Green Chemistry Approach Silver Nanoparticles Via SidarhombifoliaL. As Antibacterial Material

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Abstract--- *The recent development and implementation of biologically inspired experimental processes for the synthesis of green approach nanoparticles is an important branch of bionanotechnology. The green synthesis of silver nanoparticles (AgNPs) from aqueous solution of silver nitrate ($AgNO_3$) by usingSidarhombifoliaL.The fresh leaf extract as a reducing agent has been reported in the present study. UV-visible spectroscopy studies were carried out to assess the formation of $AgNO_3$ nanoparticles and Scanning Electron Microscopic (SEM) was used to characterize of the $AgNO_3$ nanoparticles. XRD and SEM image divulges that silver nanoparticles are quite polydispersed, the size range is 29.32 nm. The above silver nanoparticles were efficiently againsts to the human pathogens. This report added the value for the application of nanoparticles in nanomedicine and various human applications with the absence of adverse side effects and eco-friendly.*

Keywords--- *Silver Nanoparticles,Leaf Extract, XRD, SEM, Antibacterial Activity.*

I. INTRODUCTION

NANOTECHNOLOGY is expected to be the basis of many of the main technological innovations of the 21st century. Research and development in this field is growing rapidly throughout the world [1]. This emerging area of research interlaces various disciplines of science.The size, shape and surface morphology play a vital role in controlling the physical, chemical, optical and electronic properties of nanomaterials. Nanoparticles of noble metals are even used for the purification of water which is one of the essential enablers of life on earth [2].Nanoparticles are usually ≤100 nm in each spatial dimension and are commonly synthesized using top-down and bottom-up strategies [3]. In top-down approach, the bulk materials are gradually broken down to nanosized materials, whereas in bottomup approach, atoms or molecules are assembled to molecular structuresin nanometer range. Bottom-up approach is commonly used for chemical and biological synthesis of nanoparticles [4,5].

Silver has long been recognized as having inhibitory effect on microbes present in medical and industrial process [6]. The most important application of silver and silver nanoparticles is in medical industry such as topical ointments to prevent infection against burn and open wounds [7]. In this present work, we have demonstrated biosynthesis of AgNPs by reduction of aqueous silver nitrate ($AgNO_3$) using aqueous*Sidarhombifolia.* leaf extract. Additionally, we have also examined the antibacterial activity of these biosynthesized AgNPs since has been widely used as an antibacterial agent.

II. MATERIALS AND METHODS

A. *Plant material and preparation of the extract*

The fresh leaves of *Sidarhombifolia* were washed several times withultrapure water to remove the dust. Leaf extract used for the synthesiswas prepared from 25g of thoroughly washed leaves in 500mLErlenmayer flask and boiled with 250mL ultrapure water for20 min at 70°C. Filtered leaf extract was stored at −15°C for further use,being usable for 1 week.

B. *Synthesis of Silver Nanoparticles*

The aqueous solution of silver nitrate ($AgNO_3$) at concentration of 1mM was prepared to synthesize biomimetic silver nanoparticles from aqueous extract of*Sidarhombifolia*leaf. In details, 10 mL of aqueous solution at the concentration of 1mM silver nitrate solution was added to 0.5 mL of *Sidarhombifolia*aqueous leaf extract while stirring for reduction into silver ions and the reaction mixture was kept at room temperature for 24h. The formation of dark brown colour was observed after suitable incubation time at room temperature and

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