ISSN: 1391-8796
Proceedings of
5th Ruhuna International Science & Technology Conference
University of Ruhuna, Matara, Sri Lanka
February 15, 2018

Synthesis of magnetic iron oxide nanoparticles using an aqueous extract of *Eichhornia crassipes* (Water Hyacinth)

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Iron nanoparticles have been extensively studied, synthesized and used in many applications due to its distinctive characteristics such as magnetic properties and biocompatibility. Conventional synthetic methods utilize toxic and potentially hazardous chemicals which lead to various biological and environmental risks. Thus, a green synthesis of iron oxide nanoparticles has explored to establish an eco-friendly, economical method, using an abundant plant species in Sri Lanka. Invasive plant *Eicchornia crassipes* (water hyacinth) is a good candidate towards developing a greener synthetic method due to the presence of sulfated polysaccharides that act as a strong reducing agent during the synthetic process. Phytochemical screening was carried out to identify the phytochemicals present in aqueous and methanolic extracts of the plant. Both extracts were rich in alkaloids, saponins, steroids and carbohydrates. Iron oxide nanoparticles were synthesized by aqueous extract of freeze-dried petiole parts of *Eicchornia crassipes* and 0.08 M $FeCl_3.6H_2O$ as the iron precursor. Sulfated polysaccharide coated, moderately stable and water-soluble iron oxide nanoparticles were obtained from the synthesis at 45 ^{0}C. Size of the nanoparticles was determined using a particle analyzer and the mean diameter of synthesized NPs is 50-120 nm and about 61% from the total population is below 100 nm. FTIR spectroscopic data of synthesized nanopatrticles supported the fact that nanoparticles are functionalized with negatively charged sulfated polysaccharides. It is further proved by the negative zeta potential value (-23.7 mV). PXRD analysis results showed that synthesized particles were amorphous in nature. Proper modifications of this greener method have a huge potential towards developing more efficient iron oxide nanoparticle synthetic method while adding value to invasive plant *Eicchornia crassipes.*

Keywords: green synthesis, iron oxide nanoparticles, *eicchornia crassipes*, *sulfated polysaccharides*

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