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Naturally formed iron oxide nanoparticles surpassing chemically synthesized counterpart: Toxicity studies

Abstract: Extensive anthropogenic tampering of environment has dragged the attention of researchers towards the mitigation measures in which a significant section is occupied by the nanomaterials. Designing of nanoparticles (NPs) by using chemical methods is very much prominent from the pioneering times of nanotechnology but in the current times green synthesis act as proficient and novel alternative for chemical synthesis. Herein we have compared the Fe₃O₄ Nps synthesised by using scraps of naturally corroded iron i.e. iron rust against Fe₃O₄ NPs synthesised by chemical precipitation method using NH₄OH templated with CTAB. They have been screened through multiassay approaches for revealing their mephitical stretch. The toxicity evaluation of well characterized Nps clearly demarcates the non-toxic nature of naturally derived Nps on bacterial population of *S. typhi*, *P. aeruginosa* and *E. coli* and fungal strain of *Laurilia taxodi*. The rust originated Nps surpasses its chemical counterpart as growth promoter for seeds of *Vigna radiata* and *Chlorella* sp. of algal species scrutinized via seed germination assay and algae paper disc method respectively. The findings of this piece of work reveal that on contrary to the chemical method, the naturally obtained NPs are environment- friendly, economically viable and non-toxic in nature. Such Nps should be highly promoted when their target application is the environment. Hence, this waste-to-wealth ideology should be promoted for maintaining waste and designing solutions for the medical industries in one go.

Keywords: Nanoparticles, Iron rust, Antioxidant, Anti-inflammatory