

Trivalent Chromium Removal using Flocculating Yeasts – effect of pre-Treatments on Removal Efficiency

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The use of heavy metals in industrial applications with the production of contaminated wastewater is a serious environmental problem. The importance of developing efficient and inexpensive treatments to these wastewaters is clear, taking in consideration that heavy metals are a threat to public health due to their accumulation through the food chain and that its reuse is possible.

An alternative to traditional treatments, often inadequate when applied to large volumes of diluted solutions, is the use of waste biomass, since many micro-organisms are able to accumulate and concentrate heavy metals from solutions.

Trivalent chromium uptake by the flocculating yeast *Saccharomyces cerevisiae* NRRLY265 was studied, being characterised the effects of permeabilization with ethanol and heat pre-treatments on equilibrium.

In diluted chromium solutions (0-10 p.p.m.), the higher removal yield was observed for cells without pre-treatment, followed by cells permeabilized with ethanol and pre-treated with a heat shock. In concentrated solutions (40-150 p.p.m.), cells permeabilized with ethanol removed chromium more efficiently, while cells without pre-treatment exhibited the lowest removal yield.

Sorption equilibrium experimental data was well described by Langmuir model, confirming that chromium uptake capacity was higher for ethanol permeabilized cells. The higher biomass affinity to the metal was obtained for intact cells.

These results indicate that living cells with no pre-treatment have a higher affinity to chromium in diluted solutions. Pre-treatments increase the cell uptake capacity in concentrated solutions. This may be explained by cell denaturation, in heat treated cells and by an increase in permeability caused by ethanol exposure, resulting in new binding sites for chromium.

The presented results demonstrate the possibility of using industrial residual biomass as a means to remove heavy metals from aqueous solutions.

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