Abstract

The rapid, cost-effective, and environment-friendly synthesis of Iron Oxide nanoparticles is challenging for scientists. Though quick physical and chemical methods are expensive and produce toxic by-products that affect the environment badly. The IONPs synthesized by these methods are not suitable for biological applications. The biosynthesis of IONPs using plants and microorganisms is a cost-effective and sustainable alternative. In this study, the IONPs were synthesized using bacterial supernatant of ***Bacillus circulans.*** The nanoparticles were obtained in uniform size distribution and were spherical when observed through SEM. The average diameter of IONPs fabricated determined by using SEM was 18.37nm. The FT-IR, EDX and XRD analysis confirmed the formation of maghemite (γ-Fe_2O_3) nanoparticles. The crystallite size of as-synthesized IONPs was 13.84nm, determined by using XRD. The IONPs synthesized in this study were employed for antioxidant activity using DPPH and ABTS assays. The as-synthesized IONPs showed 39.44% ABTS radical cation inhibition whereas 35.44% DPPH percentage scavenging. The calcination of IONPs for 2 hours at 300°C caused the conversion to the hematite (α-Fe_2O_3) phase with a crystallite size of 23.18nm. The calcined IONPs showed slightly less antioxidant activity; 35.04% ABTS radical cation inhibition and 26.5% DPPH percentage scavenging. The IONPs synthesized in this study can be utilized in the photocatalytic degradation of organic dyes.