

# **Chitosan nanoparticles included different doses of copper oxide nanoparticles produced by molasses: Investigating electrical conductance and antibacterial attributes**

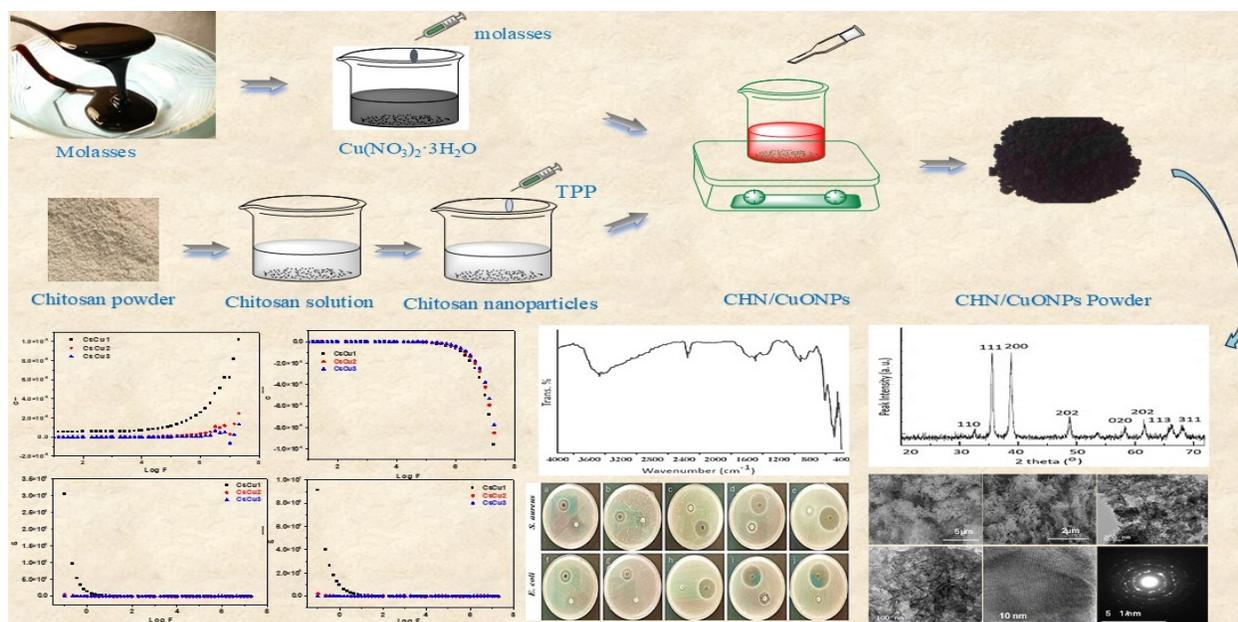
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## **Abstract**

This research explores an environmentally friendly approach for synthesizing copper oxide nanoparticles (CuONPs) using molasses, which is rich in carbohydrates, polyphenols, and other beneficial compounds. This method eliminates the need for harsh processing conditions. The CuONPs were integrated into ionotropic chitosan nanoparticles (CsNPs) at varying concentrations, demonstrating effective production of small, stable CuONPs. The findings highlight the crucial role of CsNPs in maintaining CuONPs stability, preventing their aggregation into larger particles. An analysis revealed that both the dielectric constant and dielectric loss decreased with increased frequency, while a clear correlation was established between CuONPs and improved electrical conductivity. Additionally, the CsNPs-CuONPs nanocomposite exhibited antimicrobial properties against *Escherichia coli* (*E.coli*) and *Staphylococcus aureus* (*S. aureus*), showcasing its potential for biomedical applications. This technique provides a sustainable method for producing CuONPs-infused CsNPs without the use of organic solvents, costly raw materials, or complex machinery. Overall, this approach is notable for its effectiveness, simplicity, versatility, and cost-effectiveness, offering a safe and environmentally benign way to generate nanoparticles without contamination risks.

**Keywords:** Copper oxide nanoparticles, chitosan nanoparticles, dielectric, conductivity, antibacterial.



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