

## Experimental investigation of heavy metals removal from industrial wastewater using low cost natural adsorbents and commercial activated carbon

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### Abstract

Using activated carbon is one of the most common methods for removing heavy metals from water and wastewaters. In spite of its large scale used, commercial activated carbon still remains an expensive material. Hence, the need of low cost materials for the treatment of wastewaters has motivated research on investigation the various agro-based natural adsorbent. The objective of this study is to study the capability of two less expensive natural adsorbents for removal of heavy metals namely Zinc and Nickel from industrial wastewater. Natural adsorbents produced from locally agriculture by-product i.e., walnut shell and grain rice. Some important physico-chemical key parameters such as pH, mixing time and mass of the adsorbents have been investigated and their optimum values have been determined. The capabilities of produced natural adsorbents have been compared with commercially available activated carbon. The coefficients of Freundlich and Langmuir isotherms have been determined using fitting the obtained experimental data on the isotherms models. The obtained results indicated that the natural adsorbent of grain rice showed better performance in removing Zinc and Nickel than other used activated carbons. It is also demonstrated that increasing the alkalinity of solution may lead to deposit of metals and higher amounts of removal percent.

**Keywords:** Industrial wastewater, Heavy metals removal, Adsorption, Natural adsorbents, Commercial activated carbon.

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