified by performing titrations with an ion-selective electrode (ISE) at pH 5 (Cd, Cu) or by ligand exchange (Fe). The complexing capacity (CC) for Cd was highest for HoA, a fulvic-type, easily soluble fraction, at 1042 μmol Cd g^{-1}C of ligand. The other DOM fractions exhibited distinctively lower CCs. The highest stability constants ($\log K_{int}$) measured were: 7.74 (HoA), 7.69 (HoN), 7.02 (HiA), 6.93 (HiN), and 8.11 (HiB); $\log K_{int}$ for the HA was 10.05 and that for the FA$>$1000, was 7.98. Using a continuous distribution model to evaluate the titration data, the MSW fractions HiA and HiN demonstrated a rather narrow range of binding site strengths, as opposed to the broader distribution curves exhibited by HoA and HiB. The HoN distribution curve was markedly different from that of the other DOM fractions and was shifted towards higher binding strength. Using the same distribution model for Cu binding by compost derived humic substances (HS), it was shown that the HoA, HoN, and HiB exhibited a broader range of $\log K_{int}$ (9 to 10.5). Stability constants with Fe of the DOM and its fractions exhibited values

for logK ranging from 7-8. A specific ligand exchange technique, which was developed in our laboratory, was used for the determination of the logKs for Fe with HS.