“Green” Nanoscale Zero-Valent Iron for remediation of soil contaminated with heavy metal

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Some industrial activities are prone to contaminate soils and groundwater through accumulation of high concentrations of a wide range of contaminants, which are a major risk to the health of millions of people worldwide [1]. The emergence of nanotechnology opened new horizons in the field of soil and water remediation, by providing new solutions either by its own action or as complementary to most conventional ones. One of nanotechnology based solutions rely on the synthesis of zero valent iron nanoparticles (nZVI), which has shown potential as an innovative and cost-effective remediation technology to some of the most challenging environmental clean-up problems [2]. The synthesis methods for the production of nanoparticles present some limitations, among which, can be mentioned stability problems and safety and environmental concerns related to the toxicity of sodium borohydride used as reductant, as observed in the chemical synthesis method. Therefore, other routes are being explored, which consist mainly in using green methods for the synthesis of nZVI, implying the choice of “greener” solvents and reducing agents or the utilization of appropriate capping agents [3]. The benefits of using extracts of natural products or wastes as reducing agent are twofold: its reduced toxicity and the valorization of wastes and natural products it allows.

The aim of the study is to present results of the use of nZVI obtained by most conventional chemical synthesis and green synthesis methods in the remediation of heavy metals in industrial contaminated soil. The study shows the efficiency of the “greener” methods in soil remediation and the contribution of these methods in the valorization of some industrial wastes, whose high antioxidant content allow the development of a more sustainable technology to soil remediation treatments.

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