

Synthesis of Silver Nanoparticles using Tannic Acid and their Ultrasonic Study

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Abstract—Currently, variety of methods, such as physical, chemical and biological, has been employed for the synthesis of Ag-NPs. For chemical methods, different organic and inorganic reducing agents are used. These chemicals are usually hazardous chemicals and sometimes require energy inputs. So there is an increasing interest in producing NPs using green, i.e. environment friendly, methods. Recently, a polyphenolic plant extract, tannic acid has been used since it is an aggressive reducing agent and acts as stabilizer as well. Ag-NPs size can be controlled by molar ratio variation of tannic acid to AgNO_3 and these can be synthesized within a few minutes at room temperature. Aqueous solutions of silver nitrate and tannic acid are prepared separately. Solution of silver nitrate is prepared at six different molar concentrations (1×10^{-5} M/L to 1×10^{-4} M/L) in presence of Tannic Acid at a fixed concentration (1×10^{-4} M/L). In this way, size controlled Ag-NPs are synthesized using 'green' reducing agent tannic acid. Tannic acid at its natural acidic pH, is known to be a weak reducing agent that can only grow seeds into NPs at room temperature. The pH of tannic acid solution was adjusted at 8.0 prior to the addition of metal salt. The alkaline pH environment enhanced the reducing and stabilizing capacity of tannic acid allowing room temperature synthesis of Ag-NPs in few seconds. Stable colloidal dispersions were formed in all instances. Using the method of ultrasonication, the dispersion of the NPs in the base fluid is made uniform.