TITLE: EVALUATION OF THE REMOVAL CAPACITY OF CHROMIUM (VI) IONS OF SYNTHETIC AQUEOUS SOLUTIONS BY BIOSORPTION IN BIOMASS OF *Lasiodiplodia theobromae* MMPI: STUDY AND KINETIC MODELING

AUTHORS: HAUPENTHAL, L.D.; ROCHA, R. D.C.; BASSANI, J. C.; CUNHA, M. A. A.

INSTITUTION: UNIVERSIDADE TECNOLÓGICA FEDERAL DO PARANÁ, PATO BRANCO, PR (RODOVIA DO CONHECIMENTO, KM 01, CEP: 85503-390 PATO BRANCO – PR, BRAZIL)

ABSTRACT:
The purpose of electroplating is the overlay metal surfaces with different types of metals, thus increasing the corrosion resistance of the parts. These industrial processes lead to the generation of liquid effluents containing a large variety of dissolved heavy metals. Several physical and chemical treatments are already used for the treatment of these effluents. However, when metal concentrations are between 1 and 100 mg L^{-1}, they may present disadvantages, such as the incomplete removal of metals, the high need for reagents and energy, the generation of by-products or toxic waste and high costs. Therefore, alternative methods such as biosorption of heavy metals by the use of fungal biomass have demonstrated the potential of these microorganisms in relation to their great capacity to remove toxic metals from industrial effluents. Chromium is an essential metal for living organisms. However, it presents high toxicity, which makes it a dangerous metal, even in low concentrations (20 mg L^{-1}), presenting in electroplating effluents in hexavalent form. This study was performed to evaluate, through the kinetic study, the ability to remove chromium (VI) ions from synthetic aqueous solutions by biosorption using the biomass of the fungus Lasiodiplodia theobromae MMPI dried in an oven and lyophilized as biosorbent. The experiments were performed using 50 mg L^{-1} volume, 0.5 g adsorbent mass, 50 mL synthetic solution and 0.59 mm granulometry. In order to evaluate the influence of pH on the biosorption, all trials were performed under pH 5.5 and 8.5 individually. The most appropriate kinetic model was the pseudo-second order, indicating removal index of 27.11 and 20.27% for the biomass dried in an oven and lyophilized respectively, with saturation time of fifteen minutes. The near values of q_m and q_t for both biomass treatments and both pHs confirm the most appropriate kinetic model. These results demonstrate that the adsorption rate depends on the concentration of the chromium ion (VI) in the biomasses and the concentration of this adsorbed in the balance. According this, the biosorbent studied is a complementary alternative to the treatment of industrial effluents containing chromium (VI) ion.

Keywords: electroplating, effluent treatment, metal ions