



Green and Eco-friendly Synthesis of Silver nanoparticles using Saffron Bulbs (*Crocus sativus* L.) Methanol Extract

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Abstract

The present investigation report on the green bio-synthesis of silver nano-particles (Ag NPs) using methanol crude extract of saffron bulbs (*Crocus sativus* L.). Ag NPs were characterized with the UV-Vis, FTIR, XRD and SEM. The results obtained by UV-Vis absorption spectroscopy indicated the presence of Ag NPs in the solution with maximum absorption at 425 nm. Ag NPs solution was stable for nearly 60 days with a little particle aggregation in reaction solution. The results of FTIR showed that the proteins bound to Ag NPs through free amine groups and cystein residues and stabilize the Ag NPs. The XRD-pattern indicated that the synthesized Ag NPs were crystalline (54 nm average diameter). In addition, synthesized Ag NPs showed effective antibacterial activity and 20 µg/ml Ag NPs were the minimal inhibitory concentration (MIC) against *E. coli*. Thus, these Ag NPs of saffron bulbs can be used to reduce the microbial load in medicine as well as industry.

Key words: Antibacterial Activity, Saffron Bulbs, Silver nanoparticles.

Introduction

Nowadays, development of a protocol to green, eco-friendly and low cost synthesis of nano-particles is required. Eco-friendly and low-cost methods for biological synthesis of nano-particles using microorganisms, enzymes and plant extracts were reported (Klaus et al., 1999; Shankar et al., 2003; Willner et al., 2006; Konishi and Uruga, 2007; Gutierrez et al., 2010; Das et al., 2014) while, bio-synthesis of nano-particles by using plant extracts is recommended compare to other biological processes due to elimination of the complicated microbial culture maintaining processes (Shankar et al., 2003). Some research were reported for green synthesis of nano-particles using extract or latex of *Psidium guajava* (Debadin and Someswar, 2016), *Pelargonium graveolens* (Shankar et al., 2003), *Rumex hymenosepalus* (Rodríguez-León et al., 2013), Aloe vera (Chandran et al., 2006), curcas (Bar et al., 2010) and *Strychnos potatorum* (Srikanth et al., 2015). In the present study, green bio-synthesis of silver nano-particles (Ag-NPs) using the methanol crude extract of saffron bulbs (*Crocus sativus*) was investigated.

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