Modeling and Optimization of green synthesis of nickel nanoparticles via Phlomis cancellata Bunge extract through Response Surface Method

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Abstract
Green synthesis of metal nanoparticles is an interesting issue of nanoscience due to its simplicity and eco-friendliness. The present study describes a cheaper, non-toxic and simple route for biosynthesis of nickel nanoparticles using Phlomis cancellata Bunge extracts. Since the experimental conditions of this procedure play vital roles in the synthesis rate of the nanoparticles, a response surface methodology using the central composite design was employed for testing the reaction variables. The individual and interactive effects of process variables (temperature, time, concentration of Ni(NO۳)۲ and pH) upon extracellular biological synthesis of NiNPs by Phlomis cancellata Bunge were studied. The statistical and perturbation plot analysis suggest that a reaction temperature of ۹۰ °C, duration of ۳۰ min., pH of ۹,۵ and concentration of ۲٦ mM of Ni(NO۳)۲ would produce the highest amount of nanoparticles. The nanoparticles were characterized by UV-Visible spectrophotometry.

Keywords: response surface methodology, green synthesis, nickel nanoparticles, Phlomis cancellata Bunge.