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EICHHORNIA CRASSIPES CHARCOAL COULD REMOVE CHROMIUM FROM THE TANNERY WASTEWATER

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Leather processing involves a series of chemical treatments and mechanical operations to attain the prescribed characteristics of the final leather. Since soaking to finishing operations, each and every chemical operation generate significant amount of solid and liquid wastes. Inapt disposal the liquid and solid waste from the tannery causes serious environmental pollution. In tanning, 90% tanneries use basic chromium sulfate as a tanning agent to obtain quality leather (Avindhan et al. 2004). On an average, the pickled pelt up takes only 60% of the used chromium and the remaining 40% of chromium is remained in the solid/liquid phases, especially as spent chrome liquor (Fabiani et al. 1997). Suresh et al. (2001) reported that chromium content in the wet blu**e** spent chrome liquor ranges from 1500-3000 mg/L.

Chromium is a potential pollutant to soil, water, and air under definite conditions. It exists in several oxidation states, with trivalent and hexavalent species being the most common forms (Kotas and Stasicka 2000). The occupational exposure of chromium has been widespread; chromium (III) under certain ligand conditions in the environments leads to cell death and structural modification of proteins (Balamurugan et al. 2002). Removal of the chromium present in the wastewater is necessary for human health and environmental safety.

In the past few decades, many researches have been carried out to recovery or remove chromium from the tannery wastewater using stone cutting solid waste (Al-Jabari et al. 2012), bone charcoal (Dabbi et al. 2002), natural marl (Jabari et al. 2009); but most of the techniques approached by treating mixed tannery wastewater. Chemical precipitation and electrochemical precipitation are widely used for the removal of heavy metals. Unfortunately, both the techniques have a significant problem in terms of disposal the precipitated wastes (Ozdemir et al. 2005; Meunier et al. 2006); the ion exchange technique does appear to be economical (Pehlivan and Altun 2006).

Here an approach was made to remove chromium from the chrome tanning wastewater using *Eichhornia crassipes* charcoal. Except root, *Eichhornia crassipes* was collected from the nearby university pond, sun-dried and burnt at 450-550°C, grinded to make powder using a mortar and sieved on 80-mesh (Fig. 1).

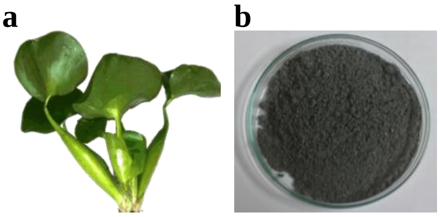

Fig. 1 – ***Eichhornia crassipes*** **a) and obtained charcoal b)**

The prepared charcoal was directly mixed with chrome tanning wastewater. The remaining chromium in the wastewater was determined by following the Society of Leather Technologists and Chemists (1996) official method of analysis (SLC 208). Various parameters such as charcoal dose and contact time were optimized in batch-wise experiment.

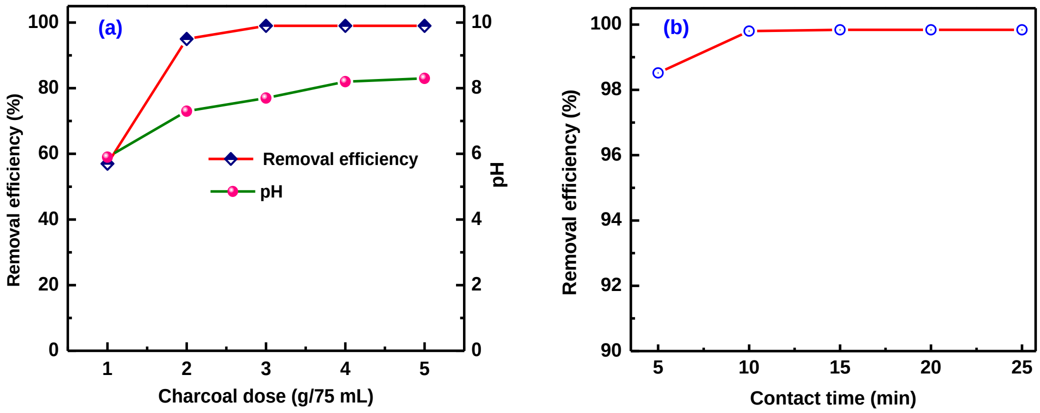

Fig. 2 – Effect of charcoal dose a) and contact time b) on chromium removal efficiency

Above Fig. 2 shows that at the optimized treatment conditions were: charcoal dose 4 g/75 mL wastewater and contact time 15 min. The chromium content of the wastewater before treatment was 3190.1 mg/L and after treatment (at optimized condition) was 5.2 mg/L. The result shows excellent chromium removal efficiency (99.8%) at optimized conditions. It could be a better option to use the bisorbent to remove chromium from the tannery wastewater as well as other industrial wastewater.