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7. ABSTRACT This research delves into the evaluation and enhancement of a Fe ₃ O ₄ magnetic nanocomposite tailored for the effective removal of heavy metals from diverse aqueous solutions. The significance of this work lies in its direct application to environmental and industrial contexts, where heavy metal contamination poses a severe threat. The study scrutinizes the nanocomposite's resilience under various environmental conditions, encompassing shifts in pH levels, ionic strengths, and temperature ranges, all of which are pivotal in real-world applications. Moreover, it delves into the fine-tuning of its characteristics, focusing on optimizing its heavy metal adsorption capacity and magnetic behavior for efficient post-capture separation. The culmination of this research holds great promise for addressing critical challenges in heavy metal remediation, offering a sustainable, efficient, and customizable solution with substantial benefits for environmental and human well-being.		Address of Applicant :"Dr V S Krishna Government Degree and PG College, Autonomous, VISAKHAPTNAM, Andhra Pradesh, India. Tel: 8919153232; Email: budiredla@gmail.com "
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