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synthesis magnetic nanoparticles of Fe_3O_4 for the harvesting of native microalgae *Chlorella sorokiniana.pa91* from municipal wastewater by using RSM

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Microalgae are valuable organisms due to their ability to produce various beneficial products for human utilization [1].Understanding the interface interactions between microalgae cells and magnetic nanoparticles (MNPs) is essential for effective magnetic harvesting of microalgae using MNPs.In order to make large-scale microalgae cultivation economically viable, it is crucial to enhance the harvesting process. Magnetic separation is a straightforward process involving the use of a magnetic separator to remove magnetic contaminants or selective magnetic adsorbents for the recovery of desired products [2].Magnetic nanoparticles show great potential as they can effectively attract and bind to microalgal cells, facilitating their separation through a magnetic field and enabling efficient harvesting. This technology holds promise for streamlining microalgae production and expanding its applications in various industries. This method enables rapid and cost-effective harvesting of microalgae for various industrial purposes. magnetic nanoparticles consisting of Fe_3O_4 were synthesized using the co-precipitation. The researchers utilized the surface response method (RSM) in conjunction with a central composite design (CCD) to thoroughly investigate the impact of three key factors: time, nanoparticle concentration, and pH in the culture medium. RSM, a statistical technique, enabled the simultaneous evaluation and optimization of multiple variables, providing a comprehensive understanding of their interactions.These significant findings highlight the effectiveness and feasibility of the magnetic nanoparticle-based harvesting method [3]. Moreover, the utilization of municipal wastewater as a cultivation medium offers significant advantages in terms of cost-effectiveness and sustainability. The use of magnetic nanoparticles and the application of RSM with CCD led to the optimization of harvesting conditions for native microalgae *Chlorella sorokiniana.pa91*. The achieved harvesting efficiency of 79% under the optimized conditions demonstrates the efficacy of the magnetic nanoparticle-based method and sets the stage for economic and efficient microalgae harvesting techniques.

Keywords: **:** Fe_3O_4 nanoparticles, municipal wastewater, microalgae harvesting, RSM-CCD

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