

Eco-Friendly Adsorbent to Removal Heavy Metal using Melissa officinalis Extraction -@Diethanolamine from aqueous solution

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^a Department of Chemistry, College of Science, University of Basrah, Basrah, Iraq edu.iq

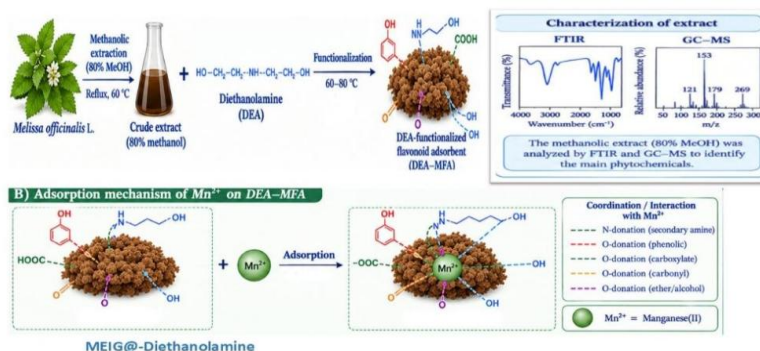
Corresponding author:
<mailto:khawla.braqal@uobasrah.edu.iq>

Khawlah S. Burghal ^a

Abstract

This study, using environmentally friendly bio adsorbents to purge industrial wastewater of heavy metal ions, is an effective strategy. However, Melissa officinalis L. To remove harmful manganese ions from aqueous solutions, A methanolic extract of Melissa officinalis L. leaves was functionalized with Diethanolamine (DEA) to construct a high-capacity biosorbent for Mn(II) ion remediation in a batch adsorption model. To determine the optimal conditions, intermittent adsorption tests were performed. To find the ideal circumstances, intermittent adsorption tests were carried out. Adsorption happened quickly; it took 90 minutes to reach equilibrium. To optimize the procedure, the effects of time, dosage, concentration, and pH were methodically examined. After 90 minutes, the maximum removal rates of manganese ions from equilibrium were 94.05% under ideal circumstances for efficiently eliminating ions (Mn) from aqueous solutions. the Langmuir model with Melissa officinalis extraction—@Diethanolamine utilizing an R² value of 0.9905, having q_{max} values of 255.6 mg g⁻¹. Detailed thermodynamic analysis indicated that the dye-adsorbent interaction is primarily one of the physisorption's in nature .

Graphical abstract



1. Introduction

The current global population growth, unplanned urbanization, industrialization, agricultural practices, and overuse of chemical compounds have all contributed to serious environmental contamination and the environment heavy metals release of inti. The chemical industry, as well as the production of dyes, photographic materials, fertilizers, tanning products, and petrochemical products, are some of the several sources of heavy metal ions [1, 2].

Animals and plants can easily absorb the contaminants that heavy metals discharge into the environment when they are present in wastewater. Because of the way their food chains are structured, aquatic systems are especially vulnerable to contamination. Fish and other edible species absorb heavy metals as they go up the food chain. Because they are at the top of the food chain, humans are most affected by bioaccumulation [3]. As a result, heavy metal contamination is now a serious issue. Extreme toxicity, non-biodegradable sites, and major health issues in both people and animals are characteristics of these metal ions. Obstructive lung diseases, osteoporosis, enzyme inhibition, kidney dysfunction,