Chromium removal from tannery wastewater using ground shrimp shells

Massimiliano Fabbricino*, Rosita Gallo
University of Naples Federico II, Department of Hydraulics, Geotechnics and Environmental Engineering,
Via Claudio 21, 80125 Naples, Italy
Tel. +39 081 7683438; email: fabbrici@unina.it

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ABSTRACT

Crustacean shells contain high levels of chitin, a biopolymer that can be used to chelate metal ions. This study investigated the use of crustacean shells for chromium removal from tannery wastewater. Preliminary experiments aimed to determine whether chromium removal was due to adsorption by the carbohydrate’s chemical groups or to formation of insoluble chromium hydroxide due to the pH increase from addition of the polysaccharide to the wastewater. These experiments were performed using synthetic wastewater and commercial chitosan, a chemical compound obtained by chitin deacetylation. Subsequent experiments, carried out using tannery wastewater, were performed to determine whether chromium could be recovered from the sludge. Finally, different amounts of ground shrimp shells from fishery waste were used to remove chromium from tannery wastewater. The results showed that chromium removal was mediated primarily by adsorption and that chromium recovery from sludge was possible at very low pH. Ground shrimp shells removed chromium more effectively than commercial chitosan due to the combination of precipitation and adsorption processes.

Keywords: Adsorption; Chitin; Chromium; Wastewater; Tanneries

* Corresponding author.