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TECHNICAL FACULTY IN BOR



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CONFERENCE ON TECHNICAL
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THE EFFICIENCY OF NICKEL ION ADSORPTION FROM SYNTHETIC SOLUTIONS USING MULLEIN

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Mentors: Maja Nujkić, Žaklina Tasić

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Abstract

• Introduction

The aim of this study is to determine the biosorption efficiency of the medicinal plant mullein (*Verbascum thapsus*), which is repurposed as waste material, in solutions containing Zn (II) ions at various pH values.

• Materials and Methods

Zinc chloride ($ZnCl_2$) was utilized to prepare the Zn(II) ion solutions. A baseline solution with a concentration of 100 ppm was prepared. The solution's temperature and concentration were maintained at room levels. pH values were adjusted from 3 to 7 using an HNO_3 solution. Exactly 1g of mullein was weighed on a technical scale and transferred to a glass container containing the appropriate concentration of Zn(II) ion solution. The mixture was then homogenized for 90 min. at 400 rpm using a magnetic stirrer, followed by filtration using a Büchner funnel. The concentration of residual Zn(II) ions in the solution after biosorption was determined using an Inductively Coupled Plasma Optical Emission Spectrometer (ICP-OES).

• Results

Based on the results obtained from the ICP-OES analysis, the calculation of the efficiency of Zn(II) ion removal was performed with respect to the influence of the solution's pH value. The results were as follows: 63.77% at pH = 3; 65.575% at pH = 4; 63.07% at pH = 5; 59.255% at pH = 6; and 61.47% at pH = 7, for an initial Zn(II) concentration of 100 ppm. Gu and Lan achieved a removal percentage of 38.32% for Zn (II) ions, investigating the pH range of 2-7 and using algae as a biosorbent. Conversely, in the work of Sheikh et al., onion seeds were employed as a biosorbent, resulting in a 59% removal rate for Zn(II) ions within the pH range of 2-10. The study by Sheikh et al. revealed that maximum adsorption was attained at pH 7, while in the study by Gu and Lan, adsorption was significantly more efficient within the pH range of 2-4.

• Conclusion

Anomalies were observed, indicating non-linear growth or decline in the efficiency values of Zn (II) adsorption with an increase in pH values within the range of 3-7. The maximum efficiency for Zn (II) adsorption is 65.575% at pH = 4. If we compare zinc with other results it is evident that mullein at this pH range is a better adsorbent for zinc ions, and much better results were produced then for adsorption nickel ions.

Keywords: *Biosorption, ICP-OES analysis*

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