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Data Article

Zinc, nickel, and cobalt ions removal from aqueous solution and plating plant wastewater by modified *Aspergillus flavus* biomass: A dataset

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ABSTRACT

The biomass of *Aspergillus flavus* was modified by calcium chloride to achieve a bioadsorbent for treating nickel, cobalt, and zinc ions from aqueous solutions. The information of pH, bioadsorbent dose, contact time, and temperature effect on the removal efficiency are presented. The data of Freundlich and Langmuir isotherm and pseudo-first-order and pseudo-second-order kinetic models are also depicted. The data showed that the maximum bioadsorption capacity of nickel, cobalt, and zinc ions is 32.26, 31.06 and 27.86 mg/g, respectively. The suitability of the bioadsorbent in heavy metals removal at field condition was tested with a real wastewater sample collected from a plating plant in the final part of this dataset. Based on the findings, the bioadsorbent was shown to be an affordable alternative for the removal of metals in the wastewater.

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Specifications Table

Subject area	*Chemical engineering*
More specific subject area	*Environmental biotechnology*
Type of data	*Table, image, figure*
How data was acquired	– *SEM images of the modified biomass of Aspergillus flavus and used one were prepared using a SEM instrument, Hitachi S4160 model.* – *A flame atomic adsorption spectrometry (SpectrAA-10 Plus, Varian Company) was used for metal ions measurement.* – *- A digital pH meter (Metrohm) was applied for pH analyzing.*
Data format	*Analyzed*
Experimental factors	– *Aspergillus flavus was cultured to obtain fresh biomass.* – *The A. flavus biomass was dried and then modified by $CaCl_2$ and NaOH.* – *The effect of bioadsorbent dosage, pH and temperature was acquired.* – *The isotherm and kinetic parameters were revealed.* – *-A plating wastewater was treated using the bioadsobent.*
Experimental features	*Heavy metals ion bioadsoption by A. flavus biomass*
Data source location	*Bushehr University of Medical Sciences, Bushehr, Iran, GPS: 28.9667°N 50.8333°E*
Data accessibility	*Data represented with the article*

Value of the data

- By a simple method the biomass of *Aspergillus flavus* could be modified toward bioadsorption of heavy metal ions.
- This data potentially useful for factories like plating plants with heavy metals laden-wastewaters.
- These data may be useful for scientific community with concern about heavy metal pollution and also will be important for recycling the heavy metals of Zn, Co, and Ni from wastewaters.

1. Data

Five scanning electron microscope (SEM) images of *A. flavus* (before modification, after modification, after bioadsorption of Zn, after bioadsorption of Co, and after bioadsorption of Ni) are depicted in Fig. 1. The effect of pH on the bioadsorption of Ni(II), Co(II), and Zn(II) is shown in Fig. 2. Fig. 3 depicts the effect of temperature and contact time on the bioadsorption of Zn(II), Ni(II), and Co (II). The effect of bioadsorbent dosage on the metals removal is also presented in Fig. 4. The isotherm (Langmuir and Freundlich models) and kinetic (pseudo-first-order and pseudo-second-order models) parameters are shown in Table 1 and 2. The characteristics of plating wastewater before and after treatment with the prepared bioadsorbent are depicted in Table 3.

2. Experimental design, materials and methods

2.1. Preparation of Aspergillus flavus biomass

The locally isolated non-aflatoxin producing *A. flavus* strain was provided from the Microbiology Department of Bushehr University of Medical Sciences, Iran in the form of dry ice. Then, it was cultured in the solid medium contains 40 g/L glucose, 10 g/L peptone, and 15 g/L agar, and kept in 4 °C. For biomass production, the fungi was introduced under sterile conditions to a liquid medium