

## Effects of eggshells for lead ions removal from aqueous solution

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### ABSTRACT

Characteristics and efficiency of untreated eggshells (UNES) were investigated as a low-cost adsorbent in removal of  $Pb^{2+}$  ions from aqueous solution. Initial findings showed UNES potential to be applied as an effective sorbent due to high concentrations of carbon and calcium and high porosity and availability of functional groups. Adsorption experiments were studied with varying pH, contact time, and UNES concentration. Maximum percentages of  $Pb^{2+}$  ions removal were recorded at optimum pH, contact time, and adsorbent concentration. At optimum conditions of the above-mentioned parameters, more than 92% yield was obtained within 10 min at UNES dose of 2.5 g/100 mL for the initial  $Pb^{2+}$  concentration of 100 mg/L. Evaluation of the isotherms and kinetics confirmed that UNES has high value of adsorption capacity. Adsorption capacity was calculated from the Langmuir as 3.0172 mg/g at 20°C. The system was best described by the pseudo-second-order kinetic, which its equation provided evidence in favor of the adsorption kinetic. This experiment demonstrated the ability of UNES as an effective, sustainable, and low-cost adsorbent for removal of the heavy metal ions in different wastewaters.

**Keywords:** Adsorption; Eggshells; Lead ions; Low cost

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