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Controlled biosynthesis of silver nanoparticles using sugar industry waste, and its antimicrobial activity

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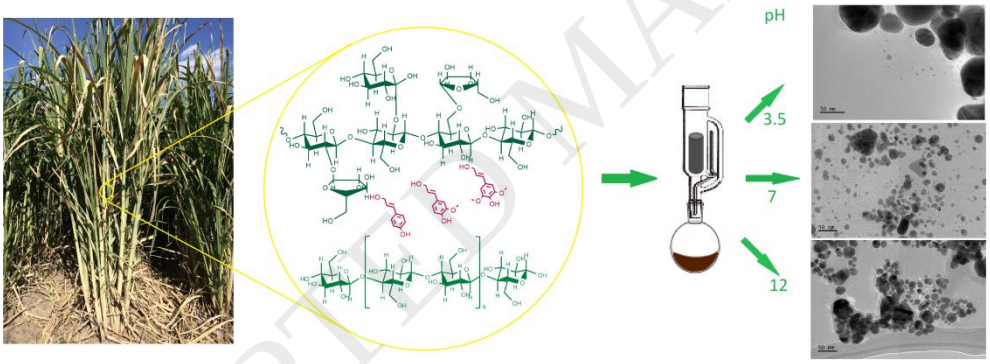
Graphical abstract



ABSTRACT

The synthesis of silver nanoparticles (AgNPs) using natural extracts is a process that has already been studied due to their excellent antimicrobial activity. However, in most cases, it has been found that the preparation of these nanoparticles leads to the formation of silver chloride (AgCl) as an undesirable side product, which is difficult to remove. In this paper, the AgNPs were prepared using the extract of the sugar industry waste, sugar cane bagasse, as a reducing and capping agent, by a soxhlet extraction system. It was observed that varying the pH of the reaction medium it was possible to avoid the formation of AgCl and in addition, the pH has an important role in controlling the particle size and dispersion. Uv-Vis absorption, FTIR, DRX, SEM, TEM and DLS techniques were used to characterize these particles. In addition, a good antimicrobial activity was observed when AgNPs were used against *Escherichia coli*, *Pseudomonas aeruginosa* (both Gram negative bacteria) and