

## عنوان مقاله:

Modeling and optimization study by response surface methodology on magnesium ions removal from hard water through a biosorbent

## محل انتشار:

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## خلاصه مقاله:

Hazelnut shell was used as a green adsorbent and environment-friendly for magnesium ions ( $Mg^{2+}$ ) adsorption from hard water solution in batch system. The characterization of the biosorbent was entirely evaluated using SEM, XRD and FT-IR analyses. Design of experiments (DOE) decreased the number of non-significant experiments, which resulted in reducing the time and cost of studies. Response surface methodology (RSM) was applied to dynamic assessment of the adsorption process. The effects of variables (pH, adsorbent dosage,  $Mg^{2+}$  concentration, time) and their interactions were investigated by central composite face design (CCFD). In addition, the numerical optimization was also analyzed. The results demonstrated that maximum efficiency, 56.21 %, and adsorbent capacity, 5.729 mg/g, occurred at initial concentration of 200 mg/L, adsorbent dosage of 1 g and pH 10 in duration of 59.816 min which were in good agreement with experimental results. In order to validate of the dynamic model, artificial neural network (ANN) was employed. Although RSM had a superior capability in developing of the model in comparison with ANN, it was acceptable to forecast the magnesium ions removal by both RSM and ANN approaches. Finally, the studies of the adsorption isotherms, kinetic models, reusability tests of the adsorbent and comparison with walnut shell were also done.

## کلمات کلیدی:

Hard water, Response Surface Methodology (RSM), Optimization, Biosorbent, Magnesium ions removal

## لینک ثابت مقاله در پایگاه سیویلیکا:

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