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INTEGRATED BIOLOGICAL TREATMENT AND ELECTROCOAGULATION FOR SLAUGHTERHOUSE WASTEWATER: A NOVEL APPROACH USING FRESHWATER SNAILS (*Viviparus contectus*, *Planorbis rubrum*, *Melanoides tuberculata*)

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Abstract

As a potential pollution source, slaughterhouse wastewater (SWW) with development of the meat production and processing sector is a threat in the world. Therefore, the determination of economical, favourable, cost-effective and proper treatment method is crucial for sustainable environmental protection. This study focused on the performance and efficiency of a two-stage process combining biological treatment (BT) with freshwater snails and electrocoagulation (EC) of SWW. *Viviparus contectus*, *Planorbis rubrum*, *Melanoides tuberculata* were used in primary treatment while secondary treatment was realized with EC process. The EC of SWW was performed for reducing both turbidity and chemical oxygen demand (COD) concentration to levels compliant with direct-discharge regulations. In addition, the stirring speed, current density, initial pH and reaction time were assessed for evaluation the optimum EC condition. Oxidative stress biomarkers and some antioxidants were assessed in freshwater snails exposed to SWW after 24 and 96 h. The best removal efficiencies of COD (91.43%) and turbidity (92.42%) were obtained at pH 5 and 20 min of operational time by *P. rubrum*. Notably, MDA (Malondialdehyde) was highest level in *M. tuberculata* compared to *V. contectus* and *P. rubrum*. Overall, removing organic and inorganic pollutants from SWW could be provided with the hybrid process BT/EC as a combining approach.

Key words: biological treatment, electrocoagulation, freshwater snail, slaughterhouse wastewater

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