

Green Approach for Preparation and Characterization of Silver Nano Particles by using Citrus Limon

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ABSTRACT

In this study, simple approach was applied for synthesis of silver Nanoparticles using Citrus Limon fruit and leaf extract. Reduction of Ag^+ to Ag^0 was confirmed by the color change of solution from colorless to brown. Its formation was also confirmed by using UV-Visible spectroscopy by recording spectra at different intervals. In this work we develop a simple technique to synthesize $AgNO_3$ nanoparticles using Silver nitrate in aqueous solution. Among a variety of Nanoparticles, they have advantages because of their properties. This method is not only rapid and one step but eco-friendly, non-toxic also and an alternative conventional methods. It is also advantages for durable textile finish on cotton and silk fabrics. Remarkable antifungal activity has been observed in the treated fabrics as well as antifungal and antimicrobial activity.

Keywords: Silver Nanoparticles, Plant Extract, UV/Vis-Spectrophotometry.

I. INTRODUCTION

Nowadays, there is a growing need to develop eco-friendly processes, which do not use toxic chemicals in the synthesis protocols. Green synthesis approaches include biological and irradiation method which have advantages over other physical and chemical methods involving chemical agents associated with environmental toxicity. Selection of solvent and eco-friendly non-toxic reducing and stabilizing agents are the most important factors which must be considered in green generating of Nanoparticles.

We have synthesized silver Nanoparticles by using plant extracts of *Citrus Limon* which acts as catalysts. The main aim of this is to study an assay method for Synthesis and characterization of silver Nanoparticles and characterization using UV/Vis-Spectrophotometer and SEM techniques.

II. METHODS AND MATERIAL

Experimental Work

Preparation of Citrus Lemon Extract

The *Citrus Limon* leaves washed with deionised water to remove dust and finely cut into small pieces. The pieces of leaves were boiled in a 100 mL of deionised water for 30 minutes to digest it till 10 mL of water and allowed to cool. The cooled solution was filtered and stored in a refrigerator for 6 hours. It was filtered and used as a *Citrus Limon* extract solution.

Synthesis of Ag Nanoparticles

In the preparation of Ag Nanoparticles, $AgNO_3$ (0.1 N) was first dissolved in 25 ml of conductivity water and mixed with 25 ml of *Citrus Limon* extract solution under vigorous stirring by using magnetic stirrer at room temperature for 30 minutes. A grey precipitate was collected by filtration and washed with conductivity water several times, and finally dried at

100°C for 2 hours in an oven. The synthesized Ag Nanoparticles were characterized using UV/Vis-Spectrophotometer and scanning electron microscopy (SEM).

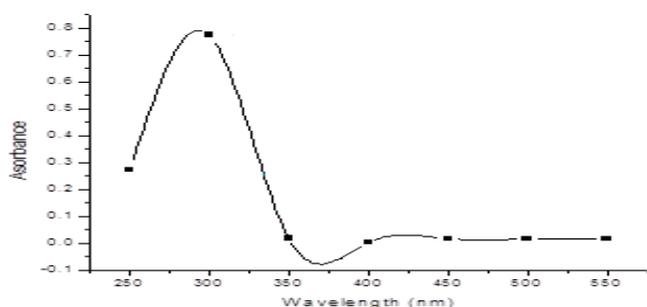
III. RESULTS AND DISCUSSION

UV/Visible Analysis of the reaction

The reduction of silver ions was characterized by measuring the UV-visible spectrum of the reaction medium at 3 h after diluting a small amount of the sample into conductivity. UV-visible spectral analysis was done by using UV/Vis spectrophotometer (SHUMADZU, UV-1800).

Table 1. Determination of λ_{\max} for Silver Nitrate solution

| Wavelength /nm | Absorbance |
|----------------|----------------|
| 250 | 0.27317 |
| 300 | 0.77479 |
| 350 | 0.01928 |
| 400 | 0.01693 |
| 450 | 0.01627 |
| 500 | 0.01547 |
| 550 | 0.01538 |
| 600 | 0.01552 |



Graph 1. Calibration curve of absorbance vs. wavelength for Silver nitrate solution by UV/VIS Spectrophotometry technique

SEM of Silver Nanoparticles

Scanning electron microscopy (SEM) provides size of the Nanoparticles which confirms the size of silver Nanoparticles. The average size of an individual particle is estimated to be 80 nm.

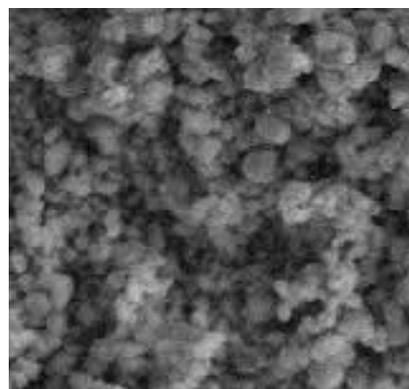


Figure 1

IV. CONCLUSION

We have successfully synthesized silver Nanoparticles. Biological methods are a new approach for synthesizing Nanoparticles using natural obtained plant extracts. These methods are accepted due to low cost and material availability.

V. REFERENCES

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