

Removal of Copper and Cadmium in Wastewater Applying Activated Carbon: A Review of Articles [Remoción de cobre y cadmio en aguas residuales mediante la aplicación de carbón activado: revisión de artículos]

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Resumen

La investigación tuvo como objetivo revisar la bibliografía de artículos referentes a la remoción de Cobre y Cadmio en aguas residuales aplicando carbón activado. Los resultados indican que la almendra logra mejores resultados para remoción de cobre y el melón de roca logra mejores resultados para remoción de cadmio.

Palabras clave: Carbon activado, aguas residuales, cobre, cadmio.

Abstract

The objective of the investigation was to review the bibliography of articles referring to the elimination of Copper and Cadmium in wastewater by applying activated carbon. The results indicate that the almond achieves better results for the removal of Copper and the rock melon achieve better results for the removal of Cadmium.

Keywords: Activated carbon, wastewater, Copper, Cadmium.

1. Introduction

At least 20 metals are classified as toxic and half of these are emitted into the environment in quantities that pose risks to human health (Nomanbhay and Palanisamy, 2005). The important toxic metals i.e. lead (Pb), cadmium (Cd), zinc (Zn), and copper (Cu) find its way to the water bodies through wastewaters (Mahvi et al., 2005).

Adsorption using commercial activated carbon (CAC) is an effective purification and separation technique used in industry especially in water and wastewater treatments that can remove heavy metals from wastewater (Gun et al, 2005). Activated carbon surfaces have a pore size that determine its adsorption capacity, a chemical structure that influences its interaction with polar and non-polar adsorbates, and active sites which determine the type of chemical reactions with other molecules (Ahmedna et al., 2004)

2. Materials and Methods

To carry out the research, the systematic review methodology was chosen and its purpose is to compile and provide a summary on a certain topic and once the research question has been answered. Consequently, this research applies a systematic review to analyze and estimate the information obtained from various studies with multiple results, to evaluate the application of activated carbon in the removal of Copper and Cadmium in wastewater.

The adsorption of metals by activated carbon is shown in the following figure.

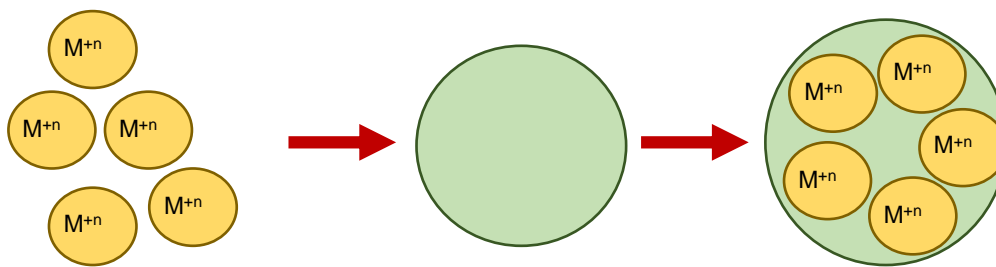


Figure 1. adsorption of metals by activated carbon

3. Results

The following investigations have been found: using almond husk as activated carbon reduced 94.7% of Cu and 93.7% of Cd (Hasar and Cuci, 2000), rock melon as activated carbon reduced 95.6% of Cu and 98.5% of Cd (Nurdin et al., 2006), granular activated carbon reduced 89% of Cu and 60.1% of Cd (Üçer et al., 2000), apricot stone as carbon activated reduced 95.5% of Cu and 86% of Cd (Kazemipour et al., 2008), walnut as activated carbon reduced 97.5% of Cu and 50.9% of Cd (Kazemipour et al., 2008), hazelnut as activated carbon reduced 92.9% of Cu and 90.5% of Cd (Kazemipour et al., 2008), almond as activated carbon reduced 99.8% of Cu and 74.8% of Cd (Kazemipour et al., 2008), pistachio as activated carbon reduced 83% of Cu and 33.8% Cd (Kazemipour et al., 2008).

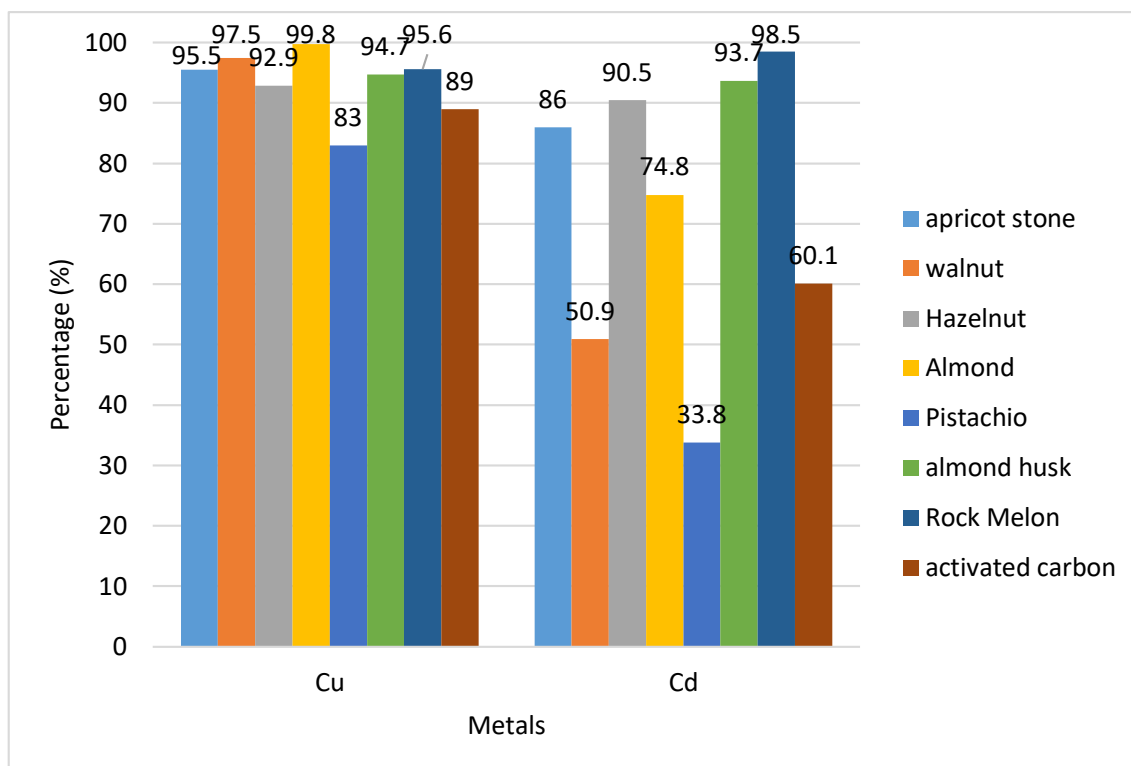


Figure 2. Comparison of activated carbon to remove Cu and Cd

4. Conclusions

According to the results obtained by authors, it can be concluded that:

- The results indicate that the almond achieves better results for the removal of Copper and the rock melon achieve better results for the removal of Cadmium.

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