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Removal and recovery of copper from aqueous solutions by Streptomyces rimosusbiomass: Enhancement of regeneration by desorption-electrolysis coupling

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ABSTRACT:

Biosorption has emerged as an alternative treatment for the removal of heavy metals. Although it is simple, effective and economic, it is nevertheless merely considered as a displacement of pollution. The loaded biomass constitutes a solid waste requiring regeneration, which is often achieved by a spontaneous desorption. In this study, we investigated the effect of an electric field applied through desorbent solution to enhance desorption flow. Moreover, desorbed metal ions may be recovered as metal deposit. The regeneration by the desorption-electrolysis process of Streptomyces rimosus biomass loaded with copper was carried out and the effects of the operating parameters, such as desorbent nature, pH and current intensity, were examined. Our results showed that adsorption agreed with the Langmuir isotherm. A maximum capacity of 25.32 mg.g-1 was reached. Among tested desorbent solutions, sulphuric acid was kept as more efficient. It allowed appreciable desorption rates, with an optimum pH of 1.5. An applied current intensity of 0.1 A led to an effectiveness of 86% at height of the released mass. We proved that the treatment by coupling desorption-electrolysis improved not only the desorption efficiency up to 99.77% but metal was also recovered as a pure electrochemical deposit.