Effect of DOM with different mole weight on Cu and Pb bioavailability

FEI-LI LI[1] AND ZAN-FANG JIN[1]

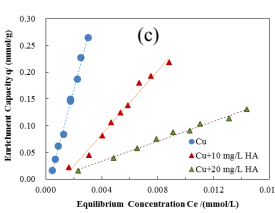
[1]Coll Biol & Environm Engn, Zhejiang Univ Technol, Hangzhou 310032, China

Dissolved organic matter (DOM) has important effect on the bioavailability of heavy metals in water system. The study selected citrate acid, fulvic acid, and humic acid as three different mole weight DOM, to study their effect on the adsorption or absorption of Cu and Pb in Chlorella alga.

Citrate acid greatly promoted the adsorption of Cu onto chlorella, increasing both the maximum enhancement capacity and the maximum concentration of chlorella survival. Fulvic acid and humic acid only increased the maximum concentration of chlorella survival, and humic acid obviously decreased the enhancement capacity with higher concentration being more effective (Fig.1). The results showed that DOM decreased Cu bioavailability for chlorella in water.

(a)

(b)



(a)

(b)

(c)

Fig. 1: Adsorption isotherms of Cu on chlorella Fig.2 Adsorption isotherms of Pb on chlorella

For Pb, the three DOM greatly increased the enhancement capacity of Pb on chlorella, and their adsorption isotherms were no longer straight lines (Fig.2). An enhancement capacity peak occurred when fulvic acid and humic acid were added at a concentration of Pb about 0.016-0.005 mmol/L. It be explained that a ternary complex of Pb, fulvic acid or humic acid, and surface adsorption points of chlorella had been formed [1]. The trinary complexes were destroyed when more Pb was added, and the adsorbed Pb on chlorella were released causing a decrease of enrichment capacity.

[1] Lamelas, C., Pinheiro, J.P., and Slaveykova, V.I., Effect of humic acid on Cd (II), Cu (II), and Pb (II) uptake by freshwater algae: kinetic and cell wall speciation considerations. Environmental science & technology, 2009. **43**(3): 730-735.