

BIOSYNTHESIS OF SILVER NANO PARTICLES USING PLANT EXTRACT

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ABSTRACT: In this study capability of plant extract such as *Allium cepa* and *Mentha piperita* for synthesis of silver nano particles was evaluated. Samples showed change in colour from almost pale yellow to brown, which indicate the formation of silver nanoparticles in the reaction mixture. The appearance of brown colour was due to the excitation of surface Plasmon vibrations, while control showed no colour change when incubated in the same condition. The highest absorbance was recorded 1.70 of *Allium cepa* and 1.84 of *Mentha piperita* at 413 nm wavelength.

Index Terms: Silver nanoparticles, biosynthesis of silver nano particles.

Introduction: Silver is most widely used metal in the world due to its metallic properties and Silver nanoparticles are the metal of choice as they hold the promise to kill microbe's effectively [16]. Chemical methods are the most popular approaches but they are often too expensive and can be toxic [6]. Nanoparticles can be formed in several different ways, while bio synthesis of nanoparticles provides advancement over chemical and physical methods as it is a cost effective and environmental friendly. The synthesis of metallic bio-nanoparticles of silver using a reduction of aqueous Ag⁺ ions with the culture supernatants of *Staphylococcus aureus*, the use of Geranium (*Pelargonium graveolens*) leaf extract in the extracellular synthesis of silver nanoparticles [14,13]. The synthesis of silver nanoparticles using Parthenium leaf extract was described [11]. The objective of this study was to synthesize of silver nanoparticle by an eco-friendly process which reduce cost and time.

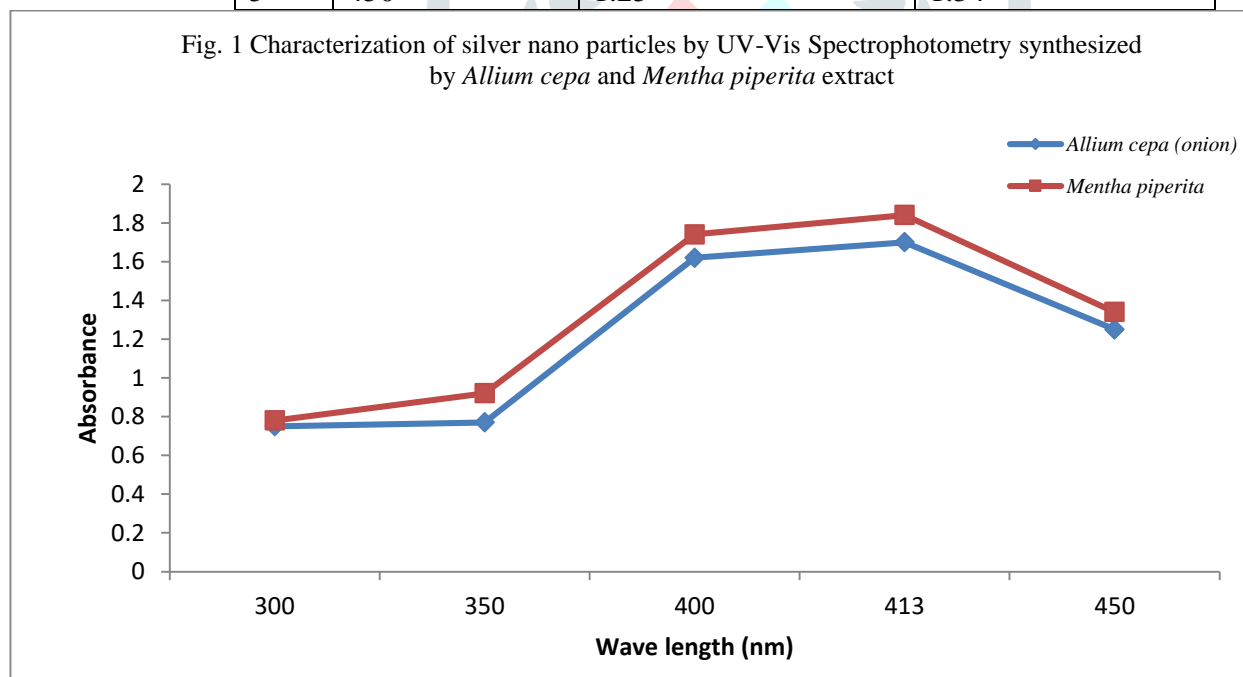
MATERIALS & METHODS:

- 1. *Allium cepa* (Onion) extract:** *Allium cepa* extract was prepared by taking 25 gm of thoroughly washed and finely crused onion mixed with 100 ml deionized water in flask and then boiling the mixture for 10 min before finally decanting it.
- 2. *Mentha piperita* leaves extract:** 25gm of *Mentha piperita* leaves were washed thoroughly with sterile distilled water and air dried. Leaves were finely cut and were boiled for 2min with 100 ml of sterile distilled water.
- 3. Silver Nitrate solution (AgNO₃):** For the reduction of Ag⁺ ions, 50 ml of 0.1 mM aqueous of AgNO₃ solution was prepared.
- 4. Synthesis of silver nano-particles:** Silver nitrate and *Allium cepa* extract was taken for the reduction of Ag⁺ ions, 5 ml of *Allium cepa* extract was mixed to 50 ml of 0.1 mM aqueous of AgNO₃ solution drop wise with constant stirring at 50-60 °C and observe the colour change. Same procedure was carried out for the synthesis of silver nano particles from *Mentha piperita* leaves extract. It was reported on treating aqueous silver nitrate solution with geranium leaf extract, rapid reduction of the silver ions is observed leading to the formation of highly stable, crystalline silver nanoparticles [13].
- 5. Characterization of silver nanoparticles by UV- visible spectrophotometer:** The absorption in the visible range directly affects the perceived colour of the chemicals involved, absorption UV- Visible light spectroscopy is used to follow up with the reaction process [17].The reduction of Ag⁺ ions was observed by measuring the UV-Vis spectra of the solution and all the observation were recorded in Table No. 1.

RESULT & DISCUSSION: The formation of silver nanoparticles by reduction of silver ions present in the aqueous solution and observed the colour change during exposure of *Allium cepa* extract and *Mentha piperita* extract was followed by UV –Vis spectroscopy analysis. The absorption spectrum of silver nanoparticles in the presence of *Allium cepa* extract and *Mentha piperita* is shown in Table No. 1. When the *Allium cepa* extract was mixed in the aqueous solution of the silver nitrate, it started to change colour from watery colour to yellowish brown and when *Mentha piperita* extract was mixed it started to change from pale yellow to yellowish brown, the change in colour clear indication of the formation of silver nanoparticles in the reaction mixture. The colour change observed was due to excitation of surface Plasmon vibrations in the silver nanoparticles [5,12]. One of the main advantages of reduction of silver ions into nanoparticles by using *Mentha piperita* leaf extract and *Allium cepa* extract was that; reduction occurs very fast as within 15 minute reaction becomes stable. Therefore it can be said that faster reduction process as compare to earlier studies [1,2 and 4] on the production of silver nanoparticles using microorganisms and plant extracts.

Table No. 1 Absorbance Spectra of *Allium cepa* and *Mentha piperita*

Sr. no	Wavelength(nm)	Absorbance	
		<i>Allium cepa</i> (onion)	<i>Mentha piperita</i>
1	300	0.75	0.78
2	350	0.77	0.92
3	400	1.62	1.74
4	413	1.70	1.84
5	450	1.25	1.34

Fig. 1 Characterization of silver nano particles by UV-Vis Spectrophotometry synthesized by *Allium cepa* and *Mentha piperita* extract

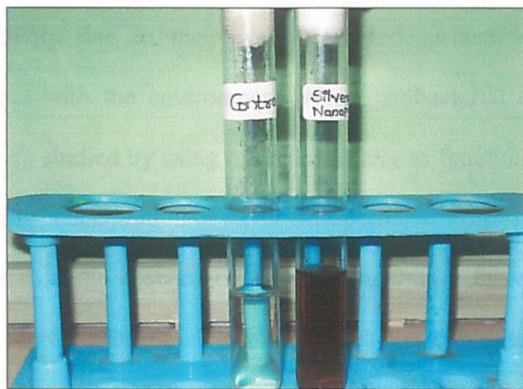


Photo plate 1 : Synthesis of Silver nanoparticles by *Allium cepa* extract

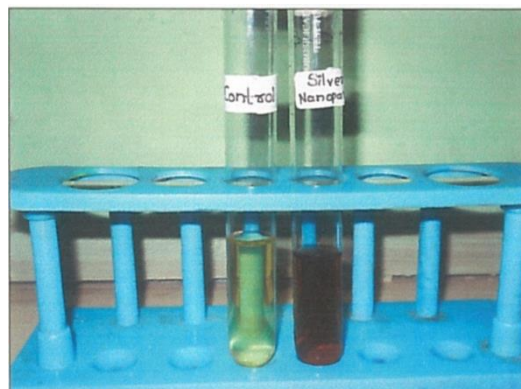


Photo plate 2 : Synthesis of Silver nanoparticles by *Mentha piperita* extract

CONCLUSION

From above study it is concluded that synthesis of silver nanoparticles reducing silver ions present in aqueous solution of silver nitrate complex by using the extract of *Mentha piperita* leaves and *Allium cepa* are comparatively faster and eco-friendly.

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