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Treatment of metal rich wastewater by fungal biomass

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A recent development in Environmental Biotechnology is biosorption of metals from industrial wastewaters. Most of reported studies are restricted to the use of microorganisms either grown in the laboratory or obtained as byproduct from fermentation and pharmaceutical industries. In this communication, studies on the use of a wood rotting Ganoderma lucidum, a naturally occurring biomass for metal removal and recovery is reported. Non-viable G. lucidum is used as a biosorbent and copper as the model metal. Kinetic studies indicated that the uptake of copper was very rapid with 90 percent of sorption taking place within 30 min and reaching equilibrium in one hour. Metal removal was marginally increased with the increase in pH in the range of 4 to 6. The capacity of G. lucidum for copper evaluated from sorption isotherm data was around 35 mg/g which was comparable to the capacity of commercially available ion exchange resins. Conditional stability constant for metal-sorbent interaction and complexation capacity of the sorbent were determined. The complexation of metal by soluble organic and inorganic ligands, which are generally present in metal rich wastewaters, can profoundly affect the metal uptake by biosorbent. Results on the effect of some selected ligands on metal uptake by G. lucidum indicated that no anion enhanced metal uptake level. The degree of decrease followed the series EDTA >> Oxalate $\geq$ Citrate >>> Pyrophosphate. Thus, the use of pyrophosphate instead of EDTA in metal plating industries can lead to an efficient end-pipe-pollution abatement method. Total metal recovery could be achieved using HCl and EDTA as eluants and the sorbent could be reused without any decrease in the metal uptake capacity.