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Biosorption of nickel from aqueous solution by *Tithonia diversifolia*

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ABSTRACT

This study investigated the feasibility of Mexican sunflower (*Tithonia diversifolia*), a common plant that inhabits the highway of the south western Nigeria, as a novel biosorbent for nickel from solutions. pH profile, time dependency and cation interference studies were conducted using stem biomass of this plant. Nickel uptake exhibited substantial enhancement both in terms of the kinetics of uptake as well as the loading capacity. Results of the investigation showed that the unmodified biomass was able to remove over 70% of the nickel content of a solution, whereas NaOH modification improved the adsorption efficiency to over 77% in the same contact time of 60 min. The optimum pH of adsorption was recorded as 5 for the metal using both types of biomass. However, modification improved the adsorption efficiency to a pH lower than 4. The kinetic study conducted showed that the adsorption process follows Lagergren's pseudo-second order reaction with R^2 values equal to 0.9988 and 0.9989 for both types of biomass. The presence of cations such as calcium and magnesium also interfered negatively with the adsorption process. Between 20–35% reductions in the metal adsorbed were recorded in the presence of a 1 M concentration of Mg, Ca or mixed Mg and Ca ions. Langmuir model of adsorption isotherm gave the best fit for this sorption process with R^2 values of 0.994, 0.995 and 0.997 for Mg, Ca and mixed Mg and Ca studies, respectively.

Keywords: Binding; Nickel; *Tithonia diversifolia*; Isotherm; Adsorption

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